

.REM 2

IDENTIFICATION

PRODUCT CODE: AC-E442A-MC
PRODUCT NAME: CVKDAAO PDT11/150 SYSTEM EXERCISER
PRODUCT DATE: SEPT 1978
MAINTAINER: DIAGNOSTIC ENGINEERING

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1.0 GENERAL PROGRAM INFORMATION.

1.1 PROGRAM PURPOSE (ABSTRACT).

THE PDT-11/150 SYSTEM EXERCISER TESTS THE PROCESSORS ABILITY TO OPERATE ALL ITS PERIPHERALS IN INTERRUPT MODE AT THE SAME TIME WITH EMPHASIS ON THE DISK SUBSYSTEMS. IT SHOULD BE NOTED THAT IT IS NOT A DIAGNOSTIC OF THE PERIPHERALS BUT A SERIES OF SYSTEM INTERACTION TESTS.

THE PROGRAM IS DEFAULTED TO EXERCISE THE CLUSTER TERMINALS & THE COMM PORT IN INTERNAL LOOPBACK (MAINT) MODE. THE DEFAULT CAN BE CHANGED TO EXERCISE ANY OF THE CLUSTER TERMINALS AND/OR THE COMM PORT IN EXTERNAL LOOPBACK. SEE PROGRAM OPTIONS SEC. 2.4.

TESTING OF THE ACTUAL CLUSTER TERMINALS OR COMM DEVICE IS NOT PERFORMED. THESE DEVICES CAN ONLY BE TESTED EITHER IN EXT. OR INT. LOOPBACK.

THE PRINTER LOGIC WILL BE EXERCISED IF SIZING DETERMINES IT TO BE PRESENT OR IF DATA TERM RDY IS ASSERTED ON ITS CONNECTOR.

THE CONSOLE TERMINAL IS NOT TESTED.

AFTER THE MEMORY HAS BEEN TESTED & ALL THE PERIPHERALS ARE BEING EXERCISED & INTERRUPTING AT RANDOM, THE DISK SUBSYSTEM TESTS WILL BEGIN. SEE TEST SUMMARY SEC. 7.0.

THE PROGRAM CONTAINS A UTILITY WHICH CAN COPY THE SYSTEM EXERCISER DISK FROM DX0 ONTO A SCRATCH DISK IN DX1. THIS ENABLES THE OPERATOR TO CREATE BACKUP COPIES OF THE EXERCISER DISK. SEE SECTION 2.8.

THE PROGRAM ALSO CONTAINS A COMPATABILITY TESTING OPTION. SEE SEC. 2.7.

1.2 SYSTEM REQUIREMENTS.

HARDWARE REQUIREMENTS:

PDT-11/150 SYSTEM
8K MEMORY - MINIMUM
CONSOLE TERMINAL
EXTERNAL LOOPBACK CONNECTORS (OPTIONAL) FOR COMM & CLUSTER TERMINAL PORTS.
(SEE PROGRAM OPTIONS SEC. 2.4)
VT-100 CONSOLE MUST BE SETUP FOR JUMP SCROLL.

SOFTWARE REQUIREMENTS:

THIS EXERCISER IS DESIGNED TO RUN IN ANY OF THE FOLLOWING WAYS:

STAND ALONE
WITH APT MONITOR
WITH RT-11 MONITOR

IT IS NOT DESIGNED TO RUN WITH THE DIAGNOSTIC SUPERVISOR.

1.3 RELATED DOCUMENTS AND STANDARDS.

DIAGNOSTIC ENGINEERING STANDARDS AND CONVENTIONS	175-003-009-02
APT	MD-11-DZZMA
SYSMAC	MD-11-DZQAC

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

THIS EXERCISER ASSUMES THAT THE POWER UP SELF TEST RUNS ERROR FREE.

1.5 ASSUMPTIONS

THIS EXERCISER ASSUMES THAT THE OPERATOR HAS MODIFIED THE DEVICE MAP (\$DEVN) AT LOC. 1246 IF THE DEFAULTS DO NOT AGREE WITH THE ACTUAL SYSTEM CONFIGURATION. SEE PROGRAM OPTIONS SEC. 2.4.
THE PROGRAM ALSO ASSUMES THE SOFTWARE SWITCH REGISTER IS PROPERLY SET UP (SWREG) AT LOC. 176. SEE SEC. 2.3.

1.6 RUNNING SYSTEMS PROGRAMS

UNLESS THE SYSTEMS PROGRAMS ARE KNOWN TO INITIALIZE THE BAUD RATES OF EACH DEVICE THRU THE PARAMETER REGISTER, THE OPERATOR SHOULD POWER DOWN & UP AGAIN WHEN FINISHED RUNNING THIS EXERCISER. THIS IS TO RESTORE THE PDT-11/150 TO ITS DEFAULT BAUD RATES. OTHERWISE, THE DEVICES WILL ATTEMPT TO RUN AT WHATEVER BAUD RATES WERE LAST USED BY THIS EXERCISER.

2.0 OPERATING INSTRUCTIONS.

2.1 LOADING AND STARTING PROCEDURES.

USE STANDARD PROCEDURE FOR PDP-11 ABSOLUTE BINARY FORMATTED PAPER TAPE.
THE PROGRAM WILL AUTO-START AFTER LOADING.

THE SYSTEM EXERCISER DISK WILL AUTO-START AFTER BOOTING.

EXAMPLE OF STARTUP ASSUMING PRINTER NOT PRESENT, 24K MEMORY,
& TERM #2 NOT TO BE TESTED, COMM PORT EXT. LOOPBACK, TERM 1 & 3 INT. LOOPBACK.
(20007 IN \$DEV, SEE SEC. 1.5):

PDT-11/150 SYSTEM EXERCISER

SWR - 000000 NEW = 110000 <CR> (HALT ON ERR, ENABLE PERFORMANCE REPORTS)

DEV = 000017 NEW = <CR> (KEEP DEFAULTS)

24K MEMORY PRESENT
PRINTER NOT PRESENT
TERM #2 TESTING DROPPED

INSERT SCRATCH DISKS, TYPE 'P' FOR NORMAL TESTING
'240G' FOR NORMAL RESTARTS
'250G' TO COPY SYS EXERCISER DISK
'260G' FOR COMPATIBILITY PASS 1: WRITE
'270G' FOR PASS 2: READ

(PROGRAM HALTS & WAITS FOR 'P' & CONTINUES....ABOVE NOTE & HALT OMITTED UNDER APT)

THE PROGRAM WILL BEGIN ACTUAL TESTING AT THIS POINT. (SEE SUMMARY OF TESTS SEC. 7.0)

DURING THE TESTS, THE PROGRAM WILL PRINT PROGRESS REPORTS (SEE SEC. 4.1) IF
BIT 12 IS SET IN THE SWREG (SEE SEC 2.3).

END OF PASS & TOTAL ERROR COUNT IS PRINTED AT THE CONCLUSION OF TESTING.
THE PROGRAM JUMPS TO THE BEGINNING & THE ABOVE SEQUENCE IS REPEATED UNTIL HALTED.

2.2 SPECIAL ENVIRONMENTS.

THIS DIAGNOSTIC FOLLOWS THE STANDARD PROCEDURE FOR RUNNING UNDER APT, RT-11 MONITORS, AS DESCRIBED IN THEIR RESPECTIVE PROCEDURES MANUAL AND SYSMAC PACKAGE.

2.3 OPERATIONAL SWITCH SETTINGS

THIS PROGRAM SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (SWREG AT LOC. 176) FROM THE CONSOLE. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

- 1) TYPE CONTROL G <^G>; THIS WILL ALLOW THE CONSOLE TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.
- 2) THE MACHINE WILL THEN TYPE: ' SWR=XXXXXX NEW=' (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)
- 3) AFTER THE 'NEW=' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE CONSOLE:
 - A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED). LEADING ZEROS NEED NOT BE TYPED, AND IF MORE THAN 6 DIGITS ARE TYPED THE LAST 6 WILL BE USED. IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.
 - B) IF A CONTROL U <^U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 3.
 - C) IF THE INPUT CHARACTER IS NOT ONE OF THE CHARACTERS MENTIONED ABOVE THEN A QUESTION MARK (?) WILL BE TYPED FOLLOWED BY A CARRAGE RETURN AND A LINE FEED SEQUENCE THEN PROCEED FROM STEP 3 (ERASING ALL PREVIOUS INPUT).
- 4) THE DIAGNOSTIC WILL CONTINUE ON TYPING <CR>.

SOFTWARE SWITCH REGISTER OPTIONS (SWREG)

BIT 15 SET = 100000 = HALT ON ERROR
13 SET = 20000 = INHIBIT ERROR TYPEOUTS
12 SET = 10000 = ENABLE PERFORMANCE REPORTS
10 SET = 2000 = BELL ON ERROR

2.4 PROGRAM OPTIONS.

A DEVICE MAP (\$DEV) AT LOCATION 1246 (ENTERED BY A CONTROL-G & CONTROL-C) IS EXAMINED BY THE PROGRAM TO DETERMINE THE METHOD OF TESTING THE CLUSTER TERMINALS & THE COMM PORT.

THE DEFAULT VALUE = 000017 (INTERNAL LOOPBACK FOR COMM PORT & CLUSTER TERMINALS) IT CAN BE CHANGED TO DO THE FOLLOWING:

\$DEV (LOC 1246) ENTERED BY CONTROL-G & C

```

BIT 15 SET= 100000= DROP PRINTER TESTS
          14 SET= 40000= DROP CLUSTER TERM #3 TESTS
          13 SET= 20000= #2
          12 SET= 10000= #1
          11 SET= 4000= DROP ASYNC COMM TESTS
          10 SET= 2000= DROP SYNC COMM TESTS
           9 SET= 1000= DROP DRIVE 1 TESTS
           8 SET= 400= DROP DRIVE 0 TESTS
           7 SET= 200= DROP CLOCK TESTS

BIT 3 SET= 10= INT. LOOPBACK (MAINT MODE) FOR COMM PORT (DEFAULT)
  2 SET= 4= INT. LOOPBACK (MAINT MODE) FOR TERM #1 (DEFAULT)
  1 SET= 2= INT. LOOPBACK (MAINT MODE) FOR #2 (DEFAULT)
  0 SET= 1= INT. LOOPBACK (MAINT MODE) FOR #3 (DEFAULT)

BIT 3 CLR= EXT. LOOPBACK FOR COMM PORT.
BIT 2 CLR= EXT. LOOPBACK FOR TERM #1.
BIT 1 CLR= EXT. LOOPBACK FOR TERM #2.
BIT 0 CLR= EXT. LOOPBACK FOR TERM #3.

```

NOTES:

1. THE CONSOLE IS NOT TESTED.
2. BITS 15-7 SETTINGS WILL OVERRIDE BIT 3-0 SETTINGS.
3. THE PRINTER LOGIC WILL BE TESTED IF BIT 15 = 0 & THE DATA TERM READY IS ASSERTED ON THE CONNECTOR. (A PHYSICAL PRINTER IS NOT REQ'D)
4. A VT-50,52 MAY BE USED INSTEAD OF A PRINTER FOR A VISUAL CHECK.

2.5 EXECUTION TIMES.

ASSUMING ALL DEVICES & 2 DISK SUBSYSTEMS PRESENT:

1ST PASS:

- 25 - 30 SEC TO STARTUP CLOCK, PRINTER, COMM DEVICE & CLUSTER TERMINALS.
- 10 - 40 SEC TO WRITE, READ & DATA COMPARE 1ST TRACK ON BOTH DISKS.
- 5 - 60 SEC TO DO 10 RANDOM SEEKS ON EACH DISK BETWEEN 1ST 10 TRACKS.

SUBSEQUENT PASSES:

- 30 SEC TO STARTUP CLOCK, PRINTER, COMM DEVICE & CLUSTER TERMINALS.
- 20 MIN TO WRITE, READ & DATA COMPARE ALL TRACKS ON BOTH DISKS.
- 5 MIN TO DO 500 RANDOM SEEKS ON EACH DISK BETWEEN ALL TRACKS.

2.6 POWER FAIL

THERE IS NO POWER FAIL AUTO-RESTART CAPABILITY IN THE PDT-11.

2.7 COMPATABILITY TESTING

PASS 1: ENTERED FROM A '260G'.

WILL WRITE ALL TRACKS & SECTORS ON SELECTED DRIVES
& HALT AFTER AN OPERATOR PROMPT. TYPING 'P' WILL BEGIN PASS 2.

PASS 2: ENTERED BY A 'P' AFTER THE ABOVE HALT, OR A '270G'.

WILL PERFORM SEQUENTIAL & RANDOM READS ONLY, ON THE SELECTED DRIVES.

2.8 COPY UTILITY

TO PROVIDE BACKUP DISKS, A UTILITY IS PROVIDED IN THE PROGRAM TO COPY
THE SYSTEM EXERCISER DISK FROM DX0 TO DX1 IN THE FOLLOWING WAY:

1. BOOT THE EXERCISER NORMALLY FROM DX0.
2. ALLOW THE PROGRAM TO HALT AFTER THE WARNING MESSAGE TO USE SCRATCH DISKS.
3. AT THIS POINT, DO A '250G' TO ENTER THE COPY UTILITY.
4. THE OPERATOR WILL BE PROMPTED TO USE A SCRATCH DISK IN DX1 & TYPE 'P' TO PROCEED.
5. WHEN COMPLETED, THERE WILL BE A VERIFYING MESSAGE.
THE OPERATOR CAN THEN DO A 'P' TO COPY ANOTHER IN THE SAME MANNER,
OR A '240G' TO BEGIN NORMAL TESTING. (OPERATOR WILL BE PROMPTED)
6. THE COPY UTILITY CAN BE ENTERED AT ANY TIME BY DOING A 'BREAK' & '250G'.

3.0 ERROR INFORMATION.

3.1 ERROR REPORTING PROCEDURE.

TYPICAL ERROR PRINTOUTS ARE SHOWN BELOW:

TERM #3 DATA COMP ERR

ERROR #	ERR PC	EXPECT	RECVD
000011	006516	000200	000100

DX1 SOFT ERR - DATA COMP

DXTST #	ERR PC	RXCS	RXES	RXSA	EXPECT	RECVD	# RETRIES
000003	010636	100337	000230	003405	100520	100120	4

DX0 HARD ERR - AFTER WRITE CMD

ERROR #	DXTST #	ERR PC	RXCS	RXES	TRACK	SECTOR	#RETRIES
000016	000001	011246	100337	000230	59	18	10

WHERE ALL VALUES TYPED ARE OCTAL EXCEPT :
#RETRIES, TRACK, & SECTOR WHICH ARE IN DECIMAL.

BITS 15,13, & 10 OF THE SWITCH REGISTER (SWREG) CONTROL THE
SEQUENCE OF EVENTS AFTER AN ERROR IS CAUGHT.

BIT 15 SET: CAUSES THE PROGRAM TO HALT IN THE ERROR ROUTINE.
IF THE PROGRAM IS CONTINUED, IT WILL PROCEED
FROM WHERE IT HALTED.

BIT 13 SET: DISABLES THE PRINTING OF THE ERROR MESSAGE.

BIT 10 SET: CAUSES THE BELL TO RING ON ERROR.

THE ERROR ROUTINE SUPPORTS THE CONTROL G <^G> FUNCTION.
REFER TO SECTION 2.3 FOR DETAILS.

NOTE: SINCE THERE ARE NO SPECIFIC TEST NUMBERS, APT WILL
REPORT ALL ERRORS AS TEST 0 ERRORS.

3.2 ERROR HALTS.

THE ONLY HALT IN THE EXERCISER IS IN THE ERROR ROUTINE, AND
IS EXECUTED ONLY IF BIT 15 OF THE SWITCH REGISTER (SWREG) IS SET
WHEN AN ERROR OCCURS.

4.0 PROGRESS & PERFORMANCE REPORTS

THE FOLLOWING REPORTS ARE ENABLED BIT 12 SET IN THE SWITCH REGISTER (SWREG LOC 176)
& WILL APPEAR FOLLOWING LOADING & STARTING AS DESCRIBED
IN SECTION 2.1 (ASSUMING ALL DEVICES ARE TO BE TESTED & NO ERRORS):

MEM TESTS DONE	(ALL MEMORY FROM LOCATION 0 TO THE BEGINNING OF THE MONITOR/ABS LOADER HAS BEEN TESTED.)
CLOCK RUNNING	(100 INTERRUPTS HAVE BEEN DETECTED BEFORE EXERCISING THE NEXT DEVICE. THE CLOCK CONTINUES RUNNING IN INTERRUPT MODE.)
PRINTER RUNNING	(5 LINES HAVE BEEN PRINTED WITH ERROR BIT CHECKING ONLY. THE PRINTER RUNS CONTINUOUSLY IN INTERRUPT MODE AT 9600 BAUD. ITS ACTUAL PERFORMANCE IS A VISUAL CHECK IF PRINTER CONNECTED. NO OTHER CHECKING PERFORMED IF EXTERNAL LOOPBACK USED.)
SYNC COMM DONE	(CHARACTERS 0 THRU 377 HAVE BEEN TRANSMITTED & RECEIVED WITH ODD PARITY ENABLED. INTERRUPTS ARE THEN DISABLED & THE SYNC COMM IS NO LONGER EXERCISED. THIS IS SO THAT THE ASYNC COMM CAN BE EXERCISED FOR THE DURATION OF THE PASS.)
ASYNC COMM RUNNING	(CHARS 0 THRU 377 HAVE BEEN TRANSMITTED & RECEIVED BEFORE EXERCISING THE NEXT DEVICE. IT CONTINUES RUNNING IN INTERRUPT MODE AT 9600 BAUD WITH ODD PARITY ENABLED & REPEATS THE 0 THRU 377 CYCLE)
TERM #1 RUNNING	(CHARACTERS 0 THRU 377 HAVE BEEN TRANSMITTED & RECEIVED BEFORE EXERCISING THE NEXT DEVICE. THE TERMINAL KEEPS RUNNING CONTINUOUSLY AT 2400 BAUD IN INTERRUPT MODE & REPEATS THE 0 THRU 377 CYCLE)
TERM #2 RUNNING	(SAME AS #1)
TERM #3 RUNNING	(SAME AS #1)
DX0 TRK 0 DONE	(DRIVE 0, TRACK 0 IS WRITTEN WITH A DATA PATTERN, READ & DATA COMPARE PERFORMED)
DX1 TRK 0 DONE	(DRIVE 1, TRACK 0 IS WRITTEN WITH A DATA PATTERN, READ & DATA COMPARE PERFORMED)
DX0 TRK 1 DONE	(ETC)
DX1 TRK 1 DONE	(ETC UNTIL...)
DX0 DATA PATT DONE	(ALL TRACKS HAVE BEEN WRITTEN WITH A DATA PATTERN IN INTERRUPT MODE.)
DX1 DATA PATT DONE	(SAME AS DX0....TRK 0 ONLY FOR 1'ST PASS QUICK VERIFY)
DX0 RANDOM SEEKS DONE	(500 RANDOM SEEKS WITH READ & DATA COMPARE HAVE BEEN PERFORMED ON DRIVE 0)
DX1 RANDOM SEEKS DONE	(SAME AS DX0....10 RANDOM SEEKS ONLY FOR 1'ST PASS QUICK VERIFY)
END OF PASS #1	TOTAL ERRORS: 0 TOTAL SOFT ERRORS: 0 TOTAL ERRORS THIS PASS: 0 SOFT ERRORS THIS PASS: 0 (...& ENTIRE PROCESS REPEATS)

5.0 DEVICE REGISTERS.

PARAMETER REGISTER:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				

PORT				BAUD				USR		USR		PAR		PAR		CHAR		MAIN	
SELECT				RATE				LT2		LT1		TYP		EN		LENGTH			

177420 (WR ONLY)

LINE CLOCK:

VECTOR: 100

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

								CLK							
								IE							

177546

CONSOLE: ADDR: 177560-177566 VECTOR: 60/64
CLUSTER #1: 176500-176506 300/304
#2: 176510-176516 310/314
#3: 176520-176526 320/324

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		

TKS								RCVR		RCVR							
								DONE		IE							

TKB								KB DATA BUFFER									

TPS								XMIT		XMIT							
								RDY		IE							

TPB								PRINTER DATA BUFFER (WRITE ONLY)									

PRINTER:

VECTOR: 200

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
PRSR	ERR								PRIN	PRIN							177514
									RDY	IE							
PRB																	177516

PRINTER DATA BUFFER
(WRITE ONLY)

ASYNCH MODEM:

VECTOR: 330/334

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
RCSR	DSI	RING	CTS	CAR		SEC	DSET		RCVR	RCVR	DSET		SEC	RTS	DTR		176610
				DET		REC	RDY		DONE	IE	IE		XMIT				
RBUF	ERR	OR	FR	PAR													176612
	ERR	ERR	ERR	ERR													
XCSR									XMIT	XMIT						BRK	176614
									RDY	IE							
XBUF																	176616

RECEIVER DATA BUFFER
TRANSMITTER DATA BUFFER
(WRITE ONLY)

SYNC MODEM:

VECTOR: 340/344

	15	14	1
--	----	----	---

7.0 SUMMARY OF TESTS (SEE PROGRAM LISTING FOR ADDT'L DETAILS ON SPECIFIC TESTS)

PHASE 1

MEMORY TESTS A. LOC 0 THRU END OF PROGRAM IS TESTED FOR TIMEOUT.
 B. END OF PROGRAM TO BOTTOM OF MONITOR/ABS LOADER
 IS TESTED WITH A 1010 & 0101 PATTERN.
 C. IF 28K PRESENT, MEMORY FROM 28K TO 30K IS SIMILARLY TESTED.

PHASE 2

ALL AVAILABLE PERIPHERALS ARE EXERCISED CONTINUOUSLY IN INTERRUPT MODE.

SEE SECTION 2.4 FOR DETAILS OF SETTING UP THE DEVICE MAP (\$DEVM) FOR DEVICE TO BE TESTED.
SEE SECTION 4.1 FOR DETAILS ON PROGRESS REPORTS.

START LINE CLOCK	INTERRUPTS ARE DETECTED.
START PRINTER	CONTINUOUS LINES ARE PRINTED.
START SYNC COMM PORT	CHARS 27 THRU 377 " " " " " " " " 1 PASS ONLY
START ASYNC COMM PORT	CHARS 0 THRU 377 TESTED CONTINUOUSLY.
START CLUSTER TERMINAL #1	CHARS 0 THRU 377 ARE XMITTED, REC'D & TESTED.
START CLUSTER TERMINAL #2	SAME
START CLUSTER TERMINAL #3	SAME

PHASE 3

WHILE THE ABOVE DEVICES ARE INTERRUPTING RANDOMLY, DISK SUBSYSTEM TESTS BEGIN:

FILL & EMPTY BUFFER TESTS ARE PERFORMED TO VERIFY THAT NO
CABLE CROSS-TALK PROBLEMS EXIST BEFORE BEGINNING ACTUAL
DATA TRANSFERS TO THE DISK SURFACE.

DX0 & DX1 DATA PATTERN: WRITE, READ & DATA COMPARE 1'ST 10 TRACKS ON 1'ST PASS.
ALL TRACKS ON SUBSEQUENT PASSES.

DX0 & DX1 RANDOM SEEKS: READ & DATA COMPARE.
20 SEEKS ON 1'ST 10 TRACKS ON 1'ST PASS.
500 SEEKS ON ALL TRACKS ON SUBSEQUENT PASSES.

DX0 INITIALIZE, RESTORE, WRITE DELETED DATA, READ STATUS, & INVALID ADDRESS TESTS.

NOTE:

1. RECOVERY IS PERFORMED (RESTORE COMMAND) AFTER ANY RNF ERROR ON WRITE OR READ.
2. DATA IS TESTED AFTER A HARD CRC ERROR ON A READ TO TEST WHETHER DATA CRC ERROR OR CRC ERROR.

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664
665      .TITLE PDT-11 EXERCISER
666      ;*COPYRIGHT (C) 1978
667      ;*DIGITAL EQUIPMENT CORP.
668      ;*MAYNARD, MASS. 01754
669      ;*
670      ;*PROGRAM BY GARY PAPAIZIAN
671      ;*
672      ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
673      ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
674      ;*
675
676      .SBTTL OPERATIONAL SWITCH SETTINGS
677
678      :
679      :      SWITCH      USE
680      :      -----
681      :      15          HALT ON ERROR
682      :      13          INHIBIT ERROR TYPEOUTS
683      :      12          ENABLE PERFORMANCE REPORTS
684      :      10          BELL ON ERROR
685      :
686
687
688      .SBTTL BASIC DEFINITIONS
689
690      ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
691      001100  STACK= 1100
692      .EQUIV EMT,ERROR      ;;BASIC DEFINITION OF ERROR CALL
693      .EQUIV IOT,SCOPE      ;;BASIC DEFINITION OF SCOPE CALL
694
695      ;*MISCELLANEOUS DEFINITIONS
696      000011  HT= 11          ;;CODE FOR HORIZONTAL TAB
697      000012  LF= 12          ;;CODE FOR LINE FEED
698      000015  CR= 15          ;;CODE FOR CARRIAGE RETURN
699      000200  CRLF= 200       ;;CODE FOR CARRIAGE RETURN-LINE FEED
700      177776  PS= 177776     ;;PROCESSOR STATUS WORD
701      .EQUIV PS,PSW
702      177774  STKLMT= 177774  ;;STACK LIMIT REGISTER
703      177772  PIRQ= 177772    ;;PROGRAM INTERRUPT REQUEST REGISTER
704      177570  DSWR= 177570    ;;HARDWARE SWITCH REGISTER
705      177570  DDISP= 177570   ;;HARDWARE DISPLAY REGISTER
706
707      ;*GENERAL PURPOSE REGISTER DEFINITIONS
708      000000  R0= %0          ;;GENERAL REGISTER
709      000001  R1= %1          ;;GENERAL REGISTER
710      000002  R2= %2          ;;GENERAL REGISTER
711      000003  R3= %3          ;;GENERAL REGISTER
712      000004  R4= %4          ;;GENERAL REGISTER
713      000005  R5= %5          ;;GENERAL REGISTER
714      000006  R6= %6          ;;GENERAL REGISTER
715      000007  R7= %7          ;;GENERAL REGISTER
716      000006  SP= %6          ;;STACK POINTER
717      000007  PC= %7          ;;PROGRAM COUNTER
```

718
719
720 000000
721 000040
722 000100
723 000140
724 000200
725 000240
726 000300
727 000340

;*PRIORITY LEVEL DEFINITIONS
PR0= 0 ;;PRIORITY LEVEL 0
PR1= 40 ;;PRIORITY LEVEL 1
PR2= 100 ;;PRIORITY LEVEL 2
PR3= 140 ;;PRIORITY LEVEL 3
PR4= 200 ;;PRIORITY LEVEL 4
PR5= 240 ;;PRIORITY LEVEL 5
PR6= 300 ;;PRIORITY LEVEL 6
PR7= 340 ;;PRIORITY LEVEL 7

728
729
730 100000
731 040000
732 020000
733 010000
734 004000
735 002000
736 001000
737 000400
738 000200
739 000100
740 000040
741 000020
742 000010
743 000004
744 000002
745 000001

;'SWITCH REGISTER' SWITCH DEFINITIONS

SW15= 100000
SW14= 40000
SW13= 20000
SW12= 10000
SW11= 4000
SW10= 2000
SW09= 1000
SW08= 400
SW07= 200
SW06= 100
SW05= 40
SW04= 20
SW03= 10
SW02= 4
SW01= 2
SW00= 1
.EQUIV SW09,SW9
.EQUIV SW08,SW8
.EQUIV SW07,SW7
.EQUIV SW06,SW6
.EQUIV SW05,SW5
.EQUIV SW04,SW4
.EQUIV SW03,SW3
.EQUIV SW02,SW2
.EQUIV SW01,SW1
.EQUIV SW00,SW0

746
747
748
749
750
751
752
753
754
755
756
757
758 100000
759 040000
760 020000
761 010000
762 004000
763 002000
764 001000
765 000400
766 000200
767 000100
768 000040
769 000020
770 000010
771 000004

;*DATA BIT DEFINITIONS (BIT00 TO BIT15)

BIT15= 100000
BIT14= 40000
BIT13= 20000
BIT12= 10000
BIT11= 4000
BIT10= 2000
BIT09= 1000
BIT08= 400
BIT07= 200
BIT06= 100
BIT05= 40
BIT04= 20
BIT03= 10
BIT02= 4

```

772      000002      BIT01= 2
773      000001      BIT00= 1
774                      .EQUIV BIT09,BIT9
775                      .EQUIV BIT08,BIT8
776                      .EQUIV BIT07,BIT7
777                      .EQUIV BIT06,BIT6
778                      .EQUIV BIT05,BIT5
779                      .EQUIV BIT04,BIT4
780                      .EQUIV BIT03,BIT3
781                      .EQUIV BIT02,BIT2
782                      .EQUIV BIT01,BIT1
783                      .EQUIV BIT00,BIT0
784
785                      ;*BASIC ''CPU'' TRAP VECTOR ADDRESSES
786      000004      ERRVEC= 4      ;;TIME OUT AND OTHER ERRORS
787      000010      RESVEC= 10     ;;RESERVED AND ILLEGAL INSTRUCTIONS
788      000014      TBITVEC=14     ;;'T' BIT
789      000014      TRTVEC= 14     ;;TRACE TRAP
790      000014      BPTVEC= 14     ;;BREAKPOINT TRAP (BPT)
791      000020      IOTVEC= 20     ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
792      000024      PWRVEC= 24     ;;POWER FAIL
793      000030      EMTVEC= 30     ;;EMULATOR TRAP (EMT) **ERROR**
794      000034      TRAPVEC=34     ;;'TRAP' TRAP
795      000060      TKVEC= 60      ;;TTY KEYBOARD VECTOR
796      000064      TPVEC= 64     ;;TTY PRINTER VECTOR
797      000240      PIRQVEC=240    ;;PROGRAM INTERRUPT REQUEST VECTOR
798
799
800
801
802                      ;;*****
803                      ;*      PDT-11/150 DEVICE VECTORS
804                      ;;*****
805
806      000200      PRVEC= 200      ;PRINTER
807
808      000100      CLKVEC= 100     ;LINE CLOCK
809
810      000330      AMRVEC= 330     ;ASYNC MODEM RECVR
811      000334      AMXVEC= 334     ;          XMTR
812
813      000340      SMRVEC= 340     ;SYNC MODEM RECVR
814      000344      SMXVEC= 344     ;          XMTR
815
816      000264      RXVEC= 264      ;DISK
817
818      000300      TK1VEC= 300     ;CLUSTER TERM #1 VECTORS
819      000304      TP1VEC= 304
820      000310      TK2VEC= 310     ;          #2
821      000314      TP2VEC= 314
822      000320      TK3VEC= 320     ;          #3
823      000324      TP3VEC= 324

```

```
824
825      ;:*****
826      ;:      PDT-11/150 DEVICE REGISTERS
827      ;:*****
828
829      177420      PARAM= 177420      ;PARAMETER REGISTER      (WRITE ONLY)
830
831      177546      CLK= 177546      ;LINE CLOCK
832
833      177514      PRS= 177514      ;PRINTER STATUS REG
834      177516      PRB= 177516      ;      BUFFER      (WRITE ONLY)
835
836      176610      AMRC= 176610      ;ASYNC MODEM RECVR STATUS REG
837      176612      AMRB= 176612      ;      BUFFER
838      176614      AMXC= 176614      ;      XMITR STATUS REG
839      176616      AMXB= 176616      ;      BUFFER      (WRITE ONLY)
840
841      176620      SMRC= 176620      ;SYNC MODEM RECVR STATUS REG
842      176622      SMRB= 176622      ;      BUFFER      (READ ONLY)
843      176622      SMPAR= 176622      ;      PARAMETER REG      (WRITE ONLY)
844      176624      SMXC= 176624      ;      XMITR STATUS REG
845      176626      SMXB= 176626      ;      BUFFER      (WRITE ONLY)
846
847      177170      RXCS= 177170      ;DISK CSR
848      177172      RXDB= 177172      ;      DATA BUFF
849      177172      RXES= 177172      ;      ERROR & STATUS REG
850      177174      RXSA= 177174      ;      TRK & SECTOR ADDR REG
851
852      176500      TK1S= 176500      ;CLUSTER TERMINAL #1
853      176502      TK1B= 176502
854      176504      TP1S= 176504
855      176506      TP1B= 176506
856
857      176510      TK2S= 176510      ;      #2
858      176512      TK2B= 176512
859      176514      TP2S= 176514
860      176516      TP2B= 176516
861
862      176520      TK3S= 176520      ;      #3
863      176522      TK3B= 176522
864      176524      TP3S= 176524
865      176526      TP3B= 176526
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866
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```
*****
*      PARAMETER REGISTER EQUATES      WRITE ONLY
*****

;BIT 14-12  PORT SELECT
;
CONSOL= 10000      ;SELECT CONSOLE TERMINAL
CT1= 0             ;CLUSTER TERMINAL #1
CT2= 50000         ;#2
CT3= 60000         ;#3
PRT= 20000         ;PRINTER PORT
AMOD= 30000        ;ASYNC COMM PORT
ULITE= 40000       ;USER LIGHTS

;BIT 11-8  BAUD RATE      (DELTA = 400)
;
B50= 0             ;50 BAUD
B75= 400           ;75
B110= 1000         ;110
B134= 1400         ;134.5
B150= 2000         ;150
B300= 2400         ;300
B600= 3000         ;600
B1200= 3400        ;1200
B1800= 4000        ;1800
B2000= 4400        ;2000
B2400= 5000        ;2400 (CLUSTER DEFAULT)
B3600= 5400        ;3600
B4800= 6000        ;4800
B7200= 6400        ;7200
B9600= 7000        ;9600 (PRINTER & ASYNC DEFAULT)
B19200= 7400       ;19200

;IF 110 BAUD SELECTED, 2 STOP BITS ARE ASSUMED.

;BITS 4-5  PARITY CONTROL
;
EPAR= 60           ;EVEN PARITY ENABLE
OPAR= 20           ;ODD PARITY ENABLE (DEFAULT)

;BITS 3-2  CHARACTER LENGTH (DELTA - 4)
;
CHAR5= 0           ;5 BITS/CHAR
CHAR6= 4           ;6
CHAR7= 10          ;7
CHAR8= 14          ;8 (PRINTER, TERMINAL, MODEM DEFAULT)

;BIT 1  MAINTENANCE BIT
;
MAINT= BIT1        ;ENABLE MAINT MODE
;PRINTER & DISK DO NOT HAVE MAINT MODE
```

```
920
921      ;*****
922      ;*      ASYNC MODEM BIT DEFINITIONS
923      ;*****
924
925      ;RCSR
926      ;
927      100000      DSI=      BIT15      ;DATA SET INTERRUPT
928      040000      RING=      BIT14      ;RING
929      020000      CTS=      BIT13      ;CLEAR TO SEND
930      010000      CDET=      BIT12      ;CARRIER DETECTED
931      002000      SREC=      BIT10      ;SECONDARY RECD/SUPERVISORY RECD
932      001000      DSRDY=      BIT9      ;DATA SET RDY
933      000200      DONE=      BIT7      ;RECVR DONE
934      000100      IE=      BIT6      ;RECVR IE
935      000040      DSIE=      BIT5      ;DATA SET IE
936      000010      SXMIT=      BIT3      ;SECONDARY XMIT/SUPERV XMIT
937      000004      RTS=      BIT2      ;REQ TO SEND
938      000002      DTR=      BIT1      ;DATA TERMINAL RDY
939
940      ;RBUF
941      ;
942      100000      ERR=      BIT15      ;ERROR
943      040000      ORERR=      BIT14      ;OVERRUN ERROR
944      020000      FRERR=      BIT13      ;FRAMING ERROR
945      010000      PARERR=      BIT12      ;PARITY ERROR
946
947      ;XCSR
948      ;
949      000200      RDY=      BIT7      ;XMIT RDY
950      000100      IE=      BIT6      ;XMIT IE
951      000001      BREAK=      BIT0      ;BREAK
952
```

```
953
954      ;*****
955      ;*      SYNC MODEM BIT DEFINITIONS
956      ;*****
957
958      ;RCSR
959      ;
960      100000      DSC=      BIT15      ;DATA SET CHANGE
961      040000      RING=      BIT14      ;RING
962      020000      CTS=      BIT13      ;CLEAR TO SEND
963      010000      CDET=      BIT12      ;CARRIER DETECTED
964      004000      RACT=      BIT11      ;RECVR ACTIVE (SYNC DETECT)
965      002000      SREC=      BIT10      ;SECONDARY RECD/SUPERVISORY RECD
966      001000      DSRDY=      BIT9      ;DATA SET RDY
967      000400      STSYN=      BIT8      ;STRIP SYNC
968      000200      DONE=      BIT7      ;RECVR DONE
969      000100      IE=      BIT6      ;RECVR IE
970      000040      DSIE=      BIT5      ;DATA SET IE
971      000020      SRSYN=      BIT4      ;SEARCH SYNC
972      000010      SXMIT=      BIT3      ;SECONDARY XMIT/SUPERV XMIT
973      000004      RTS=      BIT2      ;REQ TO SEND
974      000002      DTR=      BIT1      ;DATA TERMINAL RDY
975
976      ;RBUF
977      ;
978      100000      ERR=      BIT15      ;ERROR
979      040000      ORERR=      BIT14      ;OVERRUN ERROR
980      010000      PARERR=      BIT12      ;PARITY ERROR
981
982      ;PARCSR  PARAMETER CONT REG
983      ;
984      ;BIT 14  SYNC CHAR
985      ;
986      000000      SYNC2=      0      ;2 SYNC CHARS (DEFAULT)
987      040000      SYNC1=      BIT14      ;1
988
989      ;BITS 10-11  WORD LENGTH
990      ;
991      000000      CHR5=      0      ;5 BITS/CHAR
992      002000      CHR6=      2000      ;6
993      004000      CHR7=      4000      ;7
994      006000      CHR8=      6000      ;8 (DEFAULT)
995
996      ;BITS 8-9  PARITY CONTROL
997      ;
998      001400      ENVPAR=      1400      ;ENABLE EVEN PARITY
999      001000      ODDPAR=      1000      ;ENABLE ODD PARITY (DEFAULT)
1000
1001      ;XCSR
1002      ;
1003      100000      DNA=      BIT15      ;DATA NOT AVAIL
1004      010000      MM=      BIT12      ;MAINT MODE
1005      004000      MCLK=      BIT11      ;MAINT CLOCK
1006      000400      MR=      BIT8      ;MASTER RESET
```

```
1007      000200      RDY=      BIT7      ;XMIT RDY
1008      000100      IE=       BIT6      ;XMIT IE
1009      000040      DNAIE=    BIT5      ;DATA NOT AVAIL IE
1010      000020      SEND=     BIT4      ;SEND
1011      000010      HFDUP=    BIT3      ;1=HALF DUPLEX, 0=FULL DUPLEX (DEFAULT = 0 FOR TESTS)
```

```
1016      ;*****
1017      ;DISK BIT DEFINITIONS
1018      ;*****
```

```
1019      ;RXCS
1020      ;
1021      ;
1022      100000      ERR=      BIT15      ;ERROR
1023      000200      DONE=     BIT7      ;CONTR RDY
1024      000100      IE=      BIT6      ;DRIVE IE
1025      000020      DX1=     BIT4      ;UNIT SELECT: 0=DX0, 1=DX1
1026      000020      USEL=     BIT4      ;UNIT SELECT
```

```
1027      ;
1028      ;FUNCTIONS (INCLUDES BIT0 = GO)
1029      ;
1030      000001      FBUF=      1      ;FILL BUFFER
1031      000003      EBUF=      3      ;EMPTY BUFFER
1032      000005      WSEC=      5      ;WRITE SECTOR
1033      000007      RSEC=      7      ;READ SECTOR
1034      000011      INITAL=    11      ;INITIALIZE
1035      000013      RSTAT=     13      ;READ STATUS
1036      000015      WDDSEC=    15      ;WRITE DELETED DATA SECTOR
1037      000017      RESTOR=    17      ;RESTORE TO TRACK 0
```

```
1038      ;
1039      ;RXES: ERROR & STATUS
1040      ;
1041      000200      RDY=      BIT7      ;DRIVE RDY
1042      000040      DD=      BIT5      ;DELETED DATA DET.
1043      000020      RNF=     BIT4      ;RECORD NOT FOUND
1044      000010      CRC=     BIT3      ;CRC ERROR
1045      000004      LDATA=    BIT2      ;LOST DATA
1046      000002      INVADR=   BIT1      ;INVALID ADDR
1047      000001      ID=      BIT0      ;INITIALIZE DONE
```

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1048
1049
```

```

1050
1051
1052      ;*****
1053      ;*      SWITCH REGISTER
1054      ;*****
1055      .=174
1056 000174 000000  DISPREG: .WORD 0      ;SOFTWARE DISPLAY REG
1057 000176 000000  SWREG:  .WORD 0      ;SOFTWARE SWITCH REG
1058
1059      .=100
1060 000100 000102  102      ;SETUP CLOCK VECTOR AREA TO DO RTI
1061 000102 000002  2      ;IF ENABLED
1062
1063      .=-200
1064 000200 000137 003174  JMP      START      ;USE ONLY ONCE. WILL BE OVERLAID BY
1065                                     ;PRINTER VECTOR ADDR.
1066      . 240
1067 000240 000137 003174  JMP      START      ;RESTART ADDR
1068
1069      .=250
1070 000250 000137 003156  JMP      START3     ;ENTER HERE FOR COPY UTILITY
1071      .=260
1072 000260 000137 003136  JMP      START1     ;COMPATABILTIIY PASS 1
1073      .=270
1074 000270 000137 003144  JMP      START2     ;
1075                                     ;          PASS 2
1076
1077
1078      001000      .=1000
1079      .SBTTL  APT PARAMETER BLOCK
1080
1081      ;*****
1082      ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
1083      ;*****
1084      001000      .$X=.      ;;SAVE CURRENT LOCATION
1085      000024 000024  .=24      ;;SET POWER FAIL TO POINT TO START OF PROGRAM
1086      000024 000200  200      ;;FOR APT START UP
1087      000044 000044  .=44      ;;POINT TO APT INDIRECT ADDRESS PNTR.
1088      000044 001000  $APTHDR ;;POINT TO APT HEADER BLOCK
1089      001000      .=$X      ;;RESET LOCATION COUNTER
1090
1091      ;*****
1092      ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
1093      ;INTERFACE SPEC.
1094
1094 001000  $APTHD:
1095 001000 000000  $HIBTS: .WORD 0      ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
1096 001002 001170  $MBADR: .WORD $MAIL ;;ADDRESS OF APT MAILBOX (BITS 0-15)
1097 001004 000024  $TSTM:  .WORD 20.   ;;RUN TIM OF LONGEST TEST
1098 001006 000226  $PASTM: .WORD 150.  ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
1099 001010 000000  $UNITM: .WORD 0      ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
1100 001012 000030  .WORD  $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
  
```



```
1155 001206 000000 $MSGLG: .WORD AMSGLG ;;MESSAGE LENGTH
1156 001210 $ETABLE: ;;APT ENVIRONMENT TABLE
1157 001210 000 $ENV: .BYTE AENV ;;ENVIRONMENT BYTE
1158 001211 000 $ENVM: .BYTE AENVM ;;ENVIRONMENT MODE BITS
1159 001212 000000 $SWREG: .WORD ASWREG ;;APT SWITCH REGISTER
1160 001214 000000 $USWR: .WORD AUSWR ;;USER SWITCHES
1161 001216 000000 $CPUOP: .WORD ACPUOP ;;CPU TYPE,OPTIONS
1162 :* BITS 15-11=CPU TYPE
1163 :* 11/04=01,11/05=02,11/20 03,11/40 04,11/45-05
1164 :* 11/70=06,PDQ=07,Q=10
1165 :* BIT 10=REAL TIME CLOCK
1166 :* BIT 9=FLOATING POINT PROCESSOR
1167 :* BIT 8=MEMORY MANAGEMENT
1168 001220 000 $MAMS1: .BYTE AMAMS1 ;;HIGH ADDRESS,M.S. BYTE
1169 001221 000 $MTYP1: .BYTE AMTYP1 ;;MEM. TYPE,BLK#1
1170 :* MEM.TYPE BYTE -- (HIGH BYTE)
1171 :* 900 NSEC CORE=001
1172 :* 300 NSEC BIPOLAR=002
1173 :* 500 NSEC MOS=003
1174 001222 000000 $MADR1: .WORD AMADR1 ;;HIGH ADDRESS,BLK#1
1175 :* MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF 'TYPE' ABOVE
1176 001224 000 $MAMS2: .BYTE AMAMS2 ;;HIGH ADDRESS,M.S. BYTE
1177 001225 000 $MTYP2: .BYTE AMTYP2 ;;MEM.TYPE,BLK#2
1178 001226 000000 $MADR2: .WORD AMADR2 ;;MEM.LAST ADDRESS,BLK#2
1179 001230 000 $MAMS3: .BYTE AMAMS3 ;;HIGH ADDRESS,M.S.BYTE
1180 001231 000 $MTYP3: .BYTE AMTYP3 ;;MEM.TYPE,BLK#3
1181 001232 000000 $MADR3: .WORD AMADR3 ;;MEM.LAST ADDRESS,BLK#3
1182 001234 000 $MAMS4: .BYTE AMAMS4 ;;HIGH ADDRESS,M.S.BYTE
1183 001235 000 $MTYP4: .BYTE AMTYP4 ;;MEM.TYPE,BLK#4
1184 001236 000000 $MADR4: .WORD AMADR4 ;;MEM.LAST ADDRESS,BLK#4
1185 001240 000300 $VECT1: .WORD AVECT1 ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
1186 001242 000000 $VECT2: .WORD AVECT2 ;;INTERRUPT VECTOR#2BUS PRIORITY#2
1187 001244 176500 $BASE: .WORD ABASE ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
1188 001246 000017 $DEV: .WORD ADEV ;;DEVICE MAP
1189 001250 $ETEND:
1190 .MEXIT
```

```
1191 .SBTTL ERROR POINTER TABLE
1192
1193 ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
1194 ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
1195 ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
1196 ;*NOTE1: IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
1197 ;*NOTE2: EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
1198
1199 ;*      EM      ::POINTS TO THE ERROR MESSAGE
1200 ;*      DH      ::POINTS TO THE DATA HEADER
1201 ;*      DT      ::POINTS TO THE DATA
1202 ;*      DF      ::POINTS TO THE DATA FORMAT
1203
1204
1205 001250 $ERRTB:
1206          ::GLOBAL DATA
1207          ;ERR 1
1208 001250 020322 023160 023566 EM1,DH2,DT2,DF
1209 001256 024062
1210          ;ERR 2
1211 001260 020322 023160 023566 EM1,DH2,DT2,DF
1212 001266 024062
1213          ;ERR 3
1214 001270 020341 023204 023576 EM2,DH3,DT3,DF
1215 001276 024062
1216          ;ERR 4
1217 001300 020322 023160 023566 EM1,DH2,DT2,DF
1218 001306 024062
1219          ;ERR 5
1220 001310 020341 023204 023576 EM2,DH3,DT3,DF
1221 001316 024062
1222          ;ERR 6
1223 001320 020363 023141 023560 EM3,DH1,DT1,DF
1224 001326 024062
1225          ;ERR 7
1226 001330 020427 023246 023612 EM4,DH4,DT4,DF
1227 001336 024062
1228          ;ERR 10
1229 001340 020452 023277 023622 EM5,DH5,DT5,DF
1230 001346 024062
1231          ;ERR 11
1232 001350 020500 023277 023634 EM6,DH5,DT6,DF
1233 001356 024062
1234          ;ERR 12
1235 001360 020526 023277 023646 EM7,DH5,DT7,DF
1236 001366 024062
1237          ;ERR 13
1238 001370 020554 023277 023660 EM8,DH5,DT8,DF
1239 001376 024062
1240          ;ERR 14
1241 001400 020605 023277 023660 EM9,DH5,DT8,DF
1242 001406 024062
1243          ;ERR 15
1244 001410 020635 023334 023672 EM10,DH6,DT9,DF
```

1245	001416	024062			
1246					:ERR 16
1247	001420	020662	023401	023710	EM11,DH7,DT10,DF1
1248	001426	024070			
1249					:ERR 17
1250	001430	020662	023401	023710	EM11,DH7,DT10,DF1
1251	001436	024070			
1252					:ERR 20
1253	001440	020700	023401	023710	EM13,DH7,DT10,DF1
1254	001446	024070			
1255					:ERR 21
1256	001450	020731	023401	023710	EM14,DH7,DT10,DF1
1257	001456	024070			
1258					:ERR 22
1259	001460	020762	023470	023732	EM15,DH8,DT11,DF2
1260	001466	024100			
1261					:ERR 23
1262	001470	021013	023470	023732	EM16,DH8,DT11,DF2
1263	001476	024100			
1264					:ERR 24
1265	001500	021044	023401	023754	EM17,DH7,DT12,DF1
1266	001506	024070			
1267					:ERR 25
1268	001510	021076	023401	023754	EM18,DH7,DT12,DF1
1269	001516	024070			
1270					:ERR 26
1271	001520	021130	023401	023754	EM19,DH7,DT12,DF1
1272	001526	024070			
1273					:ERR 27
1274	001530	021161	023401	023754	EM20,DH7,DT12,DF1
1275	001536	024070			
1276					:ERR 30
1277	001540	021212	023470	023776	EM21,DH8,DT13,DF2
1278	001546	024100			
1279					

1297					:ERR 37	
1298	001630	021371	023141	023560		EM28,DH1,DT1,DF
1299	001636	024062				
1300					:ERR 40	
1301	001640	021410	023141	023560		EM29,DH1,DT1,DF
1302	001646	024062				
1303					:ERR 41	
1304	001650	021430	023334	024020		EM30,DH6,DT14,DF
1305	001656	024062				
1306					:ERR 42	
1307	001660	021441	023334	024020		EM31,DH6,DT14,DF
1308	001666	024062				
1309					:ERR 43	
1310	001670	021452	023141	023560		EM32,DH1,DT1,DF
1311	001676	024062				
1312					:ERR 44	
1313	001700	021515	023141	023560		EM33,DH1,DT1,DF
1314	001706	024062				
1315					:ERR 45	
1316	001710	021556	023141	023560		EM34,DH1,DT1,DF
1317	001716	024062				
1318					:ERR 46	
1319	001720	021430	023334	024020		EM30,DH6,DT14,DF
1320	001726	024062				
1321					:ERR 47	
1322	001730	021430	023334	024020		EM30,DH6,DT14,DF
1323	001736	024062				
1324					:ERR 50	
1325	001740	021430	023334	024020		EM30,DH6,DT14,DF
1326	001746	024062				
1327					:ERR 51	
1328	001750	021430	023334	024020		EM30,DH6,DT14,DF

1351					:ERR 61	
1352	002050	022053	023334	023672		EM40,DH6,DT9,DF
1353	002056	024062				
1354					:ERR 62	
1355	002060	022116	023334	023672		EM41,DH6,DT9,DF
1356	002066	024062				
1357					:ERR 63	
1358	002070	022152	023334	023672		EM42,DH6,DT9,DF
1359	002076	024062				
1360					:ERR 64	
1361	002100	022173	023401	023710		EM43,DH7,DT10,DF1
1362	002106	024070				
1363					:ERR 65	
1364	002110	022173	023401	023710		EM43,DH7,DT10,DF1
1365	002116	024070				
1366					:ERR 66	
1367	002120	022225	023401	023710		EM45,DH7,DT10,DF1
1368	002126	024070				
1369					:ERR 67	
1370	002130	022263	023401	023710		EM46,DH7,DT10,DF1
1371	002136	024070				
1372					:ERR 70	
1373	002140	022321	023401	023754		EM47,DH7,DT12,DF1
1374	002146	024070				
1375					:ERR 71	
1376	002150	022360	023401	023754		EM48,DH7,DT12,DF1
1377	002156	024070				
1378					:ERR 72	
1379	002160	022417	023401	023754		EM49,DH7,DT12,DF1
1380	002166	024070				
1381					:ERR 73	
1382	002170	022455	023401	023754		EM50,DH7,DT12,DF1
1383	002176	024070				
1384					:ERR 74	
1385	002200	022513	023334	023672		EM51,DH6,DT9,DF
1386	002206	024062				
1387					:ERR 75	
1						

1396					
1397					: ERRORS FOR COPY UTILITY
1398					
1399					:ERR 100
1400	002240	020700	023334	024020	EM13,DH6,DT14,DF
1401	002246	024062			
1402					:ERR 101
1403	002250	021044	023334	024020	EM17,DH6,DT14,DF
1404	002256	024062			
1405					:ERR 102
1406	002260	022632	023334	024020	EM54,DH6,DT14,DF
1407	002266	024062			
1408					:ERR 103
1409	002270	021130	023334	024020	EM19,DH6,DT14,DF
1410	002276	024062			
1411					
1412					:BAD SECTOR/TRACK TABLE FULL ERRORS
1413					
1414					:ERR 104
1415	002300	022647	000000	000000	EM55,0,0,0
1416	002306	000000			
1417					:ERR 105
1418	002310	022704	000000	000000	EM56,0,0,0
1419	002316	000000			
1420					
1421					:CRC ERRORS
1422					
1423					:ERR 106
1424	002320	022741	023401	023710	EM57,DH7,DT10,DF1
1425	002326	024070			
1426					:ERR 107
1427	002330	022762	023470	023732	EM58,DH8,DT11,DF2
1428	002336	024100			
1429					:ERR 110
1430	002340	023003	000000	000000	EM59,0,0,0
1431	002346	000000			
1432					:ERR 111
143					


```

1748
1749
1750
1751
1752 004442 032737 000200 001246 CLKTST: BIT #BIT7,$DEVM ;DROP TEST?
1753 004450 001031 BNE PRST ;BR IF YES
1754 004452 012737 012004 000100 MOV #INTSRV,CLKVEC ;SETUP VECTOR AREA
1755 004460 012737 000200 000102 MOV #200,CLKVEC+2 ;LOCKOUT OTHER INTER.
1756 004466 005037 012012 CLR INTFLG
1757 004472 052737 000100 177546 BIS #IE,CLK ;SET CLOCK LOOSE!
1758
1759 004500 004537 011160 JSR R5,TIMER ;SEE IF INTFLG GOES TO 100
1760 004504 012012 INTFLG
1761 004506 000100 100
1762 004510 104032 ERROR 32 ;CLK NOT RESPONDING
1763 004512 000410 BR PRST
1764
1765 004514 032777 010000 174416 BIT #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
1766 004522 001404 BEQ PRST
1767 004524 104401 017110 TYPE ,CLOCK
1768 004530 104401 017534 TYPE ,RUN
  
```



```
1815
1816
1817      ;*****
1818      ; START SYNC COMM PORT
1819      ;*****
1820 004734 032737 002000 001246 SMTST: BIT    #BIT10,$DEV0    ;DROP TEST?
1821 004742 001402              BEQ     20$              ;BR IF NO
1822 004744 000137 005222              JMP     AMTST              ;ELSE JUMP TEST
1823
1824 004750 005037 005220              20$: CLR     FREE
1825
1826 004754 005037 012636              8$: CLR     LSTCHR          ;LAST CHAR FLAG FOR XMIT
1827 004760 052737 000400 176624      BIS     #MR,$MXC          ;MASTER RESET
1828 004766 052737 004000 176624      BIS     #MCLK,$MXC         ;MAINT CLOCK
1829
1830 004774 032737 000010 001246      BIT     #BIT3,$DEV0        ;EXT LOOPBACK?
1831 005002 001403              BEQ     1$              ;BR IF YES
1832 005004 052737 014000 176624      BIS     #<MM'MCLK>,$MXC      ;ELSE SET MAINT MODE FOR INT. LOOPBACK
1833 005012 012737 007026 176622      1$: MOV     #<CHR8!ODDPAR!026>,$MPAR    ;SETUP SYNC PARAMETER REGISTER
1834 005020 052737 000026 176620      BIS     #<RTS!DTR!SRSYN>,$SMRC    ;SET REQ TO SEND, DATA TERM RDY
1835                                ;& SEARCH SYNC
1836 005026 052737 000020 176624      BIS     #SEND,$MXC          ;ENABLE XMIT SEND
1837 005034 012737 000026 176626      MOV     #026,$MXB          ;XMIT SYNC CHAR
1838
1839 005042 004537 011442              JSR     R5,TIMER2          ;WAIT FOR DONE
1840 005046 176620              SMRC
1841 005050 000200              DONE
1842 005052 104045              ERROR 4$              ;NO DONE
1843 005054 000435              BR      5$              ;EXIT
1844
1845 005056 013737 176622 012546      MOV     $MRB,$COMHLD        ;READ WORD
1846 005064 023727 012546 000026      CMP     $COMHLD,#026        ;IS IT SYNC CHAR?
1847 005072 001402              BEQ     4$              ;BR IF YES
1848 005074 104006              ERROR 6$              ;DID NOT REC SYNC CHAR
1849 005076 000424              BR      5$              ;EXIT
1850
1851 005100 004537 011134              4$: JSR     R5,SETVEC        ;SETUP VECTOR AREA
1852 005104 000340              SMRVEC
1853 005106 012640              SMRSRV
1854 005110 012550              SMXSRV
```



```
1882
1883
1884      ;:*****
1885      ;: START ASYNC COMM PORT
1886      ;:*****
1887 005222 032737 004000 001246 AMTST: BIT    #BIT11,$DEVM    ;DROP TEST?
1888 005230 001054                BNE     CL1TST    ;BR IF YES
1889
1890 005232 032737 000010 001246      BIT    #BIT3,$DEVM    ;EXT LOOPBACK?
1891 005240 001404                BEQ     1$          ;BR IF YES
1892 005242 012737 037036 177420      MOV    #<AMOD!B9600!OPAR!CHAR8!MAINT> ,PARAM    ;ELSE SET FOR INT LOOPBACK
1893 005250 000403                BR     3$
1894 005252 012737 037034 177420 1$: MOV    #<AMOD!B9600!OPAR!CHAR8> ,PARAM    ;WAKE UP AMOD IF JUST DID SMOD
1895 005260 052737 000006 176610 3$: BIS    #<RTS!DTR> ,AMRC    ;SET REQ TO SEND & DATA TERM RDY
1896
1897 005266 004537 011134                JSR     R5,SETVEC    ;SETUP VECTOR AREA
1898 005272 000330                AMRVEC
1899 005274 012466                AMRSRV
1900 005276 012450                AMXSRV
1901
1902 005300 005037 012544                CLR     COMCHR    ;CHAR TO BE XMITTED
1903 005304 013737 176612 012546      MOV    AMRB,COMHLD    ;CLR OUT ANY PREVIOUS STORED WORD
1904 005312 052737 000100 176610      BIS    #IE,AMRC    ;SET ASYNC MODEM LOOSE!
1905 005320 052737 000100 176614      BIS    #IE,AMXC
1906
1907 005326 004537 011160                JSR     R5,TIMER    ;SEE IF COMCHR GOES TO 377
1908 005332 012544                COMCHR
1909 005334 000377                377
1910 005336 104040                ERROR    40    ;ASYNC COMM NOT RESPONDING
1911 005340 000410                BR     CL1TST
1912
1913 005342 032777 010000 173570      BIT    #BIT12,@SWR    ;SKIP TYPEOUT IF NOT SET
1914 005350 001404                BEQ     CL1TST
1915 005352 104401 017034                TYPE    ,ACOM
1916 005356 104401 017534                TYPE    ,RUN
```

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1917
1918
1919
1920
1921
1922 005362 005737 010606      CL1TST: TST      CLPRES      ;OPTION PRESENT?
1923 005366 001002              BNE          1$          ;BR IF YES
1924 005370 000137 006036      JMP          DXTST0
1925
1926 005374 032737 004000 001246 1$:  BIT      #4000,$DEV      ;DROP ASYNC?
1927 005402 001406              BEQ          4$          ;BR IF NO
1928 005404 042737 000006 176610      BIC      #<RTS!DTR>,$AMRC ;MUST BE TOGGLED
1929 005412 052737 000006 176610      BIS      #<RTS!DTR>,$AMRC ;PRIME IT
1930
1931 005420 032737 010000 001246 4$:  BIT      #BIT12,$DEV      ;DROP TEST?
1932 005426 001051              BNE          CL2TST      ;BR IF YES
1933
1934 005430 032737 000001 001246      BIT      #BIT0,$DEV      ;TERM #1 SET FOR EXT LOOPBACK?
1935 005436 001404              BEQ          2$          ;BR IF YES
1936 005440 012737 005016 177420      MOV      #<CT1!B2400!CHAR8!MAINT>,$PARAM ;ELSE SET FOR INT LOOPBACK
1937 005446 000403              BR          3$
1938 005450 012737 005014 177420 2$:  MOV      #<CT1!B2400!CHAR8>,$PARAM ;SETUP FOR EXT LOOPBACK
1939
1940 005456 004537 011134          3$:  JSR      R5,$SETVEC      ;SETUP INTERR VECTORS
1941 005462 000300              TK1VEC
1942 005464 012166              TK1SRV
1943 005466 012150              TP1SRV
1944
1945 005470 005037 012244          CLR      T1CHR      ;CHAR TO BE XMITTED
1946 005474 013737 176502 012246      MOV      TK1B,T1HLD      ;READ CHAR (CLEAR STALE DATA)
1947 005502 052737 000100 176500      BIS      #IE,TK1S      ;SET CLUSTER TERM #1 LOOSE!
1948 005510 052737 000100 176504      BIS      #IE,TP1S
1949
1950 005516 004537 011160          JSR      R5,TIMER      ;SEE IF T1CHR GOES TO 377
1951 005522 012244              T1CHR
1952 005524 000377              377
1953 005526 104034          ERROR  34          ;CLUSTER TERM 1 NOT RESPONDING
1954 005530 000410          BR          CL2TST
1955
1956 005532 032777 010000 173400      BIT      #BIT12,$SWR      ;SKIP TYPEOUT IF NOT SET
1957 005540 001404              BEQ          CL2TST
1958 005542 104401 016766          TYPE      ,CLT1
1959 005546 104401 017534          TYPE      ,RUN
```


