```
.REM .
```

IDENTIFICATION

PRODUCT CODE: AC T616B MC

PRODUCT NAME: CxQNABO DEQNA DEC/X11 MODULE

PRODUCT DATE: APR 9, 1984

MAINTAINER: PSD

AUTHOR : STANLEY MAZURCZYK

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

1.0 OVERVIEW OF DIAGNOSTIC PRODUCT

1.1 PRODUCT DESCRIPTION

QNA OPTION MODULE (OPMOD) IS AN IOMODx TYPE MODULE WHICH EXERCISES ONE DEQNA MODULE AT MAXIMUM ACTIVITY RATES IN ORDER TO PROVOKE NOISE, TIMING AND LOGICAL INTERACTION FAILURES.

QNA OPMOD IS CALLED UPON TO TRANSMIT AND RECEIVE RANDOM LENGTH PACKETS UTILIZING 18 OR 22 BIT PHYSICAL ADDRESS SPACE. THE DEQNA TRANSMITS AND RECEIVES THE SAME PACKET (INTERNAL EXTENDED AND EXTERNAL LOOPBACK MODES MAKE THIS POSSIBLE). EACH TIME DEC/X11 PROGRAM IS RELOCATED, RECEIVE AND TRANSMIT PACKET POINTERS ARE UPDATED ACCORDINGLY.

DEQNA IS DROPPED FROM FURTHER TESTING IF ONE OF THE FOLLOWING CONDITIONS IS TRUE:

1 - DEQNA DOES NOT RESET PROPERLY.
2 - CSR AND/OR RECEIVE AND/OR TRANSMIT STATUS WORDS ARE SET INCORRECTLY.
3 - HARD ERROR OCCURS (ALL ERRORS ARE HARD ERRORS).
4 - NO TRANSMIT AND/OR RECEIVE INTERRUPT GENERATED
5 - TRANSCEIVER DISCONNECTED WHILE IN EXTERNAL LOOPBACK MODE.

DEQNA CAN BE CONFIGURED (USING SR1) TO OPERATE EITHER IN;

1 INTERNAL/EXTENTED LOOPBACK (DEFAULT)
2 - OR EXTERNAL LOOPBACK MODE.

SETTING BIT 1 IN THE SOFTWARE REGISTER 1 (SR1) INHIBITS ERROR MESSAGE PRINTING.

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2.0 PRODUCT GOALS

2.1 PERFORMANCE GOALS

THE QNA OPTION MODULE VERIFIES THAT THE DEQNA INDEED CAN COMMUNICATE IN AN INTERRUPT DRIVEN MODE WITH THE PROCESSOR. QNA OPMOD UTILIZES ONLY THE INTERNAL EXTENDED AND EXTERNAL LOOPBACK MODES.

2.2 COMPATIBILITY GOALS

THIS DIAGNOSTIC FOLLOWS DEC/X11 PROGRAMING STANDARDS AS OUTLINED IN THE "DEC/X11 MODULE PROGRAMER'S GUIDE".

QNA OPMOD RUNS ON PDP-11/23, LSI 11/23, AND PDP 11/73, Q-BUS MICROCOMPUTERS CAPABLE OF ADDRESSING 18 OR 22 BIT PHYSICAL ADDRESS SPACE.

2.3 FAILSOFT GOALS

IN BOTH, INTERNAL EXTENDED AND EXTERNAL LOOPBACK MODES UNFORMATTED DATA PATTERNS OF RANDOM LENGTH ARE SENT TO DEQNA.

2.4 RESTRICTIONS

IT IS ASSUMED THAT THE DEQNA CITIZENSHIP TESTS AND THE DEQNA FUNCTIONAL DIAGNOSTIC HAS RUN SUCCESSFULLY.

2.5 NON-GOALS

THE DIAGNOSTIC WILL NOT RUN THE QNA CITIZENSHIP TESTS NOR WILL THE TEST TURN OFF OR ON THE THREE LED'S ON THE BOARD.

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3.0 REQUIREMENTS

3.1 HARDWARE

PDP-11/23 SYSTEM WITH ONE DEQNA MODULE ON Q22-BUS.
MINIMUM OF 28K WORDS OF MEMORY
CONSOLE TERMINAL
ALSO, ONE OF THE FOLLOWING:
DEQNA BOARD TO BULKHEAD CABLE CONNECTED AND
BULKHEAD TO TRANSCEIVER TAP CABLE CONNECTED
(NORMAL ONLINE CONFIGURATION)
OR
DEQNA BOARD TO BULKHEAD CABLE CONNECTED AND
BULKHEAD TO FIELD SERVICE EXTERNAL LOOPBACK
CONNECTOR INSTALLED (OFFLINE CONFIGURATION)
OR
DEQNA BOARD TO BULKHEAD CABLE DISCONNECTED
(INTERNAL EXTENDED LOOPBACK)

4.0 PASS IDENTIFICATION

ONE PASS OF THE QNA OPMOD CONSISTS OF 1000 (DECIMAL) ITERATIONS OF TRANSMITTING, RECEIVING AND COMPARING THE CONTENTS OF TRANSMITED PACKET TO RECEIVED PACKET. PACKET LENGTH IS RANDOM EACH ITERATION.

STATUS WORDS OF THE TRANSMIT AND RECEIVE PACKET DESCRIPTOR LISTS AND THE DEQNA CSR STATUS WORD ARE CHECKED FOR CORRECT CONTENTS.

5.0 EXECUTION TIME

ONE PASS RUNNING ALONE (QNA OPMOD ONLY) ON THE PDP 11/23 TAKES APPROXIMATELY 30 SECONDS. IF OTHER DEVICES ARE CONFIGURED TO RUN SIMULTANEOUSLY WITH QNA, EXECUTION TIMES OF THESE OPMODS ARE ADDED TO GET AN APPROXIMATE EXECUTION TIME FOR THAT CONFIGURATION.

6.0 CONFIGURATION REQUIREMENTS

DEFAULT PARAMETERS:

DEVADR: 17774440, VECTOR: 700, BR1: 5, DEVCNT: 1

REQUIRED PARAMETERS:

NONE

7.0 DEVICE/OPTION SETUP

MAKE CERTAIN THAT THE DEQNA(S) ARE CONNECTED TO THE TRANSCEIVER OR

SEQ 0005

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THE FIELD SERVICE EXTERNAL LOOPBACK CONNECTOR (IF AVAILABLE) WHEN
RUNNING QNA OPMOD IN THE EXTERNAL LOOPBACK MODE ALSO, HOLDOFF TIMER
JUMPER IS REMOVED (AS SHIPPED) AND SANITY TIMER JUMPER IS IN PLACE
(AS SHIPPED).

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8.0 MODULE OPERATION

```
BEGIN TESTING
   INITIALIZE QNA OPMOD
   RESET DEQNA
   IF ( DEQNA NOT RESET )
      THEN
          PRINT ERROR MESSAGE
          DROP DEQNA FROM FURTHER TESTING
   END OF IF
   SELECT DEQNA MODE OF OPERATION (INTERNAL/EXTENDED LOOPBACK IS DEFAULT)
   REPEAT
      ALLOCATE MEMORY FOR WRITE PACKET
      GENERATE WRITE PACKET SIZE
      WHILE ( ITERATION COUNT ) <= 1000 DECIMAL DO
         SETUP TRANSMIT AND RECEIVE PACKET DESCRIPTOR LISTS
         SETUP DEQNA REGISTERS
         CHECK DEQNA FOR INITIAL CONDITIONS
         IF ( ERROR )
            THEN
                PRINT ERROR MESSAGE
                DROP DEQNA FROM FURTHER TESTING
         END OF IF
         ENABLE DEQNA INTERRUPT
         WAIT FOR TRANSMIT AND RECEIVE INTERRUPTS TO OCCUR
         IF ( INTERRUPTS DIDN'T OCCUR )
            THEN
                MONITOR DROPS DEQNA FROM FURTHER TESTING IN ABOUT 15 MIN.
            ELSE
                CHECK TRANSMIT AND RECEIVE STATUS REGISTERS FOR ERRORS
                IF ( ERROR )
                   THEN
                       PRINT ERROR MESSAGE
                       DROP DEQNA FROM FURTHER TESTING
                END OF IF
                COMPARE TRANSMIT AND RECEIVE PACKETS
                IF ( ERROR )
                   THEN
                       PRINT ERROR MESSAGE
                       DROP DEQNA FROM FURTHER TESTING
                END OF IF
         END OF IF
      END OF WHILE
   UNTIL ( CTRL C ENTERED )
END OF TESTING
```

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

9.0 OPERATION OPTIONS

SR1 BIT 0 CLEAR (0):
RUN IN INTERNAL/EXTENDED LOOPBACK MODE (DEFAULT) - NO H4000 NEEDED.

SR1 BIT 0 SET (1):
RUN IN EXTERNAL LOOPBACK MODE - H4000 OR LOOPBACK CONNECTOR REQUIRED.

SR1 BIT 1 SET (1):
INHIBIT ERROR PRINT OUT.

SR1 BIT 1 CLEAR (0):
PRINT ERROR MESSAGES.

TO SELECT EXTERNAL LOOPBACK MODE SET BIT 0 IN THE SR1. THE FOLLOWING SEQUENCE OF COMMANDS SELECTS THIS MODE OF OPERATION:

```
MOD QNABO 16    (CR)
1               (CR)
```

TO TEST DEQNA IN THE SECOND SLOT (17774460) ENTER THE FOLLOWING COMMANDS AFTER THE QNA OPTION MODULE HAS BEEN LOADED:

```
MOD QNABO 6     (CR)
174460          (LF)
704             (CR)
```

10.0 PRINTOUTS

A. ALL PRINTOUTS HAVE THE STANDARD FORMAT DESCRIBED IN THE DEC/X11 DOCUMENT.

B. ERROR MESSAGES DUMP THE CONTENTS OF THE DEQNA DESCRIPTOR RINGS IN THE FOLLOWING ORDER.

DEQNA ERROR MESSAGE

TRANSMIT DESCRIPTOR LIST

FLAG WORD
LOW ORDER ADDR BITS
HIGH ORDER ADDR BITS
PACKET LENGTH
STATUS WORD 1
STATUS WORD 2

RECEIVE DESCRIPTOR LIST

FLAG WORD
LOW ORDER ADDR BITS
HIGH ORDER ADDR BITS
PACKET LENGTH
STATUS WORD 1
STATUS WORD 2

DEQNA CSR REGISTER
DEQNA I/O PAGE ADDR

SEQ 0008

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'ERROR MESSAGE' = DEQNA WILL NOT RESET
= DEQNA - BAD DEQNA STATUS
= DEQNA - BAD RECEIVE STATUS
= DEQNA - BAD TRANSMIT STATUS
= DEQNA - XMIT PACKET LENGTH NOT = RCV PACKET LENGTH
= DEQNA - ATTEMPT TO ACCESS NON-EXISTANT MEMORY LOC.

TRANSMIT AND RECEIVE DESCRIPTOR LISTS ARE NOT PRINTED OUT WITH
'DEQNA WILL NOT RESET' ERROR MESSAGE.

11.0 GLOSSARY

1) STATION ADDRESS -- THIS IS A UNIQUE ADDRESS GIVEN FOR EACH ETHERNET DEVICE.

2) IOMODX -- THIS IS THE MODULE TYPE SUPPORTED BY DEC/X11 TO SUPPORT THE DEQNA DEVICE TYPE.

3) INTERNAL/EXTENDED LOOPBACK -- THIS DEQNA OPERATION MODE ALLOWS THE TRANSMITTED DATA TO RIPPLE THROUGH MOST OF THE DEQNA TRANSMIT LOGIC AND BACK TO THE RECEIVE FIFO.

3) EXTERNAL LOOPBACK -- THIS DEQNA OPERATION MODE ALLOWS THE TRANSMITTED DATA TO RIPPLE THROUGH THE DEQNA TRANSMIT LOGIC TO FIELD SERVICE EXTERNAL LOOPBACK CONNECTOR OR TRANSCEIVER AND BACK TO THE RECEIVE FIFO.

12.0 BIBLIOGRAPHY

1) 'QNA FUNCTIONAL & PROGRAMING SPECIFICATION'
KEITH AMUNDSEN 28-FEB-1983 REV 1.0

2) CXQUACO 'DEC/X11 USER'S MANUAL', JANUARY 1978

3) CXQADFO 'DEC/X11 PROGRAMER'S GUIDE', SEPTEMBER 1978

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

13. DEVICE REGISTERS

I/O PAGE CONFIGURATION DEFINITIONS...

STATION ADDRESS 0000 BIN 0 OCT — <07:00>READ ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP00	RESERVED								000	000	000	000	000	XXX		
									OCTAL PLACE							

STATION ADDRESS 0010 BIN 2 OCT — <07:00>READ ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP02	RESERVED								000	000	000	000	XXX	000		
									OCTAL PLACE							

STATION ADDRESS 0100 BIN 4 OCT — <07:00>READ ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP04	RESERVED								000	000	000	XXX	000	000		
									OCTAL PLACE							

STATION ADDRESS 0110 BIN 6 OCT — <07:00>READ ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP06	RESERVED								000	000	XXX	000	000	000		
									OCTAL PLACE							

STATION ADDRESS 1000 BIN 10 OCT — <07:00>READ ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP10	RESERVED								000	XXX	000	000	000	000		
									OCTAL PLACE							

STATION ADDRESS 1010 BIN 12 OCT — <07:00>READ ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP12	RESERVED								XXX	000	000	000	000	000		
									OCTAL PLACE							

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

RECEIVE BUFFER DESCRIPTOR LOW ADDRESS <15:00> WRITE ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP04																

RECEIVE BUFFER DESCRIPTOR HIGH ADDRESS <05:00> WRITE ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP06	RESERVED										A21	A20	A19	A18	A17	A16

TRANSMIT BUFFER DESCRIPTOR LOW ADDRESS <15:00> WRITE ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP10																

TRANSMIT BUFFER DESCRIPTOR HIGH ADDRESS <05:00> WRITE ONLY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP12	RESERVED										A21	A20	A19	A18	A17	A16

INTERRUPT VECTOR ADDRESS <09:02> READ/WRITE

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP14	RESERVED						A07	A06	A05	A04	A03	A02	A01	RESERVED		

CONTROL AND STATUS REGISTER (SEE BELOW)

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
IOP16	XIE	RDL	CAL	RDL	RDL	SEL	ELE	ILE	ILI	IEI	RDL	XTL	BDI	NIE	SR	RE

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```
;
;
; OFFSET
;          15  14  13  12  11  10   9   8   7   6   5   4   3   2   1   0
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCT.0   ) 1 ) 0 )   0->                                                  )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCT.1   ) 1 ) 0 ) 1 )     0->                       ) H. O. ADDRESS BITS    )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCT.2   )       LOW ORDER ADDRESS BITS
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCT.3   )       WORD COUNT                                               )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCT.4   )       STATUS WORD 1                                            )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCT.5   )       STATUS WORD 2                                            )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCT.6   )         0 >                                                    )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCT.7   ) 0->   ) 1 )  0->                                               )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCR.0   ) 1 ) 0 )       0->                                              )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCR.1   ) 1 ) 0 ) 1 )   0->                       ) H. O. ADDRESS BITS    )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCR.2   !       LOW ORDER ADDRESS BITS                                   )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCR.3   )       WORD COUNT                                               )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCR.4   )       STATUS WORD 1                                            )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCR.5   )       STATUS WORD 2                                            )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCR.6   )       0 >                                                      )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;DCR.7   ) 0->   ) 1 )   0->                                              )
;        +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
;
;
;--
```

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

BIT DEFINITIONS
****

BITS	FIELD	DESCRIPTION
0	RE	RECEIVER ENABLE
1	SR	SOFTWARE RESET
2	NI	NON-EXISTANT MEMORY
3	BD	BOOT/DIAGNOSTIC ROM
4	XL	TRANSMIT LIST VALID
5	RL	RECEIVE LIST VALID
6	IE	INTERRUPT ENABLE
7	RI	RECEIVE INTERRUPT REQUEST
8	IL	INTERNAL LOOPBACK MODE
9	EL	EXTERNAL LOOPBACK MODE
10	SE	SANITY TIMER
14,12,11	RR	RESERVED
13	CA	CARRIER
15	XI	TRANSMIT INTERRUPT REQUEST

DEC X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```
000000            IOMODX  <QNAB >,174440,700,5,0,0,1000.,,171,RECBUF,1024.,,1024.
000000            MODULE  150000,QNAB ,174440,700,5,0,0,1000.,,171,RECBUF,1024.,,1024.
                  .TITLE  QNAB DEC/X11 SYSTEM EXERCISER MODULE
                ;         DDXCOM  VERSION  6.4     28-JAN-82
                                  .LIST   BIN
                                  ;*****************************************************************************
000000                            BEGIN:
000000      121     116     101   MODNAM: .ASCII  /QNAB / ;MODULE NAME.
000003      102     040
000005      000                   XFLAG:  .BYTE   OPEN              ;USED TO KEEP TRACK OF WBUFF USAGE
000006   174440                   ADDR:   174440+0                  ;1ST DEVICE ADDR.
000010   000700                   VECTOR: 700+0                     ;1ST DEVICE VECTOR.
000012      240                   BR1:    .BYTE   PRTY5+0           ;1ST BR LEVEL.
000013      000                   BR2:    .BYTE   PRTY0+0           ;2ND BR LEVEL.
000014   000001                   DVID1:  0+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   150000                   STAT:   150000                    ;STATUS WORD.
000030   000434'                  INIT:   START                     ;MODULE START ADDR.
000032   000252'                  SPOINT: MODSP                     ;MODULE STACK POINTER.
000034   000000                   PASCNT: 0                         ;PASS COUNTER.
000036   001750                   ICONT:  1000.                     ;# OF ITERATIONS PER PASS*1000.
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   001064'                  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   000171                   IDNUM:  171                       ;MODULE IDENTIFICATION NUMBER=171
000124   005216'                  RBUFVA: RECBUF                    ;READ BUFFER VIRTUAL ADDRESS
000126   000000                   RBUFPA: OPEN                      ;READ BUFFER PHYSICAL ADDRESS
```

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```
000130  000000                  RBUFEA: OPEN                    ;READ BUFFER EA BITS
000132  002000                  RBUFSZ: 1024.                   ;SIZE OF THE READ BUFFER
000134  000000                  WBUFPA: OPEN                    ;WRITE BUFFER PHYSICAL ADDRESS
000136  000000                  WBUFEA: OPEN                    ;WRITE BUFFER EA BITS
000140  002000                  WBUFRQ: 1024.                   ;WRITE BUFFER SIZE REQUESTED
000142  000000                  WBUFSZ: OPEN                    ;WRITE BUFFER SIZE AVAILABLE
000144  000000                  CDERCT: OPEN                    ;CDATA/DATCK ERROR COUNT
000146  000000                  CDWDCT: OPEN                    ;CDATA/DATCK WORD COUNT
000150  000000                  FREE:   OPEN                    ;RESERVED FOR FUTURE USE
        000040                          .REPT   SPSIZ           ;MODULE STACK STARTS HERE.
                                        .NLIST
                                        .WORD   0
                                        .LIST
                                        .ENDR
000252                          MODSP:
                                ;*******************************************************************************
```

```
                        ;*****************************************************************
                        ;
                        ;               IOP16 / CSR BIT DEFINITIONS...
                        ;
                        ;---
                        ;
100000                  RI=     BIT15           ; RECEIVE INTERRUPT REQUEST     READ/WRITE 1
040000                  NA14=   BIT14           ; RESERVED
020000                  CA=     BIT13           ; ETHERNET CARRIER SENSE        READ ONLY
010000                  XC=     BIT12           ; TRANSCEIVER POWERED           READ ONLY
004000                  NA11=   BIT11           ; RESERVED
002000                  SE=     BIT10           ; SANITY TIMER ENABLE           READ/WRITE
001000                  EL=     BIT9            ; EXTERNAL LOOPBACK ENABLE      READ/WRITE
000400                  IL=     BIT8            ; INTERNAL LOOPBACK DISABLE     READ/WRITE
000200                  XI=     BIT7            ; TRANSMIT INTERRUPT REQUEST    READ/WRITE 1
000100                  IE=     BIT6            ; DEVICE INTERRUPT ENABLE       READ/WRITE
000040                  RL=     BIT5            ; RECEIVE LIST INVALID          READ ONLY
000020                  XL=     BIT4            ; TRANSMIT LIST INVALID         READ ONLY
000010                  BD=     BIT3            ; BOOT/DIAGNOSTIC READ ENABLE   READ/WRITE
000004                  NI=     BIT2            ; NON-EXISTANT MEMORY ACCESS    READ ONLY
000002                  SR=     BIT1            ; SOFTWARE RESET                READ/WRITE
000001                  RE=     BIT0            ; RECEIVER ENABLE               READ/WRITE
044000                  CSRM=   NA14!NA11       ; MASK FOR UNUSED CSR BITS
110301                  CSRSAT= RI!XC!RE!XI!IE!XI ; CSR ERROR STATUS
                        ;
                        ;*****************************************************************
                        ;
                        ;       OFFSETS TO DESCRIPTOR WORD BUFFER FOR TRANSMIT AND RECEIVE
                        ;
                        ;---
                        ;
                        ;       TRANSMIT DESCRIPTOR
                        ;       -------------------
                        ;
000000                  DCT.0=  ^D0             ; FLAG WORD TRANSMIT
000002                  DCT.1=  ^D2             ; DESCRIPTOR BITS AND HIGH ORDER ADDRESS
000004                  DCT.2=  ^D4             ; LOW ORDER ADDRESS BITS
000006                  DCT.3=  ^D6             ; DATA BUFFER WORD SIZE
000010                  DCT.4=  ^D8             ; STATUS WORD 1
000012                  DCT.5=  ^D10            ; STATUS WORD 2
000014                  DCT.6=  ^D12            ; FLAG (END OF DESCRIPTOR)
000016                  DCT.7=  ^D14            ; INVALID DESCRIPTOR
                        ;
                        ;       RECEIVE DESCRIPTOR
                        ;       ------------------
                        ;
000020                  DCR.0=  ^D16            ; FLAG WORD
000022                  DCR.1=  ^D18            ; DESCRIPTOR BITS AND HIGH ORDER ADDRESS
000024                  DCR.2=  ^D20            ; LOW ORDER ADDRESS BITS
000026                  DCR.3=  ^D22            ; DATA BUFFER WORD SIZE
000030                  DCR.4=  ^D24            ; STATUS WORD 1
000032                  DCR.5=  ^D26            ; STATUS WORD 2
000034                  DCR.6=  ^D28            ; FLAG WORD (END OF DESCRIPTOR
000036                  DCR.7=  ^D30            ; INVALID DESCRIPTOR
```

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```
                        ;*****************************************************************
                        ;
                        ;       CONSTANT DESCRIPTOR VALUES
                        ;
                        ;---
                        ;
100000                  V=      BIT15                   ; VALID ADDRESS BIT
040000                  C=      BIT14                   ; CHAIN ADDRESS BIT
020000                  E=      BIT13                   ; END OF MESSAGE BIT
010000                  S=      BIT12                   ; SET UP MODE PACKET
                        ;
                        ;*****************************************************************
                        ;
                        ;       STATUS BIT DESCRIPTORS
                        ;
                        ;---
                        ;
                        ;       STATUS WORD 1 (DCT,4 AND DCR,4)
                        ;
040000                  ERRSU=  BIT14                   ; ERROR SUMMARY
                        ;
                        ;*****************************************************************
                        ;
                        ;       DEQNA STATUS WORD EQUATES
                        ;
                        ;---
044000                  S.QNA1  =044000                 ; DEQNA MASK
020017                  S.XMT1  =020017                 ; TRANSMIT STATUS WORD 1 MASK
140000                  S.XMT2  =140000                 ; TRANSMIT STATUS WORD 2 MASK
000360                  S.RCV1  =000360                 ; RECEIVE  STATUS WORD 1 MASK
177400                  S.RCV2  =177400                 ; RECEIVE  STATUS WORD 2 MASK
174377                  S.RCV3  =174377                 ; RECEIVE  STATUS WORD MASK
                        ;
000144                  LCOUNT  =+D100                  ; TIME OUT COUNT
```

```
603
605                                     R.ADR'Y:        .BLKB   6
606                                                     .BYTE   0
607                                     .ENDM
     000252                             R.ADR1: .BLKB   6
     000260     000                                     .BYTE   0
     000261                             R.ADR2: .BLKB   6
     000267     000                                     .BYTE   0
     000270                             R.ADR3: .BLKB   6
     000276     000                                     .BYTE   0
     000277                             R.ADR4: .BLKB   6
     000305     000                                     .BYTE   0
     000306                             R.ADR5: .BLKB   6
     000314     000                                     .BYTE   0
     000315                             R.ADR6: .BLKB   6
     000323     000                                     .BYTE   0
608                                                     .EVEN
609
610
612                                     T.ADR'X:        .BLKB   6
613                                                     .BYTE   0
614                                     .ENDM
     000324                             T.ADR1: .BLKB   6
     000332     000                                     .BYTE   0
     000333                             T.ADR2: .BLKB   6
     000341     000                                     .BYTE   0
     000342                             T.ADR3: .BLKB   6
     000350     000                                     .BYTE   0
     000351                             T.ADR4: .BLKB   6
     000357     000                                     .BYTE   0
     000360                             T.ADR5: .BLKB   6
     000366     000                                     .BYTE   0
     000367                             T.ADR6: .BLKB   6
     000375     000                                     .BYTE   0
615                                                     .EVEN
616
617
618
619 000376                             IO.CSR:         .BLKB   6
620 000404     000                                     .BYTE   0
621
622 000405                             IO.ADR:         .BLKB   6
623 000413     000                                     .BYTE   0
624                                                     .EVEN
625
626 000414                             WRTBUF:         .BLKB   ^D16            ; PHYSICAL STATION ADDRESS
```

```
                                        ;*
                                        ;
                                        ;       DEQNA DEC/X11 OPTION MODULE EXECUTABLE CODE STARTS HERE
                                        ;
                                        ;-
000434  016700  177346          START:  MOV     ADDR,R0                 ; ADDRESS TO BE TESTED TO R0
000440  004767  000032                  JSR     PC,ADRCHK
000444  000401                          BR      ERCODE                  ; ADDRESS IS NON-EXISTENT
000446  000443                          BR      GOSTRT                  ; GO RUN PROGRAM

000450  004767  002714          ERCODE: JSR     PC,CSROTA               ; OCT TO ASCII CONVERSION
000454  104402  000000' 005142'        MSGS$,BEGIN,NOQNA       ; ASCII MESSAGE CALL WITH NO HEADER
000462  012767  177777  177344        MOV     #-1,PASCNT              ; TELL UFD MONITOR THAT IT'S OK
000470  104410  000000'                END$,BEGIN              ;
000474  000000                        HALT                            ; SHOULD NEVER GET HERE

000476  000240                  ADRCHK: NOP
                                        ;*
                                        ;       SAVE CURRENT CONTENTS OF LOC. 4 AND 114 ON STACK
                                        ;-
000500  013746  000004                  MOV     @#4,-(SP)
000504  013746  000114                  MOV     @#114,-(SP)
                                        ;*
                                        ;       LOAD LOC. 4 AND 114 WITH THE TEMPORARY NON-EXISTENT
                                        ;       MEMORY TRAP ROUTINE AT LABEL 1$
                                        ;-
000510  012737  000550' 000004          MOV     #1$,@#4
000516  012737  000550' 000114          MOV     #1$,@#114
                                        ;*
                                        ;       CHECK TO SEE IF ADDRESS IS A VALID ADDRESS
                                        ;-
000524  062710  000000                  ADD     #0,(R0)
                                        ;*
                                        ;       IF WE GET HERE, THEN NO TRAP TOOK PLACE AND THE ADDR IS O.K.
                                        ;       RESTORE LOC. 4 & 114, AND RETURN NO ERROR BY BUMPING RETURN ADDR.
                                        ;-
000530  062766  000002  000004          ADD     #2,4(SP)        ;BUMP RTN ADDR FOR "GOOD RTN"
000536  012637  000114          2$:     MOV     (SP)+,@#114
000542  012637  000004                  MOV     (SP)+,@#4
000546  000207                          RTS     PC
                                        ;*
                                        ; NON-EXISTENT MEMORY TRAP TOOK PLACE, THEREFORE ADDRESS TESTED WAS
                                        ; ILLEGAL, REPLACE RETURN ADDRESS ON STACK WITH 2$ AND DO A RTI WHICH
                                        ; WILL SEND YOU TO 2$.  DO NOT BUMP RETURN ADDR, GO DIRECTLY TO PC+2
                                        ;-
000550  012716  000536'          1$:     MOV     #2$,(SP)
000554  000002                          RTI
```

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```
                                ;*
                                ; RESET THE DEVICE UNDER TEST
                                ;-
000664  004767  001130                  JSR     PC,RESET        ; GO RESET THE DEVICE
000670  017701  002560                  MOV     @IOP16,R1       ; SEE HOW IT DID
000674  042701  074000                  BIC     #XC!CSRM!CA,R1  ; GET RID OF CSR NOISE BITS
000700  022701  000060                  CMP     #XL!RL,R1       ; GET FINAL RESET STATUS
000704  001412                          BEQ     5$              ; ALL AS EXPECTED BRANCH
000706  104403  000000'  005110'        MSGN$,BEGIN,RESTER      ;ASCII MESSAGE CALL WITH COMMON HEADER
000714  004767  002450                  JSR     PC,CSROTA       ; OCTAL TO ASCII CONVERTION
000720  104402  000000'  005126'        MSGS$,BEGIN,NOREST      ; ASCII MESSAGE CALL WITH NO HEADER
000726  000167  001120                  JMP     DROP            ; DROP THE DEVICE
000732  016777  177052  002512  5$:     MOV     VECTOR,@IOP14   ; SET FLOATING VECTOR ADDRESS

                                ;*
                                ;       FINISH SETTING UP THE DEQNA AND DO THE SET UP MODE XFER
                                ;-
000740  032767  000001  177050          BIT     #BIT0,SR1               ; WHICH LOOPBACK MODE DO WE WANT ?
000746  001440                          BEQ     15$                     ; BRANCH IF 0 EXTERNAL LOOPBACK
000750  012767  001400  002524          MOV     #EL!IL,QMODE            ; SET EXTERNAL LOOPBACK MODE
000756  012767  001500  002520          MOV     #EL!IL!IE,QMODE1        ; DEQNA MODE AND INTERRUPT ENABLE

                                ;*
                                ; GET DEQNA'S PHYSICAL STATION ADDRESS AND SAVE IT
                                ;-
000764  012704  000414'                 MOV     #WRTBUF,R4              ; WRITE BUFFER BASE ADDR
000770  012705  000006                  MOV     #6,R5                   ; STATION ADR BYTE COUNT
000774  016703  177006                  MOV     ADDR,R3                 ; I/O PAGE BASE ADR
```

```
;730 001000  012300                  1$:     MOV     (R3)+,R0                ; COPY STATION ADR BYTE AS WORD
;731 001002  110014                          MOVB    R0,(R4)                 ; SAVE DESTINATION ADR
;732 001004  110064  000006                  MOVB    R0,6(R4)                ; SAVE SOURCE ADR
;733 001010  005204                          INC     R4
;734 001012  005305                          DEC     R5                      ;
;735 001014  001371                          BNE     1$                      ; DO FOR ALL BYTES IN STATION ADR
;736
;737 001016  062704  000006                  ADD     #6,R4                   ; POINTER TO SOURCE ADR
;738 001022  112714  000220                  MOVB    #220,(R4)               ; LOOPBACK PACKET INDICATOR
;739 001026  105064  000001                  CLRB    1(R4)                   ; SKIP COUNT INDICATOR
;740 001032  112764  000001  000002          MOVB    #1,2(R4)                ;
;741 001040  112764  000377  000003          MOVB    #377,3(R4)              ; END OF PREAMBLE FOR XMIT PACKET
;742 001046  000406                          BR      RESTRT                  ; GO DO THE XFER
;743 001050  012767  001000  002424  15$:     MOV     #EL,QMODE               ; SET INTERNAL/EXTENDED LOOPBACK
;744 001056  012767  001100  002420          MOV     #EL!IE,QMODE1           ; DEQNA MODE AND INTERRUPT ENABLE
;745                                 ;*
;746                                 ;       RE-START CODE IS INVOKED EACH TIME RELOCATION TAKES PLACE
;747                                 ;-
;748
;749 001064  012767  002000  177040  RESTRT: MOV     #^D1024,RBUFSZ          ; READ BUFFER SIZE
;750 001072  012767  002000  177040          MOV     #^D1024,WBUFRQ          ; WRITE BUFFER REQUEST SIZE
;751 001100  104414  000000'                 GWBUF$, BEGIN           ;GET WRITE BUFFER INFORMATION
;752 001104  004767  001206                  JSR     PC,ADRGEN               ; GENERATE PHYSICAL ADDRESS
;753
;754 001110  000240                  LOOP:   NOP                             ;
;755 001112  104417  000000'                 RAND$,BEGIN
;756 001116  016767  176732  002354          MOV     RANNUM,BUFSZ            ; SAVE IT
;757 001124  104407  000000'                 BREAK$,BEGIN            ;TEMPORARY RETURN TO MONITOR....
;    001130  104407  000000'                 BREAK$,BEGIN            ;THEN CONTINUE AT NEXT INSTRUCTION.
;758 001134  042767  177001  002336          BIC     #^C776,BUFSZ            ; MAKE THE NUMBER LESS THAN 1024 BYTES
;759 001142  026767  002332  176772          CMP     BUFSZ,WBUFSZ            ;   AND EVEN
;760 001150  100357                          BPL     LOOP                    ; DO IT AGAIN IF TO BIG
;761 001152  026727  002322  000100          CMP     BUFSZ,#^D64             ; CHECK FOR TO SMALL A LENGTH
;762 001160  103753                          BLO     LOOP                    ; GET ANOTHER NUMBER IF LESS THAN 64
;763 001162  012767  000000  002242          MOV     #0,ABTCNT               ; NO ABORTS AT THIS POINT
;764 001170  012767  000000  002236          MOV     #0,COLCNT               ; NO COLLISIONS AT THIS POINT
;765
;766 001176  016777  002300  002250  TRYAGN: MOV     QMODE,@IOP16            ; SET DEQNA MODE OF OPERATION
;767 001204  004767  000660                  JSR     PC,SETUP                ; GO SETUP THE DESCRIPTOR BUFFER
;768 001210  012767  000144  002212          MOV     #LCOUNT,TM.OUT          ; SET UP TIMEOUT COUNT
;769
;770 001216  016777  002264  002216          MOV     L022.R,@IOP04           ; MOVE IN THE LOW ORDER BITS RECEIVE
;771 001224  016777  002260  002212          MOV     HI22.R,@IOP06           ; MOVE IN THE HIGH ORDER BITS RECWEIVE
;772
;773 001232  016777  002254  002206          MOV     L022.T,@IOP10           ; MOVE IN LOW ADDRESS BITS
;774 001240  016777  002250  002202          MOV     HI22.T,@IOP12           ; MOVE IN HIGH ADDRESS BITS
;775 001246  004767  000252                  JSR     PC,ICONDT               ; DO INITIAL CONDITION TEST
;776 001252  016777  002226  002174          MOV     QMODE1,@IOP16           ; ENABLE DEQNA INTERRUPT
;777 001260  104400  000000'                 EXIT$,BEGIN                     ;EXIT TO MONITOR, MODULE WAIT FOR INTERRUPT.
;778
```

```
                                        ;*
                                        ;       DEQNA INTERRUPT SERVICE ROUTINE
                                        ;*
                                        ;
001264  032777  100000  002162  INTSRV: BIT     #RI,@IOP16              ; SEE IF WE WERE HERE BEFORE
001272  001013                          BNE     10$                     ; BRANCH IF WE ALLREADY HAD 1 INTERUPT
001274  104407  000000'                 BREAK$,BEGIN            ;TEMPORARY RETURN TO MONITOR....
001300  104407  000000'                 BREAK$,BEGIN            ;THEN CONTINUE AT NEXT INSTRUCTION.
001304  005367  002120                  DEC     TM.OUT                  ; COUNT DOWN
001310  022767  000000  002112          CMP     #0,TM.OUT               ; IF ZERO WE HAD A TIME OUT
001316  001401                          BEQ     10$                     ; BRANCH IF TIME OUT
001320  000761                          BR      INTSRV                  ; WAIT FOR BOTH INTERUPTS
001322  032777  000004  002124  10$:    BIT     #NI,@IOP16              ; NON-EXIST MEMORY ACCESS BIT SET ?
001330  001415                          BEQ     11$                     ; BRANCH IF NOT SET
001332  032767  000002  176456          BIT     #BIT1,SR1               ; PRINTING INHIBITTED ?
001340  001067                          BNE     30$                     ; BRANCH IF INHIBITTED
001342  104403  000000' 005102'         MSGN$,BEGIN,NIEROR      ;ASCII MESSAGE CALL WITH COMMON HEADER
001350  004767  001620                  JSR     PC,PDECS                ; CONVERT TO ASCII
001354  104402  000000' 004754'         MSGS$,BEGIN,D.LIST      ; ASCII MESSAGE CALL WITH NO HEADER
001362  000456                          BR      30$                     ;
001364  012777  100300  002062  11$:    MOV     #IE!RI!XI,@IOP16        ; CLEAR RECEIVE AND XMIT INTERUPTS
                                        ;-----------------------------------------------------------------
001372  000004  000000' 001400'         PIRQ$,BEGIN,12$         ; QUEUE UP TO CONTINUE AT 12$ AND RTI
                                        ;-----------------------------------------------------------------
001400  022767  000000  002022  12$:    CMP     #0,TM.OUT               ; CHECK FOR TIME OUT
001406  001015                          BNE     15$                     ; BRANCH IF OK
001410  032767  000002  176400          BIT     #BIT1,SR1               ; CHECK FOR ERROR PRINT OUT
001416  001040                          BNE     30$                     ; BRANCH IF NOT SET
001420  104403  000000' 005052'         MSGN$,BEGIN,BADQNA      ;ASCII MESSAGE CALL WITH COMMON HEADER
001426  004767  001542                  JSR     PC,PDECS                ; PRINT XMIT AND RCV DESCRIPTORS
001432  104402  000000' 004754'         MSGS$,BEGIN,D.LIST      ; ASCII MESSAGE CALL WITH NO HEADER
001440  000427                          BR      30$                     ; DON'T CKECK ANY MORE
001442  004767  001330          15$:    JSR     PC,ERRCK                ; GO CHECK FOR ERRORS IN STATUS
001446  016700  176470                  MOV     WBUFSZ,R0               ;
001452  010046                          MOV     R0,-(SP)                ; SAVE OLD WRITE BUFFER SIZE
001454  016700  002020                  MOV     BUFSZ,R0                ; WRITE CURRENTLY REQUESTED BUFFER SIZE
001460  010067  176446                  MOV     R0,RBUFSZ               ;   INTO RECEIVE BUFFER SIZE WORD,
001464  010067  176450                  MOV     R0,WBUFRQ               ;   WRITE BUFFER REQUEST WORD, AND
001470  010067  176446                  MOV     R0,WBUFSZ               ;   WRITE BUFFER SIZE WORD
001474  104412  000000' 000126'         CDATA$,BEGIN,RBUFPA     ; REQUEST FOR MONITOR TO CHECK DATA
001502  001504'                         .+2                     ; IF ERROR, CONTINUE
001504  012667  176432                  MOV     (SP)+,WBUFSZ            ; RESTORE OLD WRITE BUFFER SIZE
001510                          25$:
001510  104413  000000'                 ENDIT$,BEGIN            ;SIGNAL END OF ITERATION.
                                                                ;MONITOR SHALL TEST END OF PASS
001514  000167  177370                  JMP     LOOP                    ; GO DO ANOTHER XFER
001520  000167  000326          30$:    JMP     DROP                    ; DROP DEQNA
```

```
                                        ;+
                                        ;       CHECK CSR, TRANSMIT AND RECEIVE STATUS REGISTERS FOR INITIAL
                                        ;       CONDITIONS RIGHT AFTER THE RESET
                                        ;-

001524  012703  000100          ICONDT: MOV     #100,R3                 ;
001530  104407  000000'                  BREAK$,BEGIN            ;TEMPORARY RETURN TO MONITOR....
001534  104407  000000'                  BREAK$,BEGIN            ;THEN CONTINUE AT NEXT INSTRUCTION.
001540  012701  005156'                  MOV     #COMBUF,R1              ; GET DESCRIPTOR ADDRESS
001544  032761  001000  000010  2$:      BIT     #BIT9,DCT.4(R1)         ; MORE THAN 15 COLLISIONS
001552  001026                          BNE     3$                      ; BRANCH IF YES

001554  017702  001674                  MOV     @IOP16,R2               ; GET DEQNA CSR
001560  042702  077577                  BIC     #^C100200,R2            ; LEAVE XI AND RI BITS
001564  022702  100200                  CMP     #100200,R2              ; ARE THEY BOTH SET
001570  001451                          BEQ     5$                      ; BRANCH IF BOTH SET

001572  077314                          SOB     R3,2$                   ;

001574  032767  000400  001700          BIT     #IL,QMODE               ; IS THIS INTERNAL/EXTENDED MODE
001502  001434                          BEQ     6$                      ; BRANCH IF YES

001604  005267  001624                  INC     COLCNT                  ; INCREMENT COLLISION COUNT
001610  022767  000016  001616          CMP     #16.,COLCNT             ; 16 COLLISIONS IN A ROW ?
001616  001416                          BEQ     4$                      ; BRANCH IF YES
001620  004767  000174                  JSR     PC,RESET                ;
001624  000167  177346                  JMP     TRYAGN                  ; TRY TO TRANSMIT AGAIN

001630  005267  001576          3$:     INC     ABTCNT                  ; INCREMENT ABORT COUNT
001634  022767  000003  001570          CMP     #3,ABTCNT               ; THREE ABORTS IN A ROW ?
001642  001404                          BEQ     4$                      ; BRANCH IF YES
001644  004767  000150                  JSR     PC,RESET                ;
001650  000167  177322                  JMP     TRYAGN                  ; TRY TO TRANSMIT AGAIN

001654  032767  000002  176134  4$:     BIT     #BIT1,SR1               ; PRINTING INHIBITED
001662  001054                          BNE     20$                     ; BRANCH IF YES
001664  104402  000000' 005150'          MSGS$,BEGIN,COLLS       ; ASCII MESSAGE CALL WITH NO HEADER
001672  000443                          BR      15$                     ;

001674  032767  000002  176114  6$:     BIT     #BIT1,SR1               ; PRINTING INHIBITED
001702  001044                          BNE     20$                     ; BRANCH IF YES
001704  104402  000000' 005116'          MSGS$,BEGIN,NORIXI      ; ASCII MESSAGE CALL WITH NO HEADER
001712  000433                          BR      15$                     ;

001714  012701  005156'          5$:     MOV     #COMBUF,R1              ; GET THE DESCRIPTOR ADDRESS
001720  032761  040000  000010          BIT     #ERRSU,DCT.4(R1)        ; CHECH THE XMIT STATUS
001726  001410                          BEQ     10$                     ; BRANCH IF OK
001730  032767  000002  176060  9$:     BIT     #BIT1,SR1               ; PRINTING INHIBITED
001736  001026                          BNE     20$                     ; BRANCH IF YES
001740  104402  000000' 005074'          MSGS$,BEGIN,BADXMT      ; ASCII MESSAGE CALL WITH NO HEADER
001746  000415                          BR      15$                     ; BRANCH TO ERROR

001750  032761  040000  000030  10$:    BIT     #ERRSU,DCR.4(R1)        ; CHECK THE RECEIVE STATUS
001756  001410                          BEQ     13$                     ; BRANCH IF OK
001760  032767  000002  176030  11$:    BIT     #BIT1,SR1               ; PRINTING INHIBITED
001766  001012                          BNE     20$                     ; BRANCH IF YES
001770  104402  000000' 005066'          MSGS$,BEGIN,BADRCV      ; ASCII MESSAGE CALL WITH NO HEADER
```

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```
    878 001776  000401                          BR      15$                     ;
    879 002000  000207                  13$:    RTS     PC
    880
    881 002002  004767  001166          15$:    JSR     PC,PDECS                ; PRINT DESCRIPTOR LISTS
    882 002006  104402  000000' 004754'          MSGS$ BEGIN,D.LIST      ; ASCII MESSAGE CALL WITH NO HEADER
    883 002014  000167  000032          20$:    JMP     DROP                    ; CAN'T DO ANY MORE
```

```
885                                     ;+
886                                     ;       RESET DEQNA AND DISABLE ALL INTERRUPS
887                                     ;-
888
889 002020  052777  000002  001426  RESET:  BIS     #SR,@IOP16              ; TELL DEQNA TO "GO RESET YOURSELF"!
890 002026  012700  000144                  MOV     #^D100,R0               ; SETUP A LOOP COUNT
891 002032  077001                  5$:     SOB     R0,5$                   ; WAIT 100 MILLSEC. FOR RESET
892 002034  012777  000000  001412          MOV     #0,@IOP16               ; CLEAR DEQNA CSR
893 002042  042777  000002  001404          BIC     #SR,@IOP16              ; STOP "RESETING YOURSELF"!
894 002050  000207                          RTS     PC                      ; GO HOME
895
896
897
898                                     ;+
899                                     ;
900                                     ;       DROP DEQNA MODULE FROM FURTHER TESTING
901                                     ;
902                                     ;-
903
904 002052  042777  000100  001374  DROP:   BIC     #IE,@IOP16              ; CLEAR THE INTERRUPTS
905 002060  004767  177734                  JSR     PC,RESET                ; RESET DEQNA
906 002064  104410  000000'                 END$,BEGIN              ;
907
908
909
```

```
                                        ;+
                                        ;       CLEAR DEQNA TRANSMIT AND RECEIVE DESCRIPTOR LISTS THEN
                                        ;       INITIALIZE THEM
                                        ;-

002070  012703  005156'        SETUP:  MOV     #COMBUF,R3                      ; GET COMMAND BUFFER ADDRESS
002074  012702  000020                  MOV     #^D16,R2                        ; CLEAR COMMAND BUFFER
002100  005023                  2$:     CLR     (R3)+                           ; CLEAR THE WORD
002102  077202                          SOB     R2,2$                           ; LOOP TILL ALL DONE
                                        ;+
                                        ;       SET UP XMIT DESCRIPTOR LIST
                                        ;-
002104  012703  005156'                 MOV     #COMBUF,R3                      ; GET DESCRIPTOR ADDRESS AGAIN
002110  012763  100000  000000          MOV     #V,DCT.0(R3)                    ; SET VALID DESCR LIST,XMIT
002116  012763  120000  000002          MOV     #V!E,DCT.1(R3)                  ; XMIT,SET VALID AND END OF
002124  056763  001346  000002          BIS     WBEA,DCT.1(R3)                  ; DATA BUFFER HIGH ORDER ADDR
002132  016763  001336  000004          MOV     WBPA,DCT.2(R3)                  ; DATA BUFFER LOW ORDER ADDRESS
002140  016763  001334  000006          MOV     BUFSZ,DCT.3(R3)                 ; TRANSMIT WORD COUNT
002146  005463  000006                  NEG     DCT.3(R3)                       ; MAKE IT TWO'S COMP.
002152  005063  000010                  CLR     DCT.4(R3)                       ; CLEAR XMIT STATUS WORD 1
002156  005063  000012                  CLR     DCT.5(R3)                       ; CLEAR RCV  STATUS WORD 2
                                        ;+
                                        ; SET NOT VALID PACKET AND END OF PACKET AT END OF TRANSMIT DESCRIPTOR
                                        ;-
002162  012763  100000  000014          MOV     #V,DCT.6(R3)                    ; SET NOT VALID XMIT
002170  012763  020000  000016          MOV     #E,DCT.7(R3)                    ; SET END PACKET XMIT
                                        ;+
                                        ;       SET UP RCV DESCRIPTOR LIST
                                        ;-
002176  012763  100000  000020          MOV     #V,DCR.0(R3)                    ; SET VALID DESCR LIST,RCR
002204  012763  120000  000022          MOV     #V!E,DCR.1(R3)                  ; RCV,SET VALID AND END OF MSG
002212  056763  001254  000022          BIS     RBEA,DCR.1(R3)                  ; DATA BUFFER HIGH ORDER ADDR
002220  016763  001244  000024          MOV     RBPA,DCR.2(R3)                  ; DATA BUFFER LOW ORDER ADD
002226  016763  001246  000026          MOV     BUFSZ,DCR.3(R3)                 ; RECEIVE WORD COUNT
002234  005063  000026                  CLR     DCR.3(R3)                       ; CLEAR RECEIVE PACKET LENGTH
002240  005063  000030                  CLR     DCR.4(R3)                       ; CLEAR RECEIVE STATUS WORD 1
002244  005063  000032                  CLR     DCR.5(R3)                       ; CLEAR RECEIVE STATUS WORD 2
                                        ;+
                                        ; SET NOT VALID PACKET AND END OF PACKET AT END OF RECEIVE DESCRIPTOR
                                        ;-
002250  012763  100000  000034          MOV     #V,DCR.6(R3)                    ; SET NOT VALID RECEIVE
002256  012763  020000  000036          MOV     #E,DCR.7(R3)                    ; SET END PACKET RECEIVE

002264  032767  000001  175524          BIT     #BIT0,SR1                       ; EXTERNAL LOOPBACK MODE ?
002272  001407                          BEQ     10$                             ; BRANCH IF NOT
002274  012702  005216'                 MOV     #RECBUF,R2                      ; CLEAR 512 WORD RECEIVE BUFFER
002300  016701  001000                  MOV     512.,R1                         ;
002304  005022                  5$:     CLR     (R2)+                           ;
002306  005301                          DEC     R1                              ;
002310  001375                          BNE     5$                              ;
002312  000240                  10$:    NOP                                     ;

002314  000207                          RTS     PC                              ; GO BACK FROM WHENCE YOU CAME
```

```
                                        ;*
                                        ; CONVERT 16-BIT VIRTUAL ADDR TO 18-BIT PHYSICAL ADDR
                                        ;*

002316  012767  005156' 001132  ADRGEN: MOV     #COMBUF+DCT,0,VA        ; GET TRANSMIT DESCRIPTOR 18-BIT ADDRESS
002324  104415  000000' 003456'         GETPA$,BEGIN, VA                ;GET PHYSICAL ADDRESS FROM 16-BIT VA
002332  016767  001122  001152          MOV     PA,LO22.T               ; SAVE LOW ORDER ADDRESS
002340  016767  001116  001146          MOV     EA,HI22.T               ; SAVE HIGH ODRER ADDRESS
002346  016767  001106  001146          MOV     PA,LO18.T               ; SAVE LOW ORDER ADDRESS
002354  016767  001102  001142          MOV     EA,HI18.T               ; SAVE HIGH ODRER ADDRESS

002362  012767  005176' 001066          MOV     #COMBUF+DCR,0,VA        ; GET RECEIVE DESCRIPTOR 18-BIT ADDRESS
002370  104415  000000' 003456'         GETPA$,BEGIN, VA                ;GET PHYSICAL ADDRESS FROM 16-BIT VA
002376  016767  001056  001102          MOV     PA,LO22.R               ; SAVE LOW ORDER ADDRESS
002404  016767  001052  001076          MOV     EA,HI22.R               ; SAVE HIGH ODRER ADDRESS
002412  016767  001042  001076          MOV     PA,LO18.R               ; SAVE LOW ORDER ADDRESS
002420  016767  001036  001072          MOV     EA,HI18.R               ; SAVE HIGH ODRER ADDRESS

002426  012767  005216' 001022          MOV     #RECBUF,VA              ; GET RECEIVE BUFFER 18 BIT ADDRESS
002434  104415  000000' 003456'         GETPA$,BEGIN, VA                ;GET PHYSICAL ADDRESS FROM 16-BIT VA
002442  016767  001012  175456          MOV     PA,RBUFPA               ; SAVE 18-BIT PHYSICAL ADDR
002450  016767  001006  175452          MOV     EA,RBUFEA               ;
002456  016767  175444  001004          MOV     RBUFPA,RBPA             ; READ BUFFER LOW ADDR
002464  016767  175440  001000          MOV     RBUFEA,RBEA             ; READ BUFFER HIGH ADDR

002472  032767  000001  175316          BIT     #BIT0,SR1               ; EXTERNAL LOOPBACK MODE ?
002500  001414                          BEQ     4$                      ; BRANCH IF NOT

002502  012767  000414' 000746          MOV     #WRTBUF,VA              ; GET TRANSMIT BUFFER 18-BIT ADDRESS
002510  104415  000000' 003456'         GETPA$,BEGIN, VA                ;GET PHYSICAL ADDRESS FROM 16-BIT VA
002516  016767  000736  175410          MOV     PA,WBUFPA               ; SAVE 18-BIT PHYSICAL ADDR
002524  016767  000732  175404          MOV     EA,WBUFEA               ;

002532  016767  175376  000734  4$:     MOV     WBUFPA,WBPA             ; WRITE BUFFER LOW ADDR
002540  016767  175372  000730          MOV     WBUFEA,WBEA             ; WRITE BUFFER HIGH ADDR

002546  012701  000004                  MOV     #4,R1                   ; SHIFT COUNT
002552  006267  000714          5$:     ASR     RBEA                    ; MAP EA BITS FROM BIT 4 AND 5 TO
002556  006267  000714                  ASR     WBEA                    ;   BIT 0 AND 1 RESPECTIVELY
002562  006267  000726                  ASR     HI22.T                  ;
002566  006267  000716                  ASR     HI22.R                  ;
002572  077111                          SOB     R1,5$                   ;

002574  032767  001000  175254          BIT     #ADDR22,CONFIG          ; DO WE WANT 22-BIT ADDR ?
002602  001474                          BEQ     10$                     ; BRANCH IF NO
```

DEC V11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```
1011                                    ;*
1012                                    ;       CONVERT 18-BIT PHYSICAL ADDR TO 22 BIT PHYSICAL ADDR
1013                                    ;*
1014
1015 002604  016767  000712  000646            MOV     LO18.T,PA               ; TRANSMIT DESCRIPTOR 22-BIT ADDRESS
1016 002612  016767  000706  000642            MOV     HI18.T,EA               ;
1017 002620  104416  000000' 003460'            MAP22$, BEGIN,PA                ; GET 22-BIT ADDR FROM 18-BIT ADDR
1018 002626  016767  000632  000656            MOV     LO22,LO22.T             ; SAVE LOW ORDER ADDR
1019 002634  016767  000626  000652            MOV     HI22,HI22.T             ; SAVE HIGH ORDER ADDR
1020
1021 002642  016767  000650  000610            MOV     LO18.R,PA               ; RECEIVE DESCRIPTOR 22-BIT ADDRESS
1022 002650  016767  000644  000604            MOV     HI18.R,EA               ;
1023 002656  104416  000000' 003460'            MAP22$, BEGIN,PA                ; GET 22-BIT ADDR FROM 18-BIT ADDR
1024 002664  016767  000574  000614            MOV     LO22,LO22.R             ; SAVE LOW ORDER ADDR
1025 002672  016767  000570  000610            MOV     HI22,HI22.R             ; SAVE HIGH ORDER ADDR
1026
1027 002700  016767  175222  000552            MOV     RBUFPA,PA               ; RECEIVE BUFFER 22-BIT ADDRESS
1028 002706  016767  175216  000546            MOV     RBUFEA,EA               ;
1029 002714  104416  000000' 003460'            MAP22$, BEGIN,PA                ; GET 22-BIT ADDR FROM 18-BIT ADDR
1030 002722  016767  000536  000540            MOV     LO22,RBPA               ; BUFFER LOW ADDR
1031 002730  016767  000532  000534            MOV     HI22,RBEA               ; BUFFER HIGH ADDR
1032
1033 002736  016767  175172  000514            MOV     WBUFPA,PA               ; TRANSMIT BUFFER 22-BIT ADDRESS
1034 002744  016767  175166  000510            MOV     WBUFEA,EA               ;
1035 002752  104416  000000' 003460'            MAP22$, BEGIN,PA                ; GET 22 BIT ADDR FROM 18-BIT ADDR
1036 002760  016767  000500  000506            MOV     LO22,WBPA               ; BUFFER LOW ADDR
1037 002766  016767  000474  000502            MOV     HI22,WBEA               ; BUFFER HIGH ADDR
1038
1039 002774  000207                    10$:    RTS     PC                      ;
```

```
                                        ;*
                                        ;
                                        ;       CHECK XMIT AND RCV FLAG WORDS FOR ERRORS
                                        ;
                                        ;-
002776  012703  005156'         ERRCK:  MOV     @COMBUF,R3              ; DESCRIPTOR LIST ADDRESS
003002  032763  040000  000010          BIT     @ERRSU.DCT.4(R3)        ; CHECK FOR ERRORS
003010  001410                          BEQ     10$                     ; BRANCH IF NO ERROR
003012  032767  000002  174776          BIT     @BIT1,SR1               ; DO WE WANT TO PRINT OUT
003020  001062                          BNE     40$                     ; BRANCH IF SET
003022  104403  000000' 005074'          MSGN$,BEGIN,BADXMT      ;ASCII MESSAGE CALL WITH COMMON HEADER
003030  000451                          BR      30$                     ; DONT CHECK ANY MORE
003032  032763  040000  000030  10$:    BIT     @ERRSU.DCR.4(R3)        ; SEE IF THERE WAS AN ERROR
003040  001410                          BEQ     20$                     ; BRANCH IF NO ERROR
003042  032767  000002  174746          BIT     @BIT1,SR1               ; SEE IF WE WANT TO PRINT
003050  001046                          BNE     40$                     ; BRANCH IF SET
003052  104403  000000' 005066'          MSGN$,BEGIN,BADRCV      ;ASCII MESSAGE CALL WITH COMMON HEADER
003060  000435                          BR      30$                     ;
003062  016301  000032          20$:    MOV     DCR.5(R3),R1            ; RCV STATUS WORD 2
003066  042701  177400                  BIC     #S.RCV2,R1              ; CLEAR NOISE BIT
003072  016302  000030                  MOV     DCR.4(R3),R2            ; RCV STATUS WORD 1
003076  042702  174377                  BIC     #S.RCV3,R2              ; CLEAR NOISE BITS
003102  060201                          ADD     R2,R1                   ; FORM 11 BIT PACKET LENGTH
003104  162701  000000                  SUB     #+D0,R1                 ; ADJUST FOR ACTUAL BYTE LENGTH
003110  006201                          ASR     R1                      ;
003112  010167  000310                  MOV     R1,RCVSIZ               ; PACKET SIZE FROM RCV STATUS
003116  005467  000304                  NEG     RCVSIZ                  ; FORM 1'S COMPL
003122  016763  000300  000026          MOV     RCVSIZ,DCR.3(R3)        ; SAVE IN RCV DESCRIPTOR LIST
003130  026701  000344                  CMP     BUFSZ,R1                ; PACKET RECEIVED = PACKET TRANSMITED ?
003134  001416                          BEQ     50$                     ; BRANCH IF EQUAL
003136  032767  000002  174652          BIT     @BIT1,SR1               ; PRINT ERROR ?
003144  001010                          BNE     40$                     ; BRANCH IF DONT WANT TO PRINT ERROR
003146  104403  000000' 005060'          MSGN$,BEGIN,BADSIZ      ;ASCII MESSAGE CALL WITH COMMON HEADER
003154  004767  000014          30$:    JSR     PC,FDECS                ; PRINT OUT DESCRIPTORS
003160  104402  000000' 004754'          MSGS$,BEGIN,D.LIST      ; ASCII MESSAGE CALL WITH NO HEADER
003166  000167  176660          40$:    JMP     DROP
003172  000207                  50$:    RTS     PC
```

```
1081
1082                                    ;*
1083                                    ;
1084                                    ; ROUTINE TO PRINT THE TRANSMIT AND RECEIVE DESCRIPTOR
1085                                    ;
1086                                    ;
1087                                    ;       TRANSMIT DESCRIPTOR LIST
1088                                    ;       ------------------------
1089                                    ;-
1090
1091 003174  012703  005156'            PDECS:  MOV     #COMBUF,R3              ; DESCRIPTOR LIST ADDRESS
1092 003200  042763  020017  000010            BIC     #S.XMT1,DCT.4(R3)       ; CLEAR XMIT STATUS 1 NOISE BITS
1093 003206  042763  140000  000012            BIC     #S.XMT2,DCT.5(R3)       ; CLEAR XMIT STATUS 2 NOISE BITS
1094                                            ;*******************************************************************
                                                ;CONVERT DCT.0+COMBUF TO ASCII AND
                                                ;STORE AT T.ADR1
     003214  104420  000000' 005156'           OTOA$,BEGIN,DCT.0+COMBUF,T.ADR1
     003222  000324'
                                                ;*******************************************************************
1095                                            ;*******************************************************************
                                                ;CONVERT DCT.1+COMBUF TO ASCII AND
                                                ;STORE AT T.ADR2
     003224  104420  000000' 005160'           OTOA$,BEGIN,DCT.1+COMBUF,T.ADR2
     003232  000333'
                                                ;*******************************************************************
1096                                            ;*******************************************************************
                                                ;CONVERT DCT.2+COMBUF TO ASCII AND
                                                ;STORE AT T.ADR3
     003234  104420  000000' 005162'           OTOA$,BEGIN,DCT.2+COMBUF,T.ADR3
     003242  000342'
                                                ;*******************************************************************
1097                                            ;*******************************************************************
                                                ;CONVERT DCT.3+COMBUF TO ASCII AND
                                                ;STORE AT T.ADR4
     003244  104420  000000' 005164'           OTOA$,BEGIN,DCT.3+COMBUF,T.ADR4
     003252  000351'
                                                ;*******************************************************************
1098                                            ;*******************************************************************
                                                ;CONVERT DCT.4+COMBUF TO ASCII AND
                                                ;STORE AT T.ADR5
     003254  104420  000000' 005166'           OTOA$,BEGIN,DCT.4+COMBUF,T.ADR5
     003262  000360'
                                                ;*******************************************************************
1099                                            ;*******************************************************************
                                                ;CONVERT DCT.5+COMBUF TO ASCII AND
                                                ;STORE AT T.ADR6
     003264  104420  000000' 005170'           OTOA$,BEGIN,DCT.5+COMBUF,T.ADR6
     003272  000367'
                                                ;*******************************************************************
```

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```
1101
1102                                    ;*
1103                                    ;
1104                                    ;       RECEIVE DESCRIPTOR LIST
1105                                    ;       -----------------------
1106                                    ;
1107                                    ;-
1108
1109 003274  042763  000360  000030          BIC     #S.RCV1,DCR.4(R3)       ; CLEAR RCV STATUS 1 NOISE BITS
1110 003302  042763  177400  000032          BIC     #S.RCV2,DCR.5(R3)       ; CLEAR RCV STATUS 2 NOISE BITS
1111                                    ;*************************************************************************
                                                                        ;CONVERT DCR.0+COMBUF TO ASCII AND
                                                                        ;STORE AT R.ADR1
     003310  104420  000000' 005176'           OTOA$,BEGIN,DCR.0+COMBUF,R.ADR1
     003316  000252'
                                        ;*************************************************************************
1112                                    ;*************************************************************************
                                                                        ;CONVERT DCR.1+COMBUF TO ASCII AND
                                                                        ;STORE AT R.ADR2
     003320  104420  000000' 005200'           OTOA$,BEGIN,DCR.1+COMBUF,R.ADR2
     003326  000261'
                                        ;*************************************************************************
1113                                    ;*************************************************************************
                                                                        ;CONVERT DCR.2+COMBUF TO ASCII AND
                                                                        ;STORE AT R.ADR3
     003330  104420  000000' 005202'           OTOA$,BEGIN,DCR.2+COMBUF,R.ADR3
     003336  000270'
                                        ;*************************************************************************
1114                                    ;*************************************************************************
                                                                        ;CONVERT DCR.3+COMBUF TO ASCII AND
                                                                        ;STORE AT R.ADR4
     003340  104420  000000' 005204'           OTOA$,BEGIN,DCR.3+COMBUF,R.ADR4
     003346  000277'
                                        ;*************************************************************************
1115                                    ;*************************************************************************
                                                                        ;CONVERT DCR.4+COMBUF TO ASCII AND
                                                                        ;STORE AT R.ADR5
     003350  104420  000000' 005206'           OTOA$,BEGIN,DCR.4+COMBUF,R.ADR5
     003356  000306'
                                        ;*************************************************************************
1116                                    ;*************************************************************************
                                                                        ;CONVERT DCR.5+COMBUF TO ASCII AND
                                                                        ;STORE AT R.ADR6
     003360  104420  000000' 005210'           OTOA$,BEGIN,DCR.5+COMBUF,R.ADR6
     003366  000315'
                                        ;*************************************************************************
```

```
1118
1119 003370  017767  000060  174504  CSROTA: MOV     @IOP16,ACSR             ; GET DEQNA CSR
1120 003376  042767  044000  174476          BIC     #S.QNA1,ACSR            ; CLEAR DEQNA NOISE BITS
1121                                        ;*************************************************************
                                            ;CONVERT ACSR TO ASCII AND
                                            ;STORE AT IO.CSR
     003404  104420  000000' 000102'       OTOA$,BEGIN,ACSR,IO.CSR
     003412  000376'
                                            ;*************************************************************
1122                                        ;*************************************************************
                                            ;CONVERT ADDR TO ASCII AND
                                            ;STORE AT IO.ADR
     003414  104420  000000' 000006'       OTOA$,BEGIN,ADDR,IO.ADR
     003422  000405'
                                            ;*************************************************************
1123 003424  000207                        RTS     PC
```

```
1125
1126                            ;*********************** ***** ***************************** ****************
1127                            ;
1128                            ;                               DATA STORAGE
1129                            ;                               ------------
1130                            ;
1131
1132 003426  000000            RCVSIZ: .WORD   0               ; PACKET SIZE FROM RCV STATUS WORDS
1133 003430  000000            TM.OUT: .WORD   0               ; TIME OUT COUNTER
1134 003432  000000            ABTCNT: .WORD   0               ; # OF ABORTS
1135 003434  000000            COLCNT: .WORD   0               ; # OF COLLISIONS
1136
1137 003436  000000            IOP00:  .WORD   0               ; DEQNA ( I/O PAGE ) REGISTERS
1138 003440  000000            IOP02:  .WORD   0
1139 003442  000000            IOP04:  .WORD   0
1140 003444  000000            IOP06:  .WORD   0
1141 003446  000000            IOP10:  .WORD   0
1142 003450  000000            IOP12:  .WORD   0
1143 003452  000000            IOP14:  .WORD   0
1144 003454  000000            IOP16:  .WORD   0
1145
1146 003456  000000            VA:     .WORD   0               ; VIRTUAL ADDRESS FOR GETPA
1147 003460  000000            PA:     .WORD   0               ; PHYSICAL ADDRRESS
1148 003462  000000            EA:     .WORD   0               ; EXTENDED ADDRESS
1149 003464  000000            LO22:   .WORD   0               ; 22 BIT LOW ADDRESS
1150 003466  000000            HI22:   .WORD   0               ; 22 BIT HIGH ADDRESS
1151
1152 003470  000000            RBPA:   .WORD   0               ; 18 BIT RCV PHYSICAL ADDR
1153 003472  000000            RBEA:   .WORD   0               ; 18 BIT RCV EXTENDED ADDR
1154 003474  000000            WBPA:   .WORD   0               ; 18 BIT XMIT PHYSICAL ADDR
1155 003476  000000            WBEA:   .WORD   0               ; 18 BIT XMIT EXTENDED ADDR
1156 003500  000000            BUFSZ:  .WORD   0               ; ACTUAL BUFFER SIZE
1157 003502  000000            QMODE:  .WORD   0               ; DEQNA MODE OF OPERATION
1158 003504  0C0000            QMODE1: .WORD   0               ; DEQNA MODE OF OPERATION AND INTR ENABLE
1159 003506  000000            LO22.R: .WORD   0               ; 22 BIT RCV PHYSICAL ADDR
1160 003510  000000            HI22.R: .WORD   0               ; 22 BIT RCV EXTENDED ADDR
1161 003512  000000            LO22.T: .WORD   0               ; 22 BIT XMIT PHYSICAL ADDR
1162 003514  000000            HI22.T: .WORD   0               ; 22 BIT XMIT EXTENDED ADDR
1163 003516  000000            LO18.R: .WORD   0               ; 18 BIT RCV PHYSICAL ADDR
1164 003520  000000            HI18.R: .WORD   0               ; 18 BIT RCV EXTENDED ADDR
1165 003522  000000            LO18.T: .WORD   0               ; 18 BIT XMIT PHYSICAL ADDR
1166 003524  000000            HI18.T: .WORD   0               ; 18 BIT XMIT EXTENDED ADDR
1167
```

```
1169
1170                                    ;-------------------------------------------------------------------------------
1171                                    ;
1172                                    ;                       ERROR MESSAGES
1173                                    ;                       --------------
1174                                    .NLIST  BEX
1175
1176 003526     045     040     040    MES1:   .ASCIZ  '*      DEQNA - '
1177 003546     104     105     121    MES2:   .ASCIZ  'DEQNA WILL NOT RESET'
1178 003573     045     104     105    MES3:   .ASCIZ  '*DEQNA IS NOT PRESENT AT I/O PAGE ADDR = '
1179 003645     124     117     117    MES4:   .ASCIZ  'TOO MANY COLLISIONS/ABORTS'
1180 003700     054     040     122    MES5:   .ASCIZ  ', RI = 0 OR XI = 0 OR RI, XI = 0'
1181 003741     101     124     124    MES17:  .ASCIZ  'ATTEMPT TO ACCESS NON-EXISTANT MEMORY LOCATION'
1182 004020     102     101     104    MES18:  .ASCIZ  'BAD TRANSMIT STATUS/FLAG WORD'
1183 004056     102     101     104    MES19:  .ASCIZ  'BAD RECEIVE STATUS/FLAG WORD'
1184 004113     102     101     104    MES21:  .ASCIZ  'BAD CSR STATUS'
1185 004132     045     040     040    MES22:  .ASCIZ  '*      DEQNA CSR REGISTER      '
1186 004175     045     040     040    MES23:  .ASCIZ  '*      DEQNA I/O PAGE ADR      '
1187 004240     045     000            MES24:  .ASCIZ  '*'
1188 004242     130     115     111    MES25:  .ASCIZ  'XMIT PACKET LENGTH NOT = RCV PACKET LENGTH'
1189 004315     040     040     040    MES28:  .ASCIZ  '                               '
1190 004332     045     040     040    MES29:  .ASCIZ  '*                                      XMIT DESCRIP OR    RCV DESCRIPTOR '
1191 004432     045     040     040    MES30:  .ASCIZ  '*      FLAG WORD               '
1192 004475     045     040     040    MES31:  .ASCIZ  '*      HIGH ORDER ADDR BITS    '
1193 004540     045     040     040    MES32:  .ASCIZ  '*      LOW  ORDER ADDR BITS    '
1194 004603     045     040     040    MES33:  .ASCIZ  '*      PACKET LENGTH (BYTES)   '
1195 004646     045     040     040    MES34:  .ASCIZ  '*      STATUS WORD 1           '
1196 004711     045     040     040    MES35:  .ASCIZ  '*      STATUS WORD 2           '
1197                                    .EVEN
```

```
1199
1200                                    ;-------------------------------------------------------------------------------
1201                                    ;
1202                                    ;                               MODULE MESSAGES
1203                                    ;                               ---------------
1204
1205 004754  004332'                    D.LIST: MES29
1206 004756  004432'                            MES30
1207 004760  000324'                            T.ADR1
1208 004762  004315'                            MES28
1209 004764  000252'                            R.ADR1
1210 004766  004475'                            MES31
1211 004770  000333'                            T.ADR2
1212 004772  004315'                            MES28
1213 004774  000261'                            R.ADR2
1214 004776  004540'                            MES32
1215 005000  000342'                            T.ADR3
1216 005002  004315'                            MES28
1217 005004  000270'                            R.ADR3
1218 005006  004603'                            MES33
1219 005010  000351'                            T.ADR4
1220 005012  004315'                            MES28
1221 005014  000277'                            R.ADR4
1222 005016  004646'                            MES34
1223 005020  000360'                            T.ADR5
1224 005022  004315'                            MES28
1225 005024  000306'                            R.ADR5
1226 005026  004711'                            MES35
1227 005030  000367'                            T.ADR6
1228 005032  004315'                            MES28
1229 005034  000315'                            R.ADR6
1230 005036  004132'                            MES22
1231 005040  000376'                            IO.CSR
1232 005042  004175'                            MES23
1233 005044  000405'                            IO.ADR
1234 005046  004240'                            MES24
1235 005050  177777                            177777
1236
1237 005052  003526'                    BADQNA: MES1
1238 005054  004113'                            MES21
1239 005056  177777                            177777
1240
1241 005060  003526'                    BADSIZ: MES1
1242 005062  004242'                            MES25
1243 005064  177777                            177777
1244
1245 005066  003526'                    BADRCV: MES1
1246 005070  004056'                            MES19
1247 005072  177777                            177777
1248
1249 005074  003526'                    BADXMT: MES1
1250 005076  004020'                            MES18
1251 005100  177777                            177777
1252
1253 005102  003526'                    NIEROR: MES1
1254 005104  003741'                            MES17
1255 005106  177777                            177777
```

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```
1256
1257 005110  003526'                    RESTER: MES1
1258 005112  003546'                            MES2
1259 005114  177777                             177777
1260
1261 005116  003526'                    NORIXI: MES1
1262 005120  004113'                            MES21
1263 005122  003700'                            MES5
1264 005124  177777                             177777
1265
1266 005126  004132'                    NOREST: MES22
1267 005130  000376'                            IO.CSR
1268 005132  004175'                            MES23
1269 005134  000405'                            IO.ADR
1270 005136  004240'                            MES24
1271 005140  177777                             177777
1272
1273 005142  003573'                    NOQNA:  MES3
1274 005144  000405'                            IO.ADR
1275 005146  177777                             177777
1276
1277
1278 005150  003526'                    COLLS:  MES1
1279 005152  003645'                            MES4
1280 005154  177777                             177777
```

```
1282
1283                                    ;+
1284                                    ;
1285                                    ;       DEQNA BUFFERS
1286                                    ;       ------------
1287                                    ;
1288                                    ;-
1289
1290
1291
1292 005156                            COMBUF: .BLKW   #D16                    ; COMMAND BUFFER FOR UP TO 2
1293                                                                            ; COMMAND PACKETS
1294 005216                            RECBUF: .BLKB   #D1024                  ; READ BUFFER (RECEIVE)1024 DEC. BYTES
1295
1296 007216                                    .BLKW   #D1                     ; DUMMY LOCATION
1297
1298
1299         000001                     .END                                   ; THERE AN'T NO MORE
```

SYMBOL TABLE

```
ABTCNT  003432R     DCR.0 = 000020     IOP10   003446R     PDECS   003174R     SBADR   000102R
ACSR    000102R     DCR.1 = 000022     IOP12   003450R     PDPF11= 000002     SE    = 002000
ADDR    000006R     DCR.2 = 000024     IOP14   003452R     PDPLSI= 020000     SETUP   002070R
ADDR22= 001000      DCR.3 = 000026     IOP16   003454R     PDP44 = 100000     SOFCNT  000042R
ADRCHK  000476R     DCR.4 = 000030     IO.ADR  000405R     PDP60 = 004000     SOFER$= 104406
ADRGEN  002316R     DCR.5 = 000032     IO.CSR  000376R     PDP70 = 010000     SOFPAS  000046R
APTPRE= 000200      DCR.6 = 000034     KTPRES= 000400      PIRQ$ = 000004     SPOINT  000032R
ASB     000106R     DCR.7 = 000036     KTXTND= 040000      POPSP = 005726     SPSIZ = 000040
ASTAT   000104R     DCT.0 = 000000     LCOUNT= 000144      POPSP2= 022626     SR    = 000002
AUTO  = 000010      DCT.1 = 000002     LOOP    001110R     PRMMS$= 000002     SR1     000016R
AWAS    000110R     DCT.2 = 000004     LO18.R  003516R     PRTY  = 000000     SR2     000020R
BADQNA  005052R     DCT.3 = 000006     LO18.T  003522R     PRTY0 = 000000     SR3     000022R
BADRCV  005066R     DCT.4 = 000010     LO22    003464R     PRTY1 = 000040     SR4     000024R
BADSIZ  005060R     DCT.5 = 000012     LO22.R  003506R     PRTY2 = 000100     START   000434R
BADXMT  005074R     DCT.6 = 000014     LO22.T  003512R     PRTY3 = 000140     STAT    000026R
BD    = 000010      DCT.7 = 000016     MAP22$= 104416      PRTY4 = 000200     SVR0    000062R
BEGIN   000000R     DROP    002052R    MES1    003526R     PRTY5 = 000240     SVR1    000064R
BIT0  = 000001      DVID1   000014R    MES17   003741R     PRTY6 = 000300     SVR2    000066R
BIT1  = 000002      D.LIST  004754R    MES18   004020R     PRTY7 = 000340     SVR3    000070R
BIT10 = 002000      E     = 020000     MES19   004056R     PS    = 177776     SVR4    000072R
BIT11 = 004000      EA      003462R    MES2    003546R     PSW   = 177776     SVR5    000074R
BIT12 = 010000      ECCMEM= 000100     MES21   004113R     PUSH  = 005746     SVR6    000076R
BIT13 = 020000      EL    = 001000     MES22   004132R     PUSH2 = 024646     SYSCNT  000052R
BIT14 = 040000      ENDIT$= 104413     MES23   004175R     PWRFLG= 000002     S.QNA1= 044000
BIT15 = 100000      END$  = 104410     MES24   004240R     QMODE   003502R     S.RCV1= 000360
BIT2  = 000004      ERCODE  000450R    MES25   004242R     QMODE1  003504R     S.RCV2= 177400
BIT3  = 000010      ERRCK   002776R    MES28   004315R     QMON22= 000010     S.RCV3= 174377
BIT4  = 000020      ERRSU = 040000     MES29   004332R     RAND$ = 104417     S.XMT1= 020017
BIT5  = 000040      ERRTYP  000106R    MES3    003573R     RANNUM  000054R     S.XMT2= 140000
BIT6  = 000100      EXIT$ = 104400     MES30   004432R     RBEA    003472R     TM.OUT  003430R
BIT7  = 000200      FREE    000150R    MES31   004475R     RBPA    003470R     TRPDFD= 000023
BIT8  = 000400      GETPA$= 104415     MES32   004540R     RBUFEA  000130R     TRYAGN  001176R
BIT9  = 001000      GOSTRT  000556R    MES33   004603R     RBUFPA  000126R     T.ADR1  000324R
BREAK$= 104407      GWBUF$= 104414     MES34   004646R     RBUFSZ  000132R     T.ADR2  000333R
BR1     000012R     HI18.R  003520R    MES35   004711R     RBUFVA  000124R     T.ADR3  000342R
BR2     000013R     HI18.T  003524R    MES4    003645R     RCVSIZ  003426R     T.ADR4  000351R
BTOD$ = 104421      HI22    003466R    MES5    003700R     RE    = 000001     T.ADR5  000360R
BUFSZ   003500R     HI22.R  003510R    MODNAM  000000R     RECBUF  005216R     T.ADR6  000367R
C     = 040000      HI22.T  003514R    MODSP   000252R     RESET   002020R     USTACK= 000001
CA    = 020000      HRDCNT  000044R    MSGN$ = 104403      RESTER  005110R     V     = 100000
CAPRES= 000004      HRDER$= 104405     MSGS$ = 104402      RESTRT  001064R     VA      003456R
CDATA$= 104412      HRDPAS  000050R    MSG$  = 104401      RES1    000056R     VECTOR  000010R
CDERCT  000144R     ICONDT  001524R    NA11  = 004000      RES2    000060R     WASADR  000104R
CDWDCT  000146R     ICONT   000036R    NA14  = 040000      RH70  = 001000     WBEA    003476R
CKHNG$= 000001      ICOUNT  000040R    NCPUOP= 000020      RI    = 100000     WBPA    003474R
CLKPRE= 000001      IDNUM   000122R    NI    = 000004      RL    = 000040     WBUFEA  000136R
CLKSP$= 104422      IE    = 000100     NIEROR  005102R     RSTRT   000112R     WBUFPA  000134R
COLCNT  003434R     IL    = 000400     NOAPTY= 000002      R.ADR1  000252R     WBUFRQ  000140R
COLLS   005150R     IMODX.= 000000     NOQNA   005142R     R.ADR2  000261R     WBUFSZ  000142R
COMBUF  005156R     INDPWR= 000040     NOREST  005126R     R.ADR3  000270R     WDFR    000116R
CONFIG  000056R     INIT    000030R    NORIXI  005116R     R.ADR4  000277R     WDTO    000114R
CSRA    000100R     INTR    000120R    NULL  = 000000      R.ADR5  000306R     WRTBUF  000414R
CSRM  = 044000      INTSRV  001264R    OPEN  = 000000      R.ADR6  000315R     XC    = 010000
CSROTA  003370R     IOP00   003436R    OTOA$ = 104420      R6    =%000006     XFLAG   000005R
CSRSAT= 110301      IOP02   003440R    PA      003460R     R7    =%000007     XI    = 000200
DATCK$= 104411      IOP04   003442R    PARPRE= 002000      S     = 010000     XL    = 000020
DATER$= 104404      IOP06   003444R    PASCNT  000034R
```

SYMBOL TABLE

. ABS. 000000   000
        007220   001
ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 13357 WORDS (53 PAGES)
DYNAMIC MEMORY: 19748 WORDS (75 PAGES)
ELAPSED TIME: 00:01:04
XQNABO,XQNABO/CR/-SP=DDXCOM,XQNABO

C4

SYMBOL CROSS REFERENCE CREF V01

SYMBOL		VALUE		REFERENCES									
ABTCNT		003432	R	*20-763	*20-849	22-850	#31 1134						
ACSR		000102	R	#14-507	*30 1119	*30 1120	30-1121						
ADDR		000006	R	#14-507	18-634	19-685	19-728	30-1122					
ADDR22	=	001000		#14-507	25-1008								
ADRCHK		000476	R	18-635	#18-645								
ADRGEN		002316	R	20-752	#25-969								
APTPRE	=	000200		#14-507									
ASB		000106	R	#14-507									
ASTAT		000104	R	#14-507									
AUTO	=	000010		#14-507									
AWAS		000110	R	#14-507									
BADQNA		005052	R	21-805	#33-1237								
BADRCV		005066	R	22-877	27-1059	#33 1245							
BADSIZ		005060	R	27-1075	#33-1241								
BADXMT		005074	R	22-870	27-1053	#33-1249							
BD	=	000010		#15-528									
BEGIN		000000	R	#14-507	18-640	18 642	19 710	19 712	20 751	20 755	20 757	20 75?	
				20-777	21-786	21-786	21-795	21-797	21-800	21 805	21-807	21-814	
				21-818	22-828	22 828	22 857	22-862	22-870	22-877	22-882	23 906	
				25-970	25-977	25-984	25-994	26-1017	26-1023	26-1029	26-1035	27-1053	
				27-1059	27-1075	27-1077	28-1094	28-1095	28-1096	28-1097	28-1098	28 1099	
				29-1111	29-1112	29-1113	29-1114	29-1115	29 1116	30-1121	30-1122		
BIT0	=	000001		#14-507	15-531	19-719	24-954	25-990					
BIT1	=	000002		#14-507	15-530	21-793	21-803	22-855	22-860	22 868	22-875	27 1051	
				27-1057	27-1073								
BIT10	=	002000		#14-507	15-521								
BIT11	=	004000		#14-507	15-520								
BIT12	=	010000		#14-507	15-519	16-576							
BIT13	=	020000		#14-507	15-518	16-575							
BIT14	=	040000		#14-507	15-517	16-574	16-586						
BIT15	=	100000		#14-507	15-516	16-573							
BIT2	=	000004		#14-507	15-529								
BIT3	=	000010		#14-507	15-528								
BIT4	=	000020		#14-507	15-527								
BIT5	=	000040		#14-507	15-526								
BIT6	=	000100		#14-507	15-525								
BIT7	=	000200		#14 507	15-524								
BIT8	=	000400		#14-507	15-523								
BIT9	=	001000		#14-507	15-522	22-830							
BREAK$	=	104407		#14-507	20-757	20 757	21-786	21 786	22-828	22 828			
BR1		000012	R	#14-507	19-682								
BR2		000013	R	#14 507									
BTOD$	=	104421		#14-507									
BUFSZ		003500	R	*20-756	*20 758	20-759	20-761	21-812	24-928	24 944	27-1071	#31-1156	
C	=	040000		#16-574									
CA	=	020000		#15-518	19-707								
CAPRE$	=	000004		#14-507									
CDATA$	=	104412		#14-507	21-816								
CDERCT		000144	R	#14-507									
CDWDCT		000146	R	#14 507									
CKHNG$	=	000001		#14-507									
CLKPRE	=	000001		#14-507									

SYMBOL	VALUE		REFERENCES								
CLKSP$	= 104422		#14-507								
COLCNT	003434	R	*20-764	*22-843	22 844	#31 1135					
COLLS	005150	R	22-857	#33-1278							
COMBUF	005156	R	22-829	22-865	24-916	24-923	25-969	25-976	27-1048	28-1091	28-1094
			28-1095	28-1096	28-1097	28-1098	28 1099	29-1111	29-1112	29-1113	29-1114
			29-1115	29-1116	#34-1292						
CONFIG	000056	R	#14-507	25-1008							
CSRA	000100	R	#14-507								
CSRM	= 044000		#15-532	19-707							
CSROTA	003370	R	18-639	19-711	#30-1119						
CSRSAT	= 110301		#15-533								
DATCK$	= 104411		#14-507								
DATER$	= 104404		#14-507								
DCR.0	= 000020		#15-556	*24-940	25-976	29-1111					
DCR.1	= 000022		#15-557	*24-941	*24-942	29-1112					
DCR.2	= 000024		#15-558	*24-943	29-1113						
DCR.3	= 000026		#15-559	*24-944	*24-945	*27-1070	29-1114				
DCR.4	= 000030		#15-560	22-873	*24-946	27-1055	27-1063	*29-1109	29-1115		
DCR.5	= 000032		#15-561	*24-947	27-1061	*29-1110	29-1116				
DCR.6	= 000034		#15-562	*24-951							
DCR.7	= 000036		#15-563	*24-952							
DCT.0	= 000000		#15-544	*24-924	25-969	28-1094					
DCT.1	= 000002		#15-545	*24-925	*24-926	28-1095					
DCT.2	= 000004		#15-546	*24-927	28-1096						
DCT.3	= 000006		#15-547	*24-928	*24-929	28-1097					
DCT.4	= 000010		#15-548	22-830	22-866	*24-930	27-1049	*28-1092	28-1098		
DCT.5	= 000012		#15-549	*24-931	*28-1093	28-1099					
DCT.6	= 000014		#15-550	*24-935							
DCT.7	= 000016		#15-551	*24-936							
DROP	002052	R	19-713	21-820	22-883	#23-904	27 1078				
DVID1	000014	R	#14-507								
D.LIST	004751	R	21-797	21-807	22-882	27 1077	#33 1205				
E	= 020000		#16-575	24-925	24-936	24-941	24 952				
EA	003462	R	25-972	25-974	25-979	25 981	25-986	25-996	*26-1016	*26-1022	*26-1028
			*26-1034	#31-1148							
ECCMEM	= 000100		#14-507								
E.	= 001000		#15-522	19-721	19 722	20-743	20 744				
ENDIT$	= 104413		#14-507	21-818							
END$	= 104410		#14-507	18-642	23 906						
ERCODE	000450	R	18-636	#18-639							
ERRCK	002776	R	21-809	#27-1048							
ERRSU	= 040000		#16-586	22-866	22-873	27 1049	27-1055				
ERRTYP	000106	R	#14-507								
EXIT$	= 104400		#14-507	20-777							
FREE	000150	R	#14-507								
GETPA$	= 104415		#14-507	25-970	25 977	25 984	25 994				
GOSTRT	000556	R	18-637	#19-680							
GWBUF$	= 104414		#14-507	20-751							
HI18.R	003520	R	*25-981	26-1022	#31 1164						
HI18.T	003524	R	*25 974	26 1016	#31 1166						
HI2.	003466	R	26 1019	26 1025	26 1031	26-1037	#31 1150				
HI22.R	003510	R	20-771	*25-979	*25-1005	*26-1025	#31-1160				

SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE		REFERENCES								
HI22.T	003514	R	20-774	*25-972	*25-1004	*26-1019	#31-1162				
HRDCNT	000044	R	#14-507								
HRDER$	= 104405		#14-507								
HRDPAS	000050	R	#14-507								
ICONDT	001524	R	20-775	#22-827							
ICONT	000036	R	#14-507								
ICOUNT	000040	R	#14-507								
IDNUM	000122	R	#14-507								
IE	= 000100		#15-525	15-533	19-722	20-744	21-799	23-904			
IL	= 000400		#15-523	19-721	19-722	22-840					
IMODX.	= 000000		#14-507	20-751							
INDPAR	= 000040		#14-507								
INIT	000030	R	#14-507								
INTR	000120	R	#14-507								
INTSRV	001264	R	19-681	#21-784	21-790						
IOP00	003436	R	*19-687	#31-1137							
IOP02	003440	R	*19-689	#31-1138							
IOP04	003442	R	*19-691	20-770	#31-1139						
IOP06	003444	R	*19-693	20-771	#31-1140						
IOP10	003446	R	*19-695	20-773	#31-1141						
IOP12	003450	R	*19-697	20-774	#31-1142						
IOP14	003452	R	*19-699	19-714	#31-1143						
IOP16	003454	R	*19-701	19-706	20-766	20-776	21-784	21-791	21-799	22-833	23-889
			23-892	23-893	23-904	30-1119	#31-1144				
IO.ADR	000405	R	#17-622	30-1122	33-1233	33-1269	33-1274				
IO.CSR	000376	R	#17-619	30-1121	33-1231	33-1267					
KTPRES	= 000400		#14-507								
KTXTND	= 040000		#14-507								
LCOUNT	= 000144		#16-601	20-768							
LOOP	001110	R	#20-754	20-760	20-762	21-819					
LO18.R	003516	R	*25-980	26-1021	#31-1163						
LO18.T	003522	R	*25-973	26-1015	#31-1165						
LO22	003464	R	26-1018	26-1024	26-1030	26-1036	#31 1149				
LO22.R	003506	R	20-770	*25-978	*26-1024	#31 1159					
LO22.T	003512	R	20-773	*25-971	*26-1018	#31-1161					
MAP22$	= 104416		#14-507	26-1017	26-1023	26-1029	26 1035				
MES1	003526	R	#32-1176	33-1237	33-1241	33-1245	33-1249	33-1253	33-1257	33-1261	33-1278
MES17	003741	R	#32-1191	33-1254							
MES18	004020	R	#32-1182	33-1250							
MES19	004056	R	#32-1183	33-1246							
MES2	003546	R	#32-1177	33-1258							
MES21	004113	R	#32-1184	33-1238	33-1262						
MES22	004132	R	#32-1185	33-1230	33-1266						
MES23	004175	R	#32-1186	33-1232	33-1268						
MES24	004240	R	#32-1187	33-1234	33 1270						
MES25	004242	R	#32-1188	33-1242							
MES28	004315	R	#32-1189	33-1208	33-1212	33-1216	33-1220	33 1224	33-1228		
MES29	004332	R	#32-1190	33 1205							
MES3	003573	R	#32-1178	33-1273							
MES30	004432	R	#32-1191	33 1206							
MES31	004475	R	#32-1192	33-1210							
MES32	004540	R	#32-1193	33-1214							

SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE	REFERENCES								
MES33	004603 R	#32-1194	33-1218							
MES34	004646 R	#32-1195	33-1222							
MES35	004711 R	#32-1196	33-1226							
MES4	003645 R	#32-1179	33-1279							
MES5	003700 R	#32-1180	33-1263							
MODNAM	000000 R	#14-507								
MODSP	000252 R	14-507	#14-507							
MSGN$	= 104403	#14-507	19-710	21-795	21-805	27-1053	27-1059	27-1075		
MSGS$	= 104402	#14-507	18-640	19-712	21-797	21-807	22-857	22-862	22-870	22-877
		22-882	27-1077							
MSG$	= 104401	#14-507								
NA11	= 004000	#15-520	15-532							
NA14	= 040000	#15-517	15-532							
NCPUOP	= 000020	#14-507								
NI	= 000004	#15-529	21-791							
NIEROR	005102 R	21-795	#33-1253							
NOAPTY	= 000002	#14-507								
NOQNA	005142 R	18-640	#33-1273							
NOREST	005126 R	19-712	#33-1266							
NORIXI	005116 R	22-862	#33-1261							
NULL	= 000000	#14-507								
OPEN	= 000000	14-507	14-507	14-507	14-507	14-507	14-507	14-507	14-507	14-507
		14-507	14-507	14-507	14-507	14-507	14-507	14-507	14-507	14-507
		14-507	#14-507							
OTOA$	= 104420	#14-507	28-1094	28-1095	28-1096	28-1097	28-1098	28-1099	29-1111	29-1112
		29-1113	29-1114	29-1115	29-1116	30-1121	30-1122			
PA	003460 R	25-971	25-973	25 978	25-980	25-985	25 995	*26-1015	26-1017	*26-1021
		26-1023	*26-1027	26-1029	*26-1033	26-1035	#31-1147			
PARPRE	= 002000	#14-507								
PASCNT	000034 R	#14-507	*18-641							
PDECS	003174 R	21-796	21-806	22-881	27-1076	#28-1091				
PDPF11	= 000002	#14-507								
PDPLSI	= 020000	#14-507								
PDP44	= 100000	#14-507								
PDP60	= 004000	#14-507								
PDP70	= 010000	#14-507								
PIRQ$	= 000004	#14-507	21-800							
POPSP	= 005726	#14-507								
POPSP2	= 022626	#14-507								
PRAMS$	= 000002	#14-507								
PRTY	= 000000	#14-507								
PRTY0	= 000000	14-507	#14-507							
PRTY1	= 000040	#14-507								
PRTY2	= 000100	#14-507								
PRTY3	= 000140	#14-507								
PRTY4	= 000200	#14-507								
PRTY5	= 000240	14-507	#14-507							
PRTY6	= 000300	#14-507								
PRTY7	= 000340	#14-507								
PS	= 177776	#14-507								
PSW	= 177776	#14-507								

SYMBOL CROSS REFERENCE CREF V01

SYMBOL	VALUE		REFERENCES							
PUSH	= 005746		#14-507							
PUSHJ	= 024646		#14-507							
PWRFLG	= 000002		#14-507							
QMODE	003502	R	*19-721	*20-743	20-766	22-840	#31-1157			
QMODE1	003504	R	*19-722	*20-744	20-776	#31-1158				
QMON22	= 000010		#14-507							
RAND$	= 104417		#14-507	20-755						
RANNUM	000054	R	#14-507	20-756						
RBEA	003472	R	24-942	*25-988	*25-1002	*26-1031	#31-1153			
RBPA	003470	R	24-943	*25-987	*26-1030	#31-1152				
RBUFEA	000130	R	#14-507	*25-986	25-988	26-1028				
RBUFPA	000126	R	#14-507	21-816	*25-985	25-987	26-1027			
RBUFSZ	000132	R	#14-507	*20-749	*21-813					
RBUFVA	000124	R	#14-507							
RCVSIZ	003426	R	*27-1068	*27-1069	27-1070	#31-1132				
RE	= 000001		#15-531	15-533						
RECBUF	005216	R	14-507	24-956	25-983	#34-1294				
RESET	002020	R	19-705	22-846	22-852	#23-889	23-905			
RESTER	005110	R	19-710	#33-1257						
RESTRT	001064	R	14-507	20-742	#20-749					
RES1	000056	R	#14-507							
RES2	000060	R	#14-507							
RH70	= 001000		#14-507							
RI	= 100000		#15-516	15-533	21-784	21-799				
RL	= 000040		#15-526	19-708						
RSTRT	000112	R	#14-507							
R.ADR1	000252	R	#17-607	29-1111	33-1209					
R.ADR2	000261	R	#17-607	29-1112	33-1213					
R.ADR3	000270	R	#17-607	29-1113	33-1217					
R.ADR4	000277	R	#17-607	29-1114	33-1221					
R.ADR5	000306	R	#17-607	29-1115	33-1225					
R.ADR6	000315	R	#17-607	29-1116	33-1229					
R6	=%000006		#14-507							
R7	=%000007		#14-507							
S	= 010000		#16-576							
SBADR	000102	R	#14-507							
SE	= 002000		#15-521							
SETUP	002070	R	20-767	#24-916						
SOFCNT	000042	R	#14-507							
SOFER$	= 104406		#14-507							
SOFPAS	000046	R	#14-507							
SPOINT	000032	R	#14-507							
SPSIZ	= 000040		#1-28	14-507						
SR	= 000002		#15-530	23-889	23-893					
SR1	000016	R	#14-507	19-719	21-793	21-803	22-855	22-860	22-868	22-875
			25-990	27-1051	27-1057	27-1073				24-954
SR2	000020	R	#14-507							
SR3	000022	R	#14-507							
SR4	000024	R	#14-507							
START	000434	R	14-507	#18-634						
STAT	000026	R	#14-507							
SVR0	000062	R	#14-507							

SEQ 0046

SYMBOL CROSS REFERENCE CREF V01

SYMBOL		VALUE		REFERENCES								
SVR1		000064	R	#14-507								
SVR2		000066	R	#14-507								
SVR3		000070	R	#14-507								
SVR4		000072	R	#14-507								
SVR5		000074	R	#14-507								
SVR6		000076	R	#14-507								
SYSCNT		000052	R	#14-507								
S.QNA1	=	044000		#16-594	30-1120							
S.RCV1	=	000360		#16-597	29-1109							
S.RCV2	=	177400		#16-598	27-1062	29-1110						
S.RCV3	=	174377		#16-599	27-1064							
S.XMT1	=	020017		#16-595	28-1092							
S.XMT2	=	140000		#16-596	28-1093							
TM.OUT		003430	R	*20-768	*21-787	21-788	21-801	#31-1133				
TPPDFD	=	000023		#14-507	14-507	14-507	#14-507	14-507	14-507	#14-507	14-507	14-507
				#14-507	14-507	14-507	#14-507	14-507	14-507	#14-507	14-507	14-507
				#14-507	14-507	14-507	#14-507	14-507	14-507	#14-507	14-507	14-507
				#14-507	14-507	14-507	#14 507	14-507	14-507	#14-507	14-507	14-507
				#14-507	14-507	14-507	#14-507	14-507	14-507	#14-507	14-507	14-507
				#14-507	14-507	14-507	#14-507	14-507	14-507	#14-507	14-507	14-507
				#14-507	14-507	14-507	#14-507					
TRYAGN		001176	R	#20-766	22-847	22-853						
T.ADR1		000324	R	#17-614	28-1094	33-1207						
T.ADR2		000333	R	#17-614	28-1095	33-1211						
T.ADR3		000342	R	#17-614	28-1096	33-1215						
T.ADR4		000351	R	#17-614	28-1097	33-1219						
T.ADR5		000360	R	#17-614	28-1098	33-1223						
T.ADR6		000367	R	#17-614	28-1099	33-1227						
USTACK	=	000001		#14-507								
V	=	100000		#16-573	24-924	24-925	24-935	24-940	24-941	24 951		
VA		003456	R	*25-969	25-970	*25-976	25-977	*25-983	25-984	*25-993	25-994	#31-1146
VECTOR		000010	R	#14-507	19-680	19-714						
WASADR		000104	R	#14-507								
WBEA		003476	R	24-926	*25-999	*25-1003	*26-1037	#31-1155				
WBPA		003474	R	24-927	*25-998	*26-1036	#31-1154					
WBUFEA		000136	R	#14-507	*25-996	25-999	26-1034					
WBUFPA		000134	R	#14-507	*25-995	25-998	26-1033					
WBUFRQ		000140	R	#14-507	*20-750	*21-814						
WBUFSZ		000142	R	#14-507	20-759	21-810	*21-815	*21-817				
WDFR		000116	R	#14-507								
WDTO		000114	R	#14-507								
WRTBUF		000414	R	#17-626	19-726	25-993						
XC	=	010000		#15-519	15-533	19-707						
XFLAG		000005	R	#14-507								
XI	=	000200		#15-524	15-533	15-533	21-799					
XL	=	000020		#15-527	19-708							

MACRO CROSS REFERENCE CREF V01

MACRO NAME	REFERENCES									
BKMOD	#1-124									
BREAK	#1-222	20-757	21-786	22-828						
BTOD	#1-246									
CKDATA	#1-282	21-816								
CLKSP	#1-149									
DATACK	#1-291									
DATERR	#1-175									
DFSEVN	#1-314	14-507	14-507	14-507	14-507	14-507	14-507	14-507	14-507	14-507
	14-507	14-507	14-507							
DSEVNT	#1-324	14-507	14-507	14-507	14-507	14-507	14-507	14-507		
END	#1-212									
ENDIT	#1-203	21-818								
ENDMOD	#1-208	18-642	23-906							
EQUATS	#1-330	14-507								
EXIT	#1-157	20-777								
GETPA	#1-273	25-970	25-977	25-984	25-994					
GWBUFF	#1-261	20-751								
HLFBRK	#1-227									
HRDER	#1-165									
IOMOD	#1-120									
IOMODP	#1-144									
IOMODR	#1-140									
IOMODX	#1-136	14-507								
MAP22	#1-277	26-1017	26-1023	26-1029	26-1035					
MODULE	#1-29	14-507								
MSG	#1-191									
MSGN	#1-195	19-710	21-795	21-805	27-1053	27-1059	27-1075			
MSGS	#1-199	18-640	19-712	21-797	21-807	22-857	22-862	22-870	22-877	22-882
	27-1077									
NBKMOD	#1-132									
OTOA	#1-232	[illegible]-1094	28-1095	28-1096	28-1097	28-1098	28-1099	29-1111	29-1112	29-1113
	29-111[illegible]	[illegible]-1115	29-1116	30-1121	30-1122					
PIRQ	#1-216	[illegible]-800								
RAND	#1-161	[illegible]0-755								
SBKMOD	#1-128									
SOFER	#1-181									

QNAB DEC/X11 SYSTEM B1
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