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.REM _
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IDENTIFICATION

PRODUCT CODE: AC-E848D-MC

PRODUCT NAME: CXAAAD0 AA11/VT01-A MODULE

PRODUCT DATE: SEPTEMBER 1978

MAINTAINER: DEC/X11 SUPPORT GROUP

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1. ABSTRACT:

AAA IS A IOMOD THAT EXERCISES THE AA11 SCOPE CONTROLLER. A CONFIDENCE LOGIC TEST IS EXECUTED ON THE CONTROL/STATUS, X POSITION AND Y POSITION REGISTERS. ALL LOGIC ERRORS ARE REPORTED TO THE CONSOLE TELETYPE. THE MAJOR PORTION OF THIS MODULE IS DEFERRED TO LEVEL 0 SERVICE. A SIX LETTER MESSAGE (PDP-11) WILL BE PLOTTED ON THE SCREEN DURING EXECUTION. THIS ROUTIN IS INTERRUPT DRIVEN & FLICKERS MAY RESULT IF OTHER DEVICES ARE BEING TESTED

2. REQUIREMENTS:

HARDWARE: AA11 INTERFACE WITH A VT01-A (DIGITAL MODIFIED TEXTRONICS X-611 DISPLAY)

STORAGE:: AAA REQUIRES:
1. DECIMAL WORDS: 288
2. OCTAL WORDS: 0440
3. OCTAL BYTES: 1100

3. PASS DEFINITION:

ONE PASS OF THE XAAAB MODULE CONSISTS OF DISPLAYING 55,296 POINTS ON THE SCREEN. THIS MEANS THAT 55,296 DATA TRANSFERS OCCURED ON THE UNIBUS.

4. EXECUTION TIME:

VARIES WITH SCOPE DELAY BUT SHOULD TAKE AN AVERAGE OF ------ ------- TO COMPLETE ONE PASS. WHEN RUNNING ALONE.

5. CONFIGURATION PARAMETERS:

DEFAULT PARAMETERS:

DVA: 176756, VCT: 140, BR1: 4

REQUIRED PARAMETERS: NONE

6. DEVICE OPTION SETUP:

A. TURN ON SCOPE POWER.

7. MODULE OPERATION:

7.1 TEST SEQUENCE:

A. START: USING THE DEVICE ADDRESS, THIS SECTION OF CODE, DETERMINES THE CONTROL, X AND Y POSITION ADDRESSES, AND VECTORS.

B. PRIME: IN THIS SECTION, THE X AXIS, Y AXIS AND CONTROL REGISTERS ARE LOADED. THE SCOPE IS ENABLED AND AN 'EXIT' RETURN TO THE MONITOR.

C. AASVC: UPON A SCOPE INTERRUPT, THE PROGRAM WILL RETURN TO THIS CODE. ENTER DEFERRED SERVICE MODE AND TEST FOR A MODE FLAG. IF NO MODE FLAG, REPORT IT AS AN ERROR.

D. AASVCA: THRU CHAR13: THIS SECTION SELECTS THE PROPER POINTS TO BE INTENSIFIED ON THE SCREEN.

E. CHAR11: IN THIS CODE, THE COLOR AND CHANNEL BITS ARE ALTERNATED TO DISPLAY EACH CHANNEL AND COLOR IF A 611/613 SCOPE IS CONNECTED ALTERNATING CHARACTERS WILL HAVE ALTERNATING INTENSITY LEVELS.

F. CHAR20: IN THIS SECTION, THE PASS COUNT IS DECREMENTED AND TESTED. IF IT DID NOT BECOME ZERO, THEN SELECT ANOTHER CLOCK RATE AND RESUME COUNTING. UPON A ZERO PASS COUNT THE CONTROL AND PRESET REGISTER, ARE CLEARED AND 'ENDPAS' IS REPORTED.

8. OPERATOR OPTIONS:

NONE

9. NON-STANDARD PRINTOUTS:

NONE: ALL PRINTOUTS HAVE THE STANDARD FORMATS DESCRIBED IN THE DEC/X11 DOCUMENT MAINDEC-11-DXQAAA

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                        ;AA-11 DEC/X11 EXERCISER MODULE

000000'                         IOMOD   <AAAD  >,176756,140,4,,,100.,,43
000000'                         MODULE  140000,AAAD  ,176756,140,4,,,100.,,43
                                .TITLE  AAAD DEC/X11 SYSTEM EXERCISER MODULE
                        ;       DDXCOM  VERSION  6      23-MAY-78
                                .LIST   BIN
                                ;*****************************************************************************
000000'                         BEGIN:
000000' 040501  042101      040 MODNAM: .ASCII  /AAAD / ;MODULE NAME.
000005'     000                 XFLAG:  .BYTE   OPEN            ;USED TO KEEP TRACK OF WBUFF USAGE
000006' 176756                  ADDR:   176756+0                ;1ST DEVICE ADDR.
000010' 000140                  VECTOR: 140+0                   ;1ST DEVICE VECTOR.
000012'     200                 BR1:    .BYTE   PRTY4+0         ;1ST BR LEVEL.
000013'     000                 BR2:    .BYTE   PRTY+0          ;2ND BR LEVEL.
000014' 000001                  DVID1:  +1                      ;DEVICE INDICATOR 1.
000016' 000000                  SR1:    OPEN                    ;SWITCH REGISTER 1
000020' 000000                  SR2:    OPEN                    ;SWITCH REGISTER 2
000022' 000000                  SR3:    OPEN                    ;SWITCH REGISTER 3
000024' 000000                  SR4:    OPEN                    ;SWITCH REGISTER 4
                                ;*****************************************************************************
000026' 140000                  STAT:   140000                  ;STATUS WORD.
000030' 000232'                 INIT:   START                   ;MODULE START ADDR.
000032' 000224'                 SPOINT: MODSP                   ;MODULE STACK POINTER.
000034' 000000                  PASCNT: 0                       ;PASS COUNTER.
000036' 000144                  ICONT:  100.                    ;# OF ITERATIONS PER PASS=100.
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'                         SRADR:                          ;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' 000254'                 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
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000120' 000000                  INTR:   OPEN                    ;# OF INTERRUPTS PER ITERATION
000122' 000043                  IDNUM:  43                      ;MODULE IDENTIFICATION NUMBER=43
        000040                          .REPT   SPSIZ           ;MODULE STACK STARTS HERE.
                                        .NLIST
                                        .WORD   0
                                        .LIST
                                        .ENDR
000224'                         MODSP:
                                ;*****************************************************************************

                                ;REGISTER ADDRESS DEFINITIONS

000224' 000000                          SCSR:   OPEN
000226' 000000                          DAC0:   OPEN
000230' 000000                          DAC1:   OPEN


000232' 012767  000322  177656  START:  MOV     #210.,WDFR
000240' 012767  000322  177652          MOV     #210.,INTR
000246' 012767  000011  177644          MOV     #11,INTR

000254' 016705  177526          RESTRT: MOV     ADDR,R5         ;GET 1ST ADDRESS
000260' 010567  177740                  MOV     R5,SCSR         ;BUILD REG. ADDRESSES
000264' 005725                          TST     (5)+
000266' 010567  177734                  MOV     R5,DAC0
000272' 005725                          TST     (5)+
000274' 010567  177730                  MOV     R5,DAC1
000300' 016700  177504                  MOV     VECTOR,R0               ;GET VECTOR ADDRESS
000304' 012720  000342'                 MOV     #AA11,(0)+              ;SET UP INTR. RETURN
000310' 016720  177476                  MOV     BR1,(0)+                ;SET UP PRIORITY
000314' 016767  177704  177556          MOV     SCSR,CSRA               ;PUT CSR ADDRESS IN CSRA
000322' 012767  000144  000546          MOV     #100.,COUNT             ;DO IT 100. TIMES PER PASS
000330' 012777  000100  177666          MOV     #100,@SCSR              ;TURN ON THE INTERRUPT
000336' 104400  000000'                 EXITS,BEGIN                     ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.


                                ;INTERRUPT SERVICE ROUTINES TO DISPLAY "PDP-11" ON SCOPE

000342'                         AA11:
                                        ;-------------------------------------------------------------
000342' 000004  000000' 000352'         PIRQS,BEGIN,AA11A               ; QUEUE UP TO CONTINUE AT AA11A AND RTI
                                        ;-------------------------------------------------------------
000350' 000352'                                                         AA11A
000352' 105777  177646          AA11A:  TSTB    @SCSR                   ;IS DONE SET
000356' 100413                  BMI     AA11B                           ;BR IF DONE IS SET
000360' 017767  177640  177514  MOV     @SCSR,ACSR      ;SAVE CONTENTS OF THE CSR IN ACSR
000366' 042777  000100  177630  BIC     #100,@SCSR      ;TURN OFF INTERRUPT
                                ;*****************************************************************************
000374' 104405  000000' 000000  HRDERS,BEGIN,NULL       ;DONE DID NOT SET
                                ;*****************************************************************************
000402' 104410  000000'                 ENDS,BEGIN      ;
000406' 012767  000000  000452  AA11B:  MOV     #0,XPOS                 ;SHOULD WORK FOR ALL SCOPES
000414' 005067  000444                  CLR     YPOS
000420' 012767  000006  000446          MOV     #6,CNTR                 ;6 CHARACTER COUNT
000426' 012767  001014' 000436          MOV     #TEXT,PNTR              ;TEXT "PDP-11"
000434' 012777  000540' 177346          MOV     #CHAR3,@VECTOR          ;POINT NEXT INTR TO CHAR3
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                                ;PLOT CHARACTER
000442' 017767  000424  000410  TXT1:   MOV     @PNTR,AAR2
000450' 016767  000410  000412  CHAR:   MOV     YPOS,YPT                ;INIT ENTER WITH SCOPE INTERRUPT
000456' 052777  000024  177540          BIS     #24,@SCSR               ;ENABLE INTENSIFY OR LOADING Y
000464' 012767  177773  000362          MOV     #-5,AAR0                ;MATRIX COUNT (ROW)
000472' 012767  177771  000356  CHAR1:  MOV     #-7,AAR1                ;MATRIX COUNT (COLUMN)
000500' 117767  000354  000354          MOVB    @AAR2,AAR3              ;GET CHARACTER
000506' 005267  000346                  INC     AAR2
000512' 106167  000344          CHAR2:  ROLB    AAR3                    ;INTENSIFY POINT?
000516' 100026                          BPL     CHAR13                  ;NO
000520' 016777  000342  177500          MOV     XPOS,@DAC0              ;LOAD X
000526' 016777  000332  177474          MOV     YPOS,@DAC1              ;LOAD Y AND INTENSIFY
000534' 104400  000000'                 EXIT$,BEGIN                     ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.


000540'                         CHAR3:
                                ;-------------------------------------------------------------
000540' 000004  000000' 000546'         PIRQ$,BEGIN,A$          ; QUEUE UP TO CONTINUE AT A$ AND RTI
                                ;-------------------------------------------------------------
000546' 105777  177452          A$:     TSTB    @SCSR                   ;IS DONE SET
000552' 100410                          BMI     CHAR13                  ;BR IF DONE SET
000554' 017767  177444  177320          MOV     @SCSR,ACSR              ;SAVE CONTENTS OF CSR
                                ;*************************************************************
000562' 104405  000000' 000000          HRDERR$,BEGIN,NULL              ;DONE BIT NOT SET
                                ;*************************************************************
                                ;
000570' 104410  000000'                 END$,BEGIN              ;
000574' 062767  000070  000262  CHAR13: ADD     #70,YPOS                ;NEXT POINT
000602' 005267  000250                  INC     AAR1                    ;DONE ALL POINTS IN A COLUMN?
000606' 001341                          BNE     CHAR2                   ;NO
000610' 016767  000254  000246          MOV     YPT,YPOS                ;NEXT COLUMN
000616' 062767  000070  000242          ADD     #70,XPOS                ;ADD SCALE
000624' 005267  000224                  INC     AAR0                    ;DONE ALL COLUMNS?
000630' 001320                          BNE     CHAR1                   ;NO
000632' 062767  000070  000226          ADD     #70,XPOS                ;YES, POSITION FOR NEXT CHARACTER
000640' 062767  000002  000224          ADD     #2,PNTR                 ;NEXT CHARACTER
000646' 005767  177144                  TST     SR1                     ;TWO COLOR SCOPE ??
000652' 001441                          BEQ     CH4A                    ;BR IF NOT
000654' 032777  001000  177342          BIT     #1000,@SCSR             ;GREEN BIT SET ??
000662' 001010                          BNE     2$                      ;BR IF SET
000664' 052777  001000  177332          BIS     #1000,@SCSR             ;NO,SET FOR GREEN
000672' 012777  000714' 177110  3$:     MOV     #CHAR4,@VECTOR          ;POINT NEXT INTR TO CHAR4
000700' 104400  000000'                 EXIT$,BEGIN                     ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
000704' 042777  001000  177312  2$:     BIC     #1000,@SCSR             ;CLEAR GREEN BIT
000712' 000767                          BR      3$                      ;GO EXIT
000714'                         CHAR4:
                                ;-------------------------------------------------------------
000714' 000004  000000' 000722'         PIRQ$,BEGIN,1$          ; QUEUE UP TO CONTINUE AT 1S AND RTI
                                ;-------------------------------------------------------------
000722' 105777  177276          1$:     TSTB    @SCSR           ;WAS THE DONE BIT SET??
000726' 100410                          BMI     2$              ;BR IF YES
000730' 017767  177270  177144          MOV     @SCSR,ACSR      ;SAVE CONTENTS OF THE CSR
                                ;*************************************************************
000736' 104405  000000' 000000          HRDERR$,BEGIN,NULL      ;DONE NOT SET
                                ;*************************************************************
000744' 104410  000000'                 END$,BEGIN              ;
000750' 012777  000540' 177032  2$:     MOV     #CHAR3,@VECTOR  ;RESET VECTOR
```



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000756' 005367  000112          CH4A:   DEC     CNTR                    ;DONE ALL?
000762' 001227                          BNE     TXT1                    ;NO
000764' 042777  000002  177232          BIC     #2,@SCSR                ;INIT AND ERASE
000772' 005367  000100                  DEC     COUNT                   ;COUNT IT
000776' 001002                          BNE     1$                      ;BR IF 100. TIMES
001000' 005077  177220                  CLR     @SCSR
001004'                         1$:
001004' 104413  000000'                 ENDIT$,BEGIN            ;SIGNAL END OF ITERATION.
                                                                ;MONITOR SHALL TEST END OF PASS
001010' 000167  177372                  JMP     AA11B           ;GO DO IT AGAIN

                                ;TEXT FOR AA11 DAC WITH SCOPE OPTION
                                ;TEXT = "PDP11"
001014' 001030'                 TEXT:   P
001016' 001042'                         XD
001020' 001030'                         P
001022' 001035'                         DASH
001024' 001047'                         N1
001026' 001047'                         N1
001030'     177     011     011  P:     .BYTE 177,11,11,11,6
001033'     011     006
001035'     000     010     010  DASH:   .BYTE 0,10,10,10,0
001040'     010     000
001042'     177     101     101  XD:     .BYTE 177,101,101,101,76
001045'     101     076
001047'     000     102     177  N1:     .BYTE 0,102,177,100,0
001052'     100     000
                                        .EVEN

001054' 000000                  AAR0:   OPEN                            ;AA11 (ROW)
001056' 000000                  AAR1:   OPEN                            ;AA11 (COLUMN)
001060' 000000                  AAR2:   OPEN                            ;CHARACTER POINTER
001062' 000000                  AAR3:   OPEN                            ;HOLDS CHARACTER
001064' 000000                  YPOS:   OPEN
001066' 000000                  XPOS:   OPEN
001070' 000000                  YPT:    OPEN
001072' 000000                  PNTR:   OPEN
001074' 000000                  CNTR:   OPEN
001076' 000000                  COUNT:  OPEN                            ;KEEPS TRACK OF SWIPES PER PASS


000001                                  .END
```

```
AAR0    001054R  280*  307*  360#
AAR1    001056R  281*  303*  361#
AAR2    001060R  276*  282   283*  362#
AAR3    001062R  282*  284*  363#
AAI1    000342R  248   258#
AA11A   000352R  260   262   263#
AA11B   000406R  264   271#  341
ACSR    001022R  211#  265*  297*  326*
ADDR    000006R  177#  242
ADDR22= 001000   229#
ASB     000106R  215#
ASTAT   000104R  213#
AWAS    000110R  216#
A$      000546R  293   295#
BEGIN   000000R  174#  254   260   268   270   288   293   299   301   317   322   328   330
                 339
BIT0  = 000001   229#
BIT1  = 000002   229#
BIT10 = 002000   229#
BIT11 = 004000   229#
BIT12 = 010000   229#
BIT13 = 020000   229#
BIT14 = 040000   229#
BIT15 = 100000   229#
BIT2  = 000004   229#
BIT3  = 000010   229#
BIT4  = 000020   229#
BIT5  = 000040   229#
BIT6  = 000100   229#
BIT7  = 000200   229#
BIT8  = 000400   229#
BIT9  = 001000   229#
BREAK$= 104407   229#
BR1     000012R  179#  250
BR2     000013R  180#
BTOD$ = 104421   229#
CDATA$= 104412   229#
CHAR    000450R  276#
CHAR1   000472R  281#  308
CHAR13  000574R  285   296   302#
CHAR2   000512R  284#  304
CHAR3   000540R  275   291#  331
CHAR4   000714R  316   320#
CH4A    000756R  312   332#
CNTR    001074R  273*  332*  368#
CONFIG  000056R  199#
COUNT   001076R  252*  335*  369#
CSRA    000100R  209#  251*
DAC0    000226R  233#  245*  286*
DAC1    000230R  234#  247*  287*
DASH    001035R  347   352#
DATCK$= 104411   229#
DATER$= 104404   229#
DVID1   000014R  181#
ENDIT$= 104413   229#  339
END$  = 104410   229#  270   301   330
```



```
ERRTYP  000106R  214#
EXIT$ = 104400   229#  254   288   317
GETPA$= 104415   229#
GWBUF$= 104414   229#
HRDCNT  000044R  194#
HRDER$= 104405   229#  268   299   328
HRDPAS  000050R  196#
ICONT   000036R  191#
ICOUNT  000040R  192#
IDNUM   000122R  221#
INIT    000030R  188#
INTR    000120R  220#  239*  240*
MAP22$= 104416   229#
MODNAM  000000R  175#
MODSP   000224R  189   227#
MSGM$ = 104403   229#
MSGS$ = 104402   229#
MSG$  = 104401   229#
NULL  = 000000   229#  268   299   328
N1      001047R  348   349   356#
OPEN  = 000000   176   182   183   184   185   202   203   204   205   206   207   208   209
                 211   213   215   216   218   219   220   229#  232   233   234   360   361
                 362   363   364   365   366   367   368   369
                 229#
OTOA$ = 104420   229#
P       001030R  344   346   350#
PASCNT  000034R  190#
PIRQ$ = 000004   229#  260   293   322
PNTR    001072R  274#  276   310*  367#
POPSP = 005726   229#
POPSP2= 022626   229#
PRTY  = 000000   180   229#
PRTY0 = 000000   229#
PRTY1 = 000040   229#
PRTY2 = 000100   229#
PRTY3 = 000140   229#
PRTY4 = 000200   179   229#
PRTY5 = 000240   229#
PRTY6 = 000300   229#
PRTY7 = 000340   229#
PS    = 177776   229#
PSW   = 177776   229#
PUSH  = 005746   229#
PUSH2 = 024646   229#
RAND$ = 104417   229#
RANNUM  000054R  198#
RESTRT  000254R  217   242#
RES1    000056R  200#
RES2    000060R  201#
RSTRT   001112R  214#
SBADR   000102R  210#
SCSR    000224R  232#  243*  251   253*  263   265   266*  279*  295   297   313   315*  318*
                 324   326   334*  337*
SOFCNT  000042R  193#
SOFER$= 104406   229#
SOFPAS  000046R  195#
SPOINT  000032R  189#
```

```
SPSIZ = 000040              1#     222
SR1     000016R           182#     311
SR2     000020R           183#
SR3     000022R           184#
SR4     000024R           185#
START   000232R           188      238#
STAT    000026R           187#
SVR0    000062R           202#
SVR1    000064R           203#
SVR2    000066R           204#
SVR3    000070R           205#
SVR4    000072R           206#
SVR5    000074R           207#
SVR6    000076R           208#
SYSCNT  000052R           197#
TEXT    001014R           274      344#
TRPOFD= 000022            229#
TXT1    000442R           276#     333
VECTOR  000010R           178#     248     275*    316*    331*
WASADR  000104R           212#
WDFR    000116R           219#     238*
WDTO    000114R           218#
XD      001042R           345      354#
XFLAG   000005R           176#
XPOS    001066R           271*     286     306*    309*    365#
YPOS    001064R           272*     278     287     302*    305*    364#
YPT     001070R           278*     305     366#

. ABS.  000000      000
        001100      001

 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 XAAADO,XAAADO/SOL/CRF:SYM=DDXCON,XAAADO
 RUN-TIME:  1  1  .3 SECONDS
 RUN-TIME RATIO: 11/3=3.6
 CORE USED:  7K  (13 PAGES)
```