

The main body of the document consists of a grid of 150 small, illegible data tables or charts, arranged in 10 columns and 15 rows. Each cell in the grid contains a small table with multiple columns and rows of text, which is too small to read. The grid is located on the left side of the page, with the right side being a large, dark, blank area.

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IDENTIFICATION

PRODUCT CODE: AC-F238B-MC
PRODUCT NAME: CVKDABO PDT11/150 SYSTEM EXERCISER
PRODUCT DATE: NOV 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.

NOTE: IF RUNNING UNDER APT, THE SYNC COMM LOGIC WILL BE TESTED ONLY ON THE 1ST PASS. THIS IS SO APT 'BREAKS' SO NOT CAUSE FALSE SYNC COMM ERRORS.

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 \$DEVN, SEE SEC. 1.5):

CVKDAB PDT-11/150 SYSTEM EXERCISER

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

DEVN = 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 COMPATABILITY 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 <CP> 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 M) 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 M (LOC 1246) ENTERED BY CONTROL-G & C

BIT 15 SET=	100000=	DROP PRINTER TESTS	
4 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.
5 MIN TO WRITE, READ & DATA COMPARE ON TRACKS 0-4, 40-44, 72-76(10) ON BOTH DRIVES.
5 - 60 SEC TO DO 10 RANDOM SEEKS ON EACH DISK BETWEEN 1ST 5 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	EXPECT	RECD
ERROR #	ERR PC			
000011	006516		000200	000100

DX1 SOFT ERR - DATA COMP								
DXTST #	ERR PC	RXCS	RXES	RXSA	EXPECT	RECD	#	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)
(FOR 1'ST PASS TRACKS 0-4, 40-44, 72-76(10) DONE ONLY.)

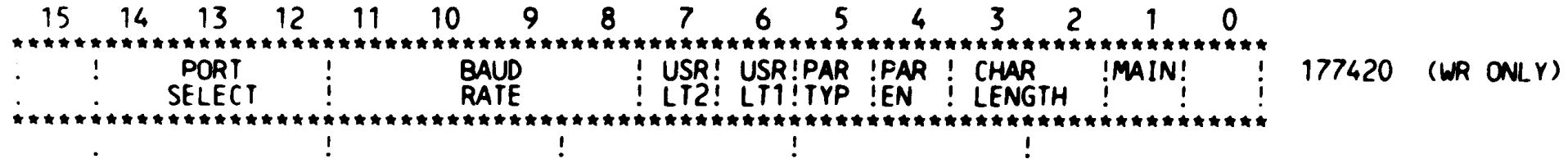
DX0 RANDOM SEEKS DONE (500 RANDOM SEEKS WITH READ & DATA COMPARE HAVE BEEN PERFORMED ON DRIVE 0)
DX1 RANDOM SEEKS DONE (SAME AS DX0....10 RANDOM SEEKS ONLY FOR 1'ST PASS QUICK VERIFY)

END OF PASS #1 TOTAL ERRORS: 0
TOTAL SOFT ERRORS: 0

TOTAL ERRORS THIS PASS: 0
SOFT ERRORS THIS PASS: 0 (...& ENTIRE PROCESS REPEATS)

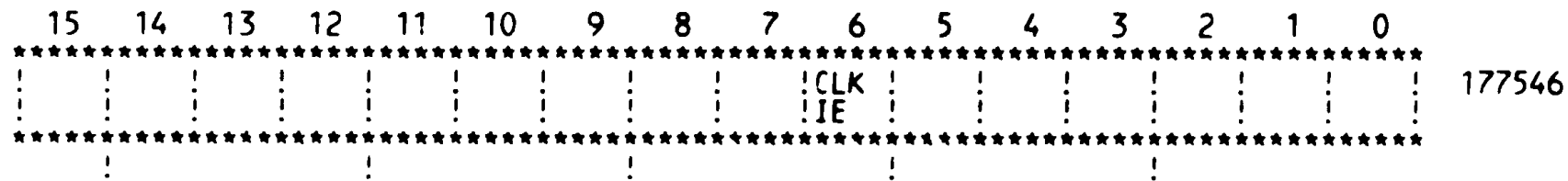
5.0 DEVICE REGISTERS.

PARAMETER REGISTER:



LINE CLOCK:

VECTOR: 100

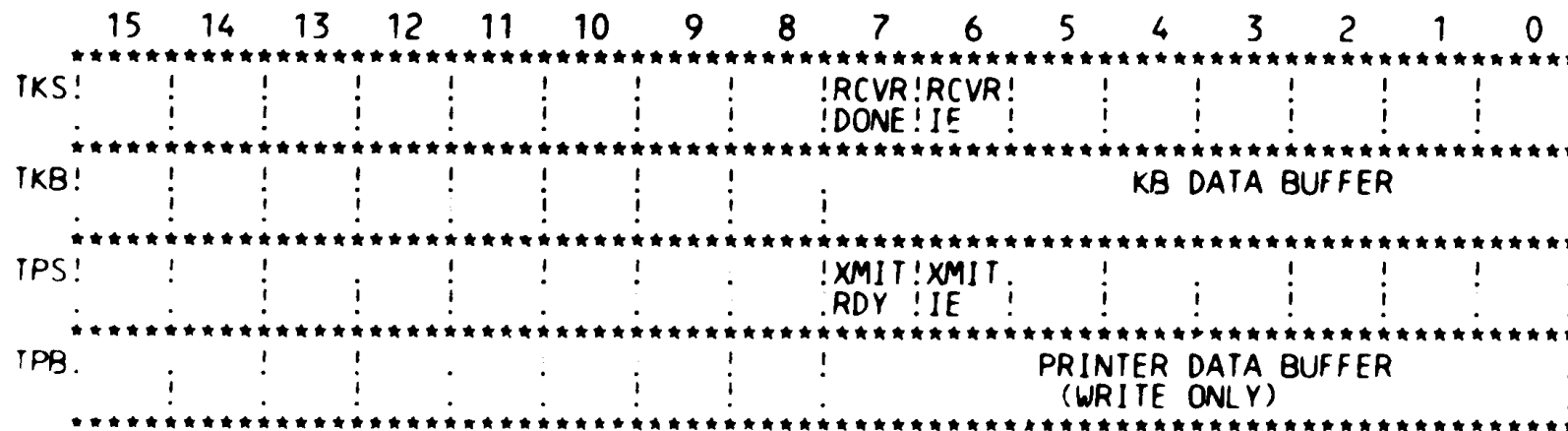


CONSOLE:

CLUSTER #1:
#2:
#3:

ADDR: 177560-177566
176500-176506
176510-176516
176520-176526

VECTOR: 60/64
300/304
310/314
320/324



PRINTER:

VECTOR: 200

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
PRS_ERR									PRIN	PRIN							177514
									RDY	IE							
PRB																	177516
																	PRINTER DATA BUFFER (WRITE ONLY)

ASYNCR 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													RECEIVER DATA BUFFER
XCSR									XMIT	XMIT						BRK	176614
									RDY	IE							
XBUF																	176616
																	TRANSMITTER DATA BUFFER (WRITE ONLY)

SYNC MODEM:

VECTOR: 340/344

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
RCSR	DSC	RING	CTS	CAR	REC	SEC	DSET	STRP	RCVR	RCVR	DSET	SRCH	SEC	RTS	DTR		176620
				DET	ACT	REC	RDY	SYNC	DONE	IE	IE	SYNC	XMIT				
RBUF	ERR	OR		PAR													176622 (RD ONLY)
		ERR		ERR													RECEIVER DATA BUFFER
PCSR		SYNC			WORD	PAR	EVEN										176622 (WR ONLY)
		CHAR			LENGTH	IE	PAR										SYNC REG
XCSR	DNA		MA	MA			MAST	XMIT	XMIT	DNA	SEND	H/F					176624
			MODE	CLK			RST	RDY	IE	IE		DUP					
XBUF																	176626
																	TRANSMITTER DATA BUFFER (WRITE ONLY)

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```
.TITLE PDT-11 EXERCISER
;*COPYRIGHT (C) 1978
;*DIGITAL EQUIPMENT CORP.
;*MAYNARD, MASS. 01754
;*
;*PROGRAM BY GARY PAPAIZIAN
;*
;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
;*
```

```
.SBTTL OPERATIONAL SWITCH SETTINGS
:
:      SWITCH      USE
:      -----      ---
:      15          HALT ON ERROR
:      13          INHIBIT ERROR TYPEOUTS
:      12          ENABLE PERFORMANCE REPORTS
:      10          BELL ON ERROR
:
```

```
.SBTTL BASIC DEFINITIONS
```

```
;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
STACK= 1100
.EQUIV EMT,ERROR      ;;BASIC DEFINITION OF ERROR CALL
.EQUIV IOT,SCOPE      ;;BASIC DEFINITION OF SCOPE CALL
```

```
;*MISCELLANEOUS DEFINITIONS
HT= 11      ;;CODE FOR HORIZONTAL TAB
LF= 12      ;;CODE FOR LINE FEED
CR= 15      ;;CODE FOR CARRIAGE RETURN
CRLF= 200   ;;CODE FOR CARRIAGE RETURN-LINE FEED
PS= 177776  ;;PROCESSOR STATUS WORD
.EQUIV PS,PSW
STKLMT= 177774 ;;STACK LIMIT REGISTER
PIRQ= 177772  ;;PROGRAM INTERRUPT REQUEST REGISTER
DSWR= 177570  ;;HARDWARE SWITCH REGISTER
DDISP= 177570 ;;HARDWARE DISPLAY REGISTER
```

```
;*GENERAL PURPOSE REGISTER DEFINITIONS
R0= %0      ;;GENERAL REGISTER
R1= %1      ;;GENERAL REGISTER
R2= %2      ;;GENERAL REGISTER
R3= %3      ;;GENERAL REGISTER
R4= %4      ;;GENERAL REGISTER
R5= %5      ;;GENERAL REGISTER
R6= %6      ;;GENERAL REGISTER
R7= %7      ;;GENERAL REGISTER
SP= %6      ;;STACK POINTER
PC= %7      ;;PROGRAM COUNTER
```

```
;*PRIORITY LEVEL DEFINITIONS
```

725	000000	PR0=	0	::PRIORITY LEVEL 0
726	000040	PR1=	40	::PRIORITY LEVEL 1
727	000100	PR2=	100	::PRIORITY LEVEL 2
728	000140	PR3=	140	::PRIORITY LEVEL 3
729	000200	PR4=	200	::PRIORITY LEVEL 4
730	000240	PR5=	240	::PRIORITY LEVEL 5
731	000300	PR6=	300	::PRIORITY LEVEL 6
732	000340	PR7=	340	::PRIORITY LEVEL 7

733
734 :*'SWITCH REGISTER' SWITCH DEFINITIONS

735	100000	SW15=	100000
736	040000	SW14=	40000
737	020000	SW13=	20000
738	010000	SW12=	10000
739	004000	SW11=	4000
740	002000	SW10=	2000
741	001000	SW09=	1000
742	000400	SW08=	400
743	000200	SW07=	200
744	000100	SW06=	100
745	000040	SW05=	40
746	000020	SW04=	20
747	000010	SW03=	10
748	000004	SW02=	4
749	000002	SW01=	2
750	000001	SW00=	1
751		.EQUIV	SW09,SW9
752		.EQUIV	SW08,SW8
753		.EQUIV	SW07,SW7
754		.EQUIV	SW06,SW6
755		.EQUIV	SW05,SW5
756		.EQUIV	SW04,SW4
757		.EQUIV	SW03,SW3
758		.EQUIV	SW02,SW2
759		.EQUIV	SW01,SW1
760		.EQUIV	SW00,SW0

761
762 :*DATA BIT DEFINITIONS (BIT00 TO BIT15)

763	100000	BIT15=	100000
764	040000	BIT14=	40000
765	020000	BIT13=	20000
766	010000	BIT12=	10000
767	004000	BIT11=	4000
768	002000	BIT10=	2000
769	001000	BIT09=	1000
770	000400	BIT08=	400
771	000200	BIT07=	200
772	000100	BIT06=	100
773	000040	BIT05=	40
774	000020	BIT04=	20
775	000010	BIT03=	10
776	000004	BIT02=	4
777	000002	BIT01=	2
778	000001	BIT00=	1
779		.EQUIV	BIT09,BIT9
780		.EQUIV	BIT08,BIT8

```

781 .EQUIV BIT07,BIT7
782 .EQUIV BIT06,BIT6
783 .EQUIV BIT05,BIT5
784 .EQUIV BIT04,BIT4
785 .EQUIV BIT03,BIT3
786 .EQUIV BIT02,BIT2
787 .EQUIV BIT01,BIT1
788 .EQUIV BIT00,BIT0
789
790 ;*BASIC "CPU" TRAP VECTOR ADDRESSES
791 000004 ERRVEC= 4 ;:TIME OUT AND OTHER ERRORS
792 000010 RESVEC= 10 ;:RESERVED AND ILLEGAL INSTRUCTIONS
793 000014 TBITVEC=14 ;: 'T' BIT
794 000014 TRTVEC= 14 ;:TRACE TRAP
795 000014 BPTVEC= 14 ;:BREAKPOINT TRAP (BPT)
796 000020 IOTVEC= 20 ;:INPUT/OUTPUT TRAP (IOT) **SCOPE**
797 000024 PWRVEC= 24 ;:POWER FAIL
798 000030 EMTVEC= 30 ;:EMULATOR TRAP (EMT) **ERROR**
799 000034 TRAPVEC=34 ;: 'TRAP' TRAP
800 000060 TKVEC= 60 ;:TTY KEYBOARD VECTOR
801 000064 TPVEC= 64 ;:TTY PRINTER VECTOR
802 000240 PIRQVEC=240 ;:PROGRAM INTERRUPT REQUEST VECTOR
803
804
805
806
807
808 ;:*****
809 ;:* PDT-11/150 DEVICE VECTORS
810 ;:*****
811 000200 PRVEC- 200 ;:PRINTER
812
813 000100 CLKVEC- 100 ;:LINE CLOCK
814
815 000330 AMRVEC= 330 ;:ASYNC MODEM RECVR
816 000334 AMXVEC= 334 ;: XMITR
817
818 000340 SMRVEC= 340 ;:SYNC MODEM RECVR
819 000344 SMXVEC- 344 ;: XMITR
820
821 000264 RXVEC= 264 ;:DISK
822
823 000300 TK1VEC= 300 ;:CLUSTER TERM #1 VECTORS
824 000304 TP1VEC= 304
825 000310 TK2VEC= 310 ;: #2
826 000314 TP2VEC- 314 ;:
827 000320 TK3VEC- 320 ;: #3
828 000324 TP3VEC 324
  
```

```

829
830
831      :*****
832      :      PDT-11/150 DEVICE REGISTERS
833      :*****
834      177420      PARAM= 177420      ;PARAMETER REGISTER      (WRITE ONLY)
835
836      177546      CLK= 177546      ;LINE CLOCK
837
838      177514      PRS= 177514      ;PRINTER STATUS REG
839      177516      PRB= 177516      ;      BUFFER      (WRITE ONLY)
840
841      176610      AMRC= 176610      ;ASYNC MODEM RECVR STATUS REG
842      176612      AMRB= 176612      ;      BUFFER
843      176614      AMXC= 176614      ;      XMITR STATUS REG
844      176616      AMXB= 176616      ;      BUFFER      (WRITE ONLY)
845
846      176620      SMRC= 176620      ;SYNC MODEM RECVR STATUS REG
847      176622      SMRB= 176622      ;      BUFFER      (READ ONLY)
848      176622      SMPAR= 176622      ;      PARAMETER REG      (WRITE ONLY)
849      176624      SMXC= 176624      ;      XMITR STATUS REG
850      176626      SMXB= 176626      ;      BUFFER      (WRITE ONLY)
851
852      177170      RXCS= 177170      ;DISK CSR
853      177172      RXDB= 177172      ;      DATA BUFF
854      177172      RXES= 177172      ;      ERROR & STATUS REG
855      177174      RXSA= 177174      ;      TRK & SECTOR ADDR REG
856
857      176500      TK1S= 176500      ;CLUSTER TERMINAL #1
858      176502      TK1B= 176502
859      176504      TP1S= 176504
860      176506      TP1B= 176506
861
862      176510      TK2S= 176510      ;      #2
863      176512      TK2B= 176512
864      176514      TP2S= 176514
865      176516      TP2B= 176516
866
867      176520      TK3S= 176520      ;      #3
868      176522      TK3B= 176522
869      176524      TP3S= 176524
870      176526      TP3B= 176526
    
```

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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  
:  
*****
```

```
927          : *      ASYNC MODEM BIT DEFINITIONS
928          : :*****
929
930          : RCSR
931          :
932          100000 DSI= BIT15      : DATA SET INTERRUPT
933          040000 RING= BIT14     : RING
934          020000 CTS= BIT13      : CLEAR TO SEND
935          010000 CDET= BIT12     : CARRIER DETECTED
936          002000 SREC= BIT10     : SECONDARY RECD/SUPERVISORY RECD
937          001000 DSRDY= BIT9     : DATA SET RDY
938          000200 DONE= BIT7      : RECVR DONE
939          000100 IE= BIT6        : RECVR IE
940          000040 DSIE= BIT5      : DATA SET IE
941          000010 SXMIT= BIT3     : SECONDARY XMIT/SUPERV XMIT
942          000004 RTS= BIT2       : REQ TO SEND
943          000002 DTR= BIT1       : DATA TERMINAL RDY
944
945          : RBUF
946          :
947          100000 ERR= BIT15      : ERROR
948          040000 ORERR= BIT14    : OVERRUN ERROR
949          020000 FRERR= BIT13    : FRAMING ERROR
950          010000 PARERR= BIT12   : PARITY ERROR
951
952          : XCSR
953          :
954          000200 RDY- BIT7        : XMIT RDY
955          000100 IE- BIT6        : XMIT IE
956          000001 BREAK- BIT0     : BREAK
957
```

```

958
959
960      :*****
961      :*      SYNC MODEM BIT DEFINITIONS
962      :*****
963      :RCSR
964      :
965      100000 DSC= BIT15      :DATA SET CHANGE
966      040000 RING= BIT14      :RING
967      020000 CTS= BIT13      :CLEAR TO SEND
968      010000 CDET= BIT12      :CARRIER DETECTED
969      004000 RACT= BIT11      :RECVR ACTIVE (SYNC DETECT)
970      002000 SREC= BIT10      :SECONDARY RECD/SUPERVISORY RECD
971      001000 DSRDY= BIT9      :DATA SET RDY
972      000400 STSYN= BIT8      :STRIP SYNC
973      000200 DONE= BIT7      :RECVR DONE
974      000100 E= BIT6      :RECVR IE
975      000040 DSIE= BIT5      :DATA SET IE
976      000020 SRSYN= BIT4      :SEARCH SYNC
977      000010 SXMIT= BIT3      :SECONDARY XMIT/SUPERV XMIT
978      000004 RTS= BIT2      :REQ TO SEND
979      000002 DTR= BIT1      :DATA TERMINAL RDY
980
981      :RBUF
982      :
983      100000 ERR= BIT15      :ERROR
984      040000 ORERR= BIT14      :OVERRUN ERROR
985      010000 PARERR= BIT12      :PARITY ERROR
986
987      :PARCSR PARAMETER CONT REG
988      :
989      :BIT 14 SYNC CHAR
990      :
991      000000 SYNC2= 0      :2 SYNC CHARS (DEFAULT)
992      040000 SYNC1= BIT14      :1
993
994      :BITS 10-11 WORD LENGTH
995      :
996      000000 CHR5= 0      :5 BITS/CHAR
997      002000 CHR6= 2000      :6
998      004000 CHR7= 4000      :7
999      006000 CHR8= 6000      :8 (DEFAULT)
1000
1001      :BITS 8-9 PARITY CONTROL
1002      :
1003      001400 ENVPAR= 1400      :ENABLE EVEN PARITY
1004      001000 ODDPAR= 1000      :ENABLE ODD PARITY (DEFAULT)
1005
1006      :XCSR
1007      :
1008      100000 DNA BIT15      :DATA NOT AVAIL
1009      010000 MM= BIT12      :MAINT MODE
1010      004000 MCLK= BIT11      :MAINT CLOCK
1011      000400 MR= BIT8      :MASTER RESET
1012      000200 RDY= BIT7      :XMIT RDY
1013      000100 IE= BIT6      :XMIT IE

```

1014 000040 DNAIE= BIT5 ;DATA NOT AVAIL IE
1015 000020 SEND= BIT4 ;SEND
1016 000010 HFDUP= BIT3 ;1=HALF DUPLEX, 0=FULL DUPLEX (DEFAULT = 0 FOR TESTS)

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000000
100000
000200
000100
000020
000020

000001
000003
000005
000007
000011
000013
000015
000017

000200
000040
000020
000010
000004
000002
000001

;DISK BIT DEFINITIONS

;RXCS
;ERR= BIT15 ;ERROR
;DONE= BIT7 ;CONTR RDY
;IE= BIT6 ;DRIVE IE
;DX1= BIT4 ;UNIT SELECT: 0=DX0, 1=DX1
;USEL= BIT4 ;UNIT SELECT
;FUNCTIONS (INCLUDES BIT0 = GO)
;FBUF= 1 ;FILL BUFFER
;EBUF= 3 ;EMPTY BUFFER
;WSEC= 5 ;WRITE SECTOR
;RSEC= 7 ;READ SECTOR
;INITAL= 11 ;INITIALIZE
;RSTAT= 13 ;READ STATUS
;WDDSEC= 15 ;WRITE DELETED DATA SECTOR
;RESTOR= 17 ;RESTORE TO TRACK 0
;RXES: ERROR & STATUS
;RDY= BIT7 ;DRIVE RDY
;DD= BIT5 ;DELETED DATA DET.
;RNF= BIT4 ;RECORD NOT FOUND
;CRC= BIT3 ;CRC ERROR
;LDATA= BIT2 ;LOST DATA
;INVADR= BIT1 ;INVALID ADDR
;ID= BIT0 ;INITIALIZE DONE

```

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1059
1060
1061 000174 000174
1062 000176 000000
1063
1064 000100 000100
1065 000102 000102
1066 000102 000002
1067
1068 000200 000200
1069 000137 000137 003174
1070
1071 000240 000240
1072 000137 000137 003174
1073
1074 000250 000250
1075 000137 000137 003156
1076 000260 000260
1077 000137 000137 003136
1078 000270 000270
1079 000137 000137 003144
1080
1081
1082
1083 001000
1084
1085
1086
1087
1088
1089 001000
1090 000024 000024
1091 000024 000200
1092 000044 000044
1093 000044 001000
1094 001000
1095
1096
1097
1098
1099 001000
1100 001000 000000
1101 001002 001170
1102 001004 000024
1103 001006 000226
1104 001010 000000
1105 001012 000030

:*****
:* SWITCH REGISTER
:*****

DISPREG:  =174 .WORD 0 ;SOFTWARE DISPLAY REG
SWREG:  =174 .WORD 0 ;SOFTWARE SWITCH REG

          =100
          102 ;SETUP CLOCK VECTOR AREA TO DO RTI
          2 ;IF ENABLED

          =200
          JMP START ;USE ONLY ONCE. WILL BE OVERLAID BY
          ;PRINTER VECTOR ADDR.

          =240
          JMP START ;RESTART ADDR

          =250
          JMP START3 ;ENTER HERE FOR COPY UTILITY

          =260
          JMP START1 ;COMPATABILITY PASS 1

          =270
          JMP START2 ; PASS 2

          =1000
          SBTTL APT PARAMETER BLOCK

:*****
:SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
:*****
          .SX= ;:SAVE CURRENT LOCATION
          =24 ;:SET POWER FAIL TO POINT TO START OF PROGRAM
          200 ;:FOR APT START UP
          -44 ;:POINT TO APT INDIRECT ADDRESS PNTR.
          $APTHDR ;:POINT TO APT HEADER BLOCK
          -.SX ;:RESET LOCATION COUNTER

:*****
:SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
:INTERFACE SPEC.

$APTHD:
$HIBTS: .WORD 0 ;:TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
$MBADR: .WORD $MAIL ;:ADDRESS OF APT MAILBOX (BITS 0-15)
$STMT: .WORD 20. ;:RUN TIM OF LONGEST TEST
$PASTM: .WORD 150. ;:RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
$UNITM: .WORD 0 ;:ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
          .WORD $ETEND-$MAIL/2 ;:LENGTH MAILBOX-ETABLE(WORDS)
  
```

```
1106 .SBTTL COMMON TAGS
1107
1108 ::*****
1109 :*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
1110 :*USED IN THE PROGRAM.
1111
1112 001100 .=1100
1113 001100 $CMTAG: .;START OF COMMON TAGS
1114 001100 000000 .WORD 0
1115 001102 000 .STSTNM: .BYTE 0 ;:CONTAINS THE TEST NUMBER
1116 001103 000 $ERFLG: .BYTE 0 ;:CONTAINS ERROR FLAG
1117 001104 000000 $ICNT: .WORD 0 ;:CONTAINS SUBTEST ITERATION COUNT
1118 001106 000000 $LPADR: .WORD 0 ;:CONTAINS SCOPE LOOP ADDRESS
1119 001110 000000 $LPERR: .WORD 0 ;:CONTAINS SCOPE RETURN FOR ERRORS
1120 001112 000000 $ERTTL: .WORD 0 ;:CONTAINS TOTAL ERRORS DETECTED
1121 001114 000 $ITEMB: .BYTE 0 ;:CONTAINS ITEM CONTROL BYTE
1122 001115 001 $ERMAX: .BYTE 1 ;:CONTAINS MAX. ERRORS PER TEST
1123 001116 000000 $ERRPC: .WORD 0 ;:CONTAINS PC OF LAST ERROR INSTRUCTION
1124 001120 000000 $GDADR: .WORD 0 ;:CONTAINS ADDRESS OF 'GOOD' DATA
1125 001122 000000 $BDADR: .WORD 0 ;:CONTAINS ADDRESS OF 'BAD' DATA
1126 001124 000000 $GDDAT: .WORD 0 ;:CONTAINS 'GOOD' DATA
1127 001126 000000 $BDDAT: .WORD 0 ;:CONTAINS 'BAD' DATA
1128 001130 000000 .WORD 0 ;:RESERVED--NOT TO BE USED
1129 001132 000000 .WORD 0
1130 001134 000 $AUTOB: .BYTE 0 ;:AUTOMATIC MODE INDICATOR
1131 001135 000 $INTAG: .BYTE 0 ;:INTERRUPT MODE INDICATOR
1132 001136 000000 .WORD 0
1133 001140 177570 SWR: .WORD DSWR ;:ADDRESS OF SWITCH REGISTER
1134 001142 177570 DISPLAY: .WORD DDISP ;:ADDRESS OF DISPLAY REGISTER
1135 001144 177560 $TKS: 177560 ;:TTY KBD STATUS
1136 001146 177562 $TKB: 177562 ;:TTY KBD BUFFER
1137 001150 177564 $TPS: 177564 ;:TTY PRINTER STATUS REG. ADDRESS
1138 001152 177566 $TPB: 177566 ;:TTY PRINTER BUFFER REG. ADDRESS
1139 001154 000 $NULL: .BYTE 0 ;:CONTAINS NULL CHARACTER FOR FILLS
1140 001155 002 $FILLS: .BYTE 2 ;:CONTAINS # OF FILLER CHARACTERS REQUIRED
1141 001156 012 $FILLC: .BYTE 12 ;:INSERT FILL CHARS. AFTER A 'LINE FEED'
1142 001157 000 $TPFLG: .BYTE 0 ;:'TERMINAL AVAILABLE' FLAG (BIT<07>=0=YES)
1143 001160 177607 000377 $BELL: .ASCIZ <207><377><377> ;:CODE FOR BELL
1144 001164 077 $QUES: .ASCII /?/ ;:QUESTION MARK
1145 001165 015 $CRLF: .ASCII <15> ;:CARRIAGE RETURN
1146 001166 000012 $LF: .ASCIZ <12> ;:LINE FEED
1147 ::*****
1148 .SBTTL APT MAILBOX-ETABLE
1149
1150 ::*****
1151 .EVEN
1152 001170 $MAIL: ;:APT MAILBOX
1153 001170 000000 $MSGTY: .WORD AMSGTY ;:MESSAGE TYPE CODE
1154 001172 000000 $FATAL: .WORD AFATAL ;:FATAL ERROR NUMBER
1155 001174 000000 $TESTN: .WORD ATESTN ;:TEST NUMBER
1156 001176 000000 $PASS: .WORD APASS ;:PASS COUNT
1157 001200 000000 $DEVCT: .WORD ADEVCT ;:DEVICE COUNT
1158 001202 000000 $UNIT: .WORD AUNIT ;:I/O UNIT NUMBER
1159 001204 000000 $MSGAD: .WORD AMSGAD ;:MESSAGE ADDRESS
1160 001206 000000 $MSGLG: .WORD AMSGLG ;:MESSAGE LENGTH
1161 001210 $ETABLE: ;:APT ENVIRONMENT TABLE
```

1162	001210	000	\$ENV:	.BYTE	AENV	::ENVIRONMENT BYTE
1163	001211	000	\$ENVM:	.BYTE	AENVM	::ENVIRONMENT MODE BITS
1164	001212	000000	\$SWREG:	.WORD	ASWREG	::APT SWITCH REGISTER
1165	001214	000000	\$USWR:	.WORD	AUSWR	::USER SWITCHES
1166	001216	000000	\$CPUOP:	.WORD	ACPUOP	::CPU TYPE,OPTIONS
1167			.*			BITS 15-11=CPU TYPE
1168			.*			11/04=01,11/05=02,11/20=03,11/40=04,11/45-05
1169			.*			11/70=06,PDQ=07,Q=10
1170			.*			BIT 10=REAL TIME CLOCK
1171			.*			BIT 9=FLOATING POINT PROCESSOR
1172			.*			BIT 8=MEMORY MANAGEMENT
1173	001220	000	\$MAMS1:	.BYTE	AMAMS1	::HIGH ADDRESS,M.S. BYTE
1174	001221	000	\$MTYP1:	.BYTE	AMTYP1	::MEM. TYPE,BLK#1
1175			.*			MEM.TYPE BYTE -- (HIGH BYTE)
1176			.*			900 NSEC CORE=001
1177			.*			300 NSEC BIPOLAR=002
1178			.*			500 NSEC MOS=003
1179	001222	000000	\$MADR1:	.WORD	AMADR1	::HIGH ADDRESS,BLK#1
1180			.*			MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF 'TYPE' ABOVE
1181	001224	000	\$MAMS2:	.BYTE	AMAMS2	::HIGH ADDRESS,M.S. BYTF
1182	001225	000	\$MTYP2:	.BYTE	AMTYP2	::MEM. TYPE,BLK#2
1183	001226	000000	\$MADR2:	.WORD	AMADR2	::MEM.LAST ADDRESS,BLK#2
1184	001230	000	\$MAMS3:	.BYTE	AMAMS3	::HIGH ADDRESS,M.S.BYTE
1185	001231	000	\$MTYP3:	.BYTE	AMTYP3	::MEM. TYPE,BLK#3
1186	001232	000000	\$MADR3:	.WORD	AMADR3	::MEM.LAST ADDRESS,BLK#3
1187	001234	000	\$MAMS4:	.BYTE	AMAMS4	::HIGH ADDRESS,M.S.BYTE
1188	001235	000	\$MTYP4:	.BYTE	AMTYP4	::MEM. TYPE,BLK#4
1189	001236	000000	\$MADR4:	.WORD	AMADR4	::MEM.LAST ADDRESS,BLK#4
1190	001240	000300	\$VECT1:	.WORD	AVECT1	::INTERRUPT VECTOR#1,BUS PRIORITY#1
1191	001242	000000	\$VECT2:	.WORD	AVECT2	::INTERRUPT VECTOR#2BUS PRIORITY#2
1192	001244	176500	\$BASE:	.WORD	ABASE	::BASE ADDRESS OF EQUIPMENT UNDER TEST
1193	001246	000017	\$DEVN:	.WORD	ADEVN	::DEVICE MAP
1194	001250		\$ETEND:			
1195			.MEXIT			

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001250

001250 020456 023074 023502
001256 023776
001260 020456 023074 023502
001266 023776
001270 020475 023120 023512
001276 023776
001300 020456 023074 023502
001306 023776
001310 020475 023120 023512
001316 023776
001320 020517 023055 023474
001326 023776
001330 020563 023162 023526
001336 023776
001340 020606 023213 023536
001346 023776
001350 020634 023213 023550
001356 023776
001360 020662 023213 023562
001366 023776
001370 020710 023213 023574
001376 023776
001400 020741 023213 023574
001406 023776
001410 020771 023250 023606
001416 023776

.SBTTL ERROR POINTER TABLE

:*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
:*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
:*LOCATION \$ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
:*NOTE1: IF \$ITEMB IS 0 THE ONLY PERTINENT DATA IS (\$ERRPC).
:*NOTE2: EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

:* EM ::POINTS TO THE ERROR MESSAGE
:* DH ::POINTS TO THE DATA HEADER
:* DT ::POINTS TO THE DATA
:* DF ::POINTS TO THE DATA FORMAT

\$ERRTB:
:GLOBAL DATA
:ERR 1 EM1,DH2,DT2,DF
:ERR 2 EM1,DH2,DT2,DF
:ERR 3 EM2,DH3,DT3,DF
:ERR 4 EM1,DH2,DT2,DF
:ERR 5 EM2,DH3,DT3,DF
:ERR 6 EM3,DH1,DT1,DF
:ERR 7 EM4,DH4,DT4,DF
:ERR 10 EM5,DH5,DT5,DF
:ERR 11 EM6,DH5,DT6,DF
:ERR 12 EM7,DH5,DT7,DF
:ERR 13 EM8,DH5,DT8,DF
:ERR 14 EM9,DH5,DT8,DF
:ERR 15 EM10,DH6,DT9,DF
:ERR 16

1252	001420	021016	023315	023624	EM11,DH7,DT10,DF1
1253	001426	024004			
1254					:ERR 17
1255	001430	021016	023315	023624	EM11,DH7,DT10,DF1
1256	001436	024004			
1257					:ERR 20
1258	001440	021034	023315	023624	EM13,DH7,DT10,DF1
1259	001446	024004			
1260					:ERR 21
1261	001450	021065	023315	023624	EM14,DH7,DT10,DF1
1262	001456	024004			
1263					:ERR 22
1264	001460	021116	023404	023646	EM15,DH8,DT11,DF2
1265	001466	024014			
1266					:ERR 23
1267	001470	021147	023404	023646	EM16,DH8,DT11,DF2
1268	001476	024014			
1269					:ERR 24
1270	001500	021200	023315	023670	EM17,DH7,DT12,DF1
1271	001506	024004			
1272					:ERR 25
1273	001510	021200	023315	023670	EM17,DH7,DT12,DF1
1274	001516	024004			
1275					:ERR 26
1276	001520	021216	023315	023670	EM19,DH7,DT12,DF1
1277	001526	024004			
1278					:ERR 27
1279	001530	021247	023315	023670	EM20,DH7,DT12,DF1
1280	001536	024004			
1281					:ERR 30
1282	001540	021300	023404	023712	EM21,DH8,DT13,DF2
1283	001546	024014			
1284					:ERR 31
1285	001550	021331	023404	023712	EM22,DH8,DT13,DF2
1286	001556	024014			
1287					:ERR 32
1288	001560	021362	023055	023474	EM23,DH1,DT1,DF
1289	001566	023776			
1290					:ERR 33
1291	001570	021373	023162	023526	EM24,DH4,DT4,DF
1292	001576	023776			
1293					:ERR 34
1294	001600	021410	023055	023474	EM25,DH1,DT1,DF
1295	001606	023776			
1296					:ERR 35
1297	001610	021425	023055	023474	EM26,DH1,DT1,DF
1298	001616	023776			
1299					:ERR 36
1300	001620	021442	023055	023474	EM27,DH1,DT1,DF
1301	001626	023776			

1302					:ERR 37	
1303	001630	021457	023055	023474		EM28,DH1,DT1,DF
1304	001636	023776				
1305					:ERR 40	
1306	001640	021476	023055	023474		EM29,DH1,DT1,DF
1307	001646	023776				
1308					:ERR 41	
1309	001650	021516	023250	023734		EM30,DH6,DT14,DF
1310	001656	023776				
1311					:ERR 42	
1312	001660	021527	023250	023734		EM31,DH6,DT14,DF
1313	001666	023776				
1314					:ERR 43	
1315	001670	021540	023055	023474		EM32,DH1,DT1,DF
1316	001676	023776				
1317					:ERR 44	
1318	001700	021603	023055	023474		EM33,DH1,DT1,DF
1319	001706	023776				
1320					:ERR 45	
1321	001710	021644	023055	023474		EM34,DH1,DT1,DF
1322	001716	023776				
1323					:ERR 46	
1324	001720	021516	023250	023734		EM30,DH6,DT14,DF
1325	001726	023776				
1326					:ERR 47	
1327	001730	021516	023250	023734		EM30,DH6,DT14,DF
1328	001736	023776				
1329					:ERR 50	
1330	001740	021516	023250	023734		EM30,DH6,DT14,DF
1331	001746	023776				
1332					:ERR 51	
1333	001750	021516	023250	023734		EM30,DH6,DT14,DF
1334	001756	023776				
1335					:ERR 52	
1336	001760	021703	023250	023606		EM35,DH6,DT9,DF
1337	001766	023776				
1338					:ERR 53	
1339	001770	021750	023404	023646		EM36,DH8,DT11,DF2
1340	001776	024014				
1341					:ERR 54	
1342	002000	022017	023250	023606		EM37,DH6,DT9,DF
1343	002006	023776				
1344					:ERR 55	
1345	002010	022043	023250	023606		EM38,DH6,DT9,DF
1346	002016	023776				
1347					:ERR 56	
1348	002020	021516	023250	023734		EM30,DH6,DT14,DF
1349	002026	023776				
1350					:ERR 57	
1351	002030	022111	023250	023606		EM39,DH6,DT9,DF
1352	002036	023776				
1353					:ERR 60	
1354	002040	021516	023250	023734		EM30,DH6,DT14,DF
1355	002046	023776				
1356					:ERR 61	
1357	002050	022141	023250	023606		EM40,DH6,DT9,DF

1358	002056	023776				
1359					:ERR 62	
1360	002060	022204	023250	023606		EM41,DH6,DT9,DF
1361	002066	023776				
1362					:ERR 63	
1363	002070	022240	023250	023606		EM42,DH6,DT9,DF
1364	002076	023776				
1365					:ERR 64	
1366	002100	022261	023315	023624		EM43,DH7,DT10,DF1
1367	002106	024004				
1368					:ERR 65	
1369	002110	022261	023315	023624		EM43,DH7,DT10,DF1
1370	002116	024004				
1371					:ERR 66	
1372	002120	022313	023315	023624		EM45,DH7,DT10,DF1
1373	002126	024004				
1374					:ERR 67	
1375	002130	022313	023315	023624		EM45,DH7,DT10,DF1
1376	002136	024004				
1377					:ERR 70	
1378	002140	022344	023315	023670		EM47,DH7,DT12,DF1
1379	002146	024004				
1380					:ERR 71	
1381	002150	022344	023315	023670		EM47,DH7,DT12,DF1
1382	002156	024004				
1383					:ERR 72	
1384	002160	022376	023315	023670		EM49,DH7,DT12,DF1
1385	002166	024004				
1386					:ERR 73	
1387	002170	022376	023315	023670		EM49,DH7,DT12,DF1
1388	002176	024004				
1389					:ERR 74	
1390	002200	022427	023250	023606		EM51,DH6,DT9,DF
1391	002206	023776				
1392					:ERR 75	
1393	002210	022453	023250	023734		EM52,DH6,DT14,DF
1394	002216	023776				
1395					:ERR 76	
1396	002220	022477	023213	023752		EM53,DH5,DT15,DF
1397	002226	023776				
1398					:ERR 77	
1399	002230	022477	023213	023764		EM53,DH5,DT16,DF
1400	002236	023776				

1401					
1402					; ERRORS FOR COPY UTILITY
1403					
1404					;ERR 100
1405	002240	021034	023250	023734	EM13,DH6,DT14,DF
1406	002246	023776			
1407					;ERR 101
1408	002250	021200	023250	023734	EM17,DH6,DT14,DF
1409	002256	023776			
1410					;ERR 102
1411	002260	022546	023250	023734	EM54,DH6,DT14,DF
1412	002266	023776			
1413					;ERR 103
1414	002270	021216	023250	023734	EM19,DH6,DT14,DF
1415	002276	023776			
1416					
1417					;BAD SECTOR/TRACK TABLE FULL ERRORS
1418					
1419					;ERR 104
1420	002300	022563	000000	000000	EM55,0,0,0
1421	002306	000000			
1422					;ERR 105
1423	002310	022620	000000	000000	EM56,0,0,0
1424	002316	000000			
1425					
1426					;CRC ERRORS
1427					
1428					;ERR 106
1429	002320	022655	023315	023624	EM57,DH7,DT10,DF1
1430	002326	024004			
1431					;ERR 107
1432	002330	022676	023404	023646	EM58,DH8,DT11,DF2
1433	002336	024014			
1434					;ERR 110
1435	002340	022717	000000	000000	EM59,0,0,0
1436	002346	000000			
1437					;ERR 111
1438	002350	022755	023315	023670	EM60,DH7,DT12,DF1
1439	002356	024004			
1440					;ERR 112
1441	002360	022776	023404	023712	EM61,DH8,DT13,DF2
1442	002366	024014			
1443					;ERR 113
1444	002370	023017	000000	000000	EM62,0,0,0
1445	002376	000000			

```

1446
1447
1448
1449
1450 002400 000000 DOPAT: 0 ;DX0 PATT TEST DONE FLAG
1451 002402 000000 DDCNT: 0 ;DX0 RANDOM SEEK COUNTER
1452 002404 000000 DOERR: 0 ;DX0 RCSR ERR COUNTER
1453 002406 000000 DOTRK: 0 ;DX0 TRACK
1454 002410 000000 DDOSEC: 0 ;DX0 SECTOR
1455 002412 000000 DDCMER: 0 ;DX0 DATA COMPARE ERROR FLAG
1456 002414 000000 DDCERR: 0 ;DX0 TOTAL DATA COMP ERROR CT
1457 002416 000000 DDOEXP: 0 ;DX0 EXPECTED DATA
1458 002420 000000 DDOREC: 0 ;DX0 RECEIVED DATA
1459 002422 000000 DDCRC: 0 ;DX0 CRC ERROR FLAG
1460 002424 000100 DDOBUF: .BLKW 100 ;DX0 DATA BUFFER
1461 002624 000012 DDOBAD: .BLKW 10. ;DX0 BAD TRK/SEC TABLE
1462
1463
1464
1465
1466
1467
1468 002650 000000 D1PAT: 0 ;DX1 PATT TEST DONE FLAG
1469 002652 000000 D1CNT: 0 ;DX1 RANDOM SEEK COUNTER
1470 002654 000000 D1ERR: 0 ;DX1 RCSR ERR COUNTER
1471 002656 000000 D1TRK: 0 ;DX1 TRACK
1472 002660 000000 D1SEC: 0 ;DX1 SECTOR
1473 002662 000000 D1CMER: 0 ;DX1 DATA COMPARE ERROR FLAG
1474 002664 000000 D1CERR: 0 ;DX1 TOTAL DATA COMPARE ERROR CT
1475 002666 000000 D1EXP: 0 ;DX1 EXPECTED DATA
1476 002670 000000 D1REC: 0 ;DX1 RECEIVED DATA
1477 002672 000000 D1CRC: 0 ;DX1 CRC ERROR FLAG
1478 002674 000100 D1BUF: .BLKW 100 ;DX1 DATA BUFFER
1479 003074 000012 D1BAD: .BLKW 10. ;DX1 BAD TRK/SEC TABLE
1480
1481 003120 000000 DXTST: 0 ;1 = DATA PATT TEST
1482 ;2 = RANDOM SFEK TEST
1483 ;3 = INITIALIZE TEST
1484 ;4 = RESTORE TEST
1485 ;5 = WRITE DELETED DATA TEST
1486 ;6 = INVALID ADDRESS TEST
1487
1488 003122 000000 FIN: 0 ;COMMON FLG FOR DX0 & DX1 FOR TRK/SEC FINISHED
1489 003124 000000 MAXTRK: 0 ;MAX TRACK #
1490 ;0 FOR 1ST PASS, 114 FOR SUBSEQUENT PASSES. SET AT START.
1491 003126 000000 MAXSK: 0 ;# OF RANDOM SEEKS TO BE PERFORMED.
1492 ;10 FOR 1ST PASS, 500 FOR SUBSEQUENT PASSES. SET AT EOP.
1493 003130 000000 COPFLG: 0 ;0 - NORM TEST 1 = COPY UTILITY ACTIVE
1494 003132 000000 COMP1: 0 ;1 COMPAT TESTS, PASS 1
1495 003134 000000 COMP2: 0 ;1 PASS 2
1496
1497
    
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1498 .SBTTL PROGRAM
1499
1500 003136 005237 003132 START1: INC COMP1 ;COMPAT PASS 1
1501 003142 000424 BR S1
1502
1503 003144 005237 003134 START2: INC COMP2 ;COMPAT PASS 2
1504 003150 005037 003132 CLR COMP1
1505 003154 000421 BR S2
1506
1507 003156 005237 003130 START3: INC COPFLG ;COPY UTILITY
1508 003162 005037 003132 CLR COMP1
1509 003166 005037 003134 CLR COMP2
1510 003172 000414 BR S3
1511
1512 003174 012737 000102 000100 START: MOV #CLKVEC+2,CLKVEC ;DO RTI IF CLOCK INTERR
1513 003202 012737 000002 000102 MOV #RTI,CLKVEC+2
1514
1515 003210 005037 003132 CLR COMP1 ;NORMAL TESTING
1516 003214 005037 003134 S1: CLR COMP2
1517 003220 005037 003130 S2: CLR COPFLG
1518
1519 003224 012706 001100 S3: MOV #STACK,SP ;SETUP STACK POINIER
1520 003230 042777 000100 175706 BIC #100,@$TKS ;DISABLE ANY TTY INTERRUPTS
1521 ;TO RT-11 MONITOR
1522 ;DISABLE INTERRUPTS
1523 003236 106427 ;MTPS #PR4
1524 003240 000200 .WORD 106427
1525 003242 013737 000042 004464 MOV 42,HLD42 ;SAVE
1526 003250 123727 001210 000001 CMPB $ENV,#1 ;APT?
1527 003256 001402 BEQ 2$ ;BR IF YES
1528 003260 005037 000042 CLR 42 ;ELSE CLR SO WE CAN USE SOFTSWR
1529 003264
1530 2$:
1531 .SBTTL INITIALIZE THE COMMON TAGS
1532 ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
1533 003264 012706 001100 MOV #$CMTAG,R6 ;;FIRST LOCATION TO BE CLEARED
1534 003270 005026 CLR (R6)+ ;;CLEAR MEMORY LOCATION
1535 003272 022706 001140 CMP #SWR,R6 ;;DONE?
1536 003276 001374 BNE -6 ;;LOOP BACK IF NO
1537 003300 012706 001100 MOV #STACK,SP ;;SETUP THE STACK POINTER
1538 ;;INITIALIZE A FEW VECTORS
1539 003304 012737 025416 000030 MOV #ERROR,@EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
1540 003312 012737 000340 000032 MOV #340,@EMTVEC+2 ;;LEVEL 7
1541 003320 012737 026450 000034 MOV #TRAP,@TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
1542 003326 012737 000340 000036 MOV #340,@TRAPVEC+2;LEVEL 7
1543 ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
1544 ;;EQUAL TO A '-1', SETUP FOR A SOFTWARE SWITCH REGISTER.
1545 003334 013746 000004 MOV @ERRVEC,-(SP) ;;SAVE ERROR VECTOR
1546 003340 012737 003374 000004 MOV #64$,@ERRVEC ;;SET UP ERROR VECTOR
1547 003346 012737 177570 001140 MOV #DSWR,SWR ;;SETUP FOR A HARDWARE SWICH REGISTER
1548 003354 012737 177570 001142 MOV #DDISP,DISPLAY ;;AND A HARDWARE DISPLAY REGISTER
1549 003362 022777 177777 175550 CMP #-1,@SWR ;;TRY TO REFERENCE HARDWARE SWR
1550 003370 001012 BNE 66$ ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
1551 003372 000403 BR 65$ ;;AND THE HARDWARE SWR IS NOT = -1
1552 003374 012716 003402 64$: MOV #C5$, (SP) ;;BRANCH IF NO TIMEOUT
1553 003400 000002 RTI ;;SET UP FOR TRAP RETURN
    
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1554 003402 012737 000176 001140 65$: MOV #SWREG,SWR ;;POINT TO SOFTWARE SWR
1555 003410 012737 000174 001142 MOV #DISPREG,DISPLAY
1556 003416 012637 000004 66$: MOV (SP)+,@WERRVEC ;;RESTORE ERROR VECTOR
1557
1558 003422 005037 001176 CLR $PASS ;;CLEAR PASS COUNT
1559 003426 132737 000200 001211 BITB #APTSIZE,$ENVM ;;TEST USER SIZE UNDER APT
1560 003434 001403 BEQ 67$ ;;YES,USE NON-APT SWITCH
1561 003436 012737 001212 001140 MOV #SWREG,SWR ;;NO,USE APT SWITCH REGISTER
1562 003444
1563 67$:
1564 .SBTTL TYPE PROGRAM NAME
1565 003444 005227 177777 ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
1566 003450 001046 INC #-1 ;;FIRST TIME?
1567 003452 104401 003520 BNE 68$ ;;BRANCH IF NO
1568 .SBTTL GET VALUE FOR SOFTWARE SWITCH REGISTER
1569 003456 005737 000042 TYPE ,69$ ;;TYPE ASCIZ STRING
1570 003462 001012 TST @#42 ;;ARE WE RUNNING UNDER XXDP/ACT?
1571 003464 123727 001210 000001 BNE 70$ ;;BRANCH IF YES
1572 003472 001406 CMPB $ENV,#1 ;;ARE WE RUNNING UNDER APT?
1573 003474 023727 001140 000176 BEQ 70$ ;;BRANCH IF YES
1574 003502 001005 CMP SWR,#SWREG ;;SOFTWARE SWITCH REG SELECTED?
1575 003504 104406 BNE 71$ ;;BRANCH IF NO
1576 003506 000403 GTSWR ;;GET SOFT-SWR SETTINGS
1577 003510 112737 000001 001134 70$: MOVB #1,$AUTOB ;;SET AUTO-MODE INDICATOR
1578 003516 71$:
1579 003516 000423 BR 68$ ;;GET OVER THE ASCIZ
1580 .:69$: .ASCIZ <CRLF>*(CVKDAB PDT-11/150 SYSTEM EXERCISER*<CRLF>
1581 003566 68$:
1582 003566 005737 003130 TST COPFLG ;:COPY UTILITY?
1583 003572 001057 BNE LOOP ;:BR IF YES
1584
1585 003574 005737 003132 TST COMP1 ;:COMPAT PASS 1?
1586 003600 001054 BNE LOOP ;:BR IF YES
1587 003602 005737 003134 TST COMP2 ;:COMPAT PASS 2?
1588 003606 001051 BNE LOOP ;:BR IF YES
1589
1590 003610 012737 000004 003124 MOV #4,MAXTRK ;:TRK 0-4, 40-44, 72-76(10) FOR 1'ST PASS
1591 003616 012737 000012 003126 MOV #10.,MAXSK ;:10 RANDOM SEEKS FOR 1'ST PASS
1592
1593 003624 005037 025766 CLR TERR ;:TOTAL ERR CT
1594 003630 005037 025770 CLR TSERR ;:TOTAL SOFT ERR CT FOR EOP TYPEOUT
1595
1596 003634 052737 000006 176610 BIS #<RTS!DTR>,AMRC
1597 003642 042737 000006 176610 BIC #<RTS.DTR>,AMRC ;:DTR MUST BE TOGGLED.

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1598
1599 003650 005227 177777          INC      #-1          ;1'ST TIME?
1600 003654 001005          BNE      4$          ;BR IF NO
1601 003656 123727 001210 000001    CMPB    $ENV,#1     ;APT?
1602 003664 001401          BEQ      4$          ;BR IF YES
1603 003666 104412          GTDEVM          ;SHOW CURRENT DEVM & GET NEW
1604
1605 003670 004737 010342          4$:     JSR      PC,SIZE ;SEE WHO IS ON THE SYSTEM
1606 003674 123727 001210 000001    CMPB    $ENV,#1     ;ARE WE RUNNING UNDER APT?
1607 003702 001413          BEQ      LOOP       ;BR IF YES & DONT HALT
1608 003704 032737 001000 001246    BIT     #1000,$DEVM ;DX0 THERE?
1609 003712 001404          BEQ      1$         ;BR IF YES
1610 003714 032737 000400 001246    BIT     #400,$DEVM  ;DX1 THERE?
1611 003722 001003          BNE      LOOP       ;BR IF NO
1612 003724 104401 017351          '$:     TYPE     ,WARNING ;INSERT SCRATCH DISKS
1613 003730 000000          HALT
1614
1615
1616 003732 012706 001100          LOOP:   MOV      #1100,SP ;LOOP HERE AFTER EOP & RESET STACK
1617
1618 003736 004737 011566          JSR      PC,TIMER1  ;TIMER TO ALLOW 'P' TO PRINT BEFORE RESET
1619
1620 003742 000005          RESET
1621 003744 042737 000100 177546    BIC     #IE,CLK     ;RESET SETS CLK IE. DONT ALLOW YET
1622
1623          ;MTPS      #PRO          ;ALLOW INTERRUPTS
1624 003752 106427          .WORD   106427
1625 003754 000000          PRO
1626
1627 003756 052737 000006 176610    BIS     #<RTS!DTR> ,AMRC ;TO CONDITION ALL TERMINALS &
1628          ;COMM PORT TO OPERATE IN EXT LOOPBACK MODE.
1629          ;NO HARM IF LOOPBACK NOT USED.
1630 003764 004737 011566          JSR      PC,TIMER1  ;TIMER TO ALLOW PREV XFERS TO FINISH
1631
1632 003770 005037 025772          CLR     PERR        ;PASS ERR COUNT FOR EOP TYPEOUT
1633 003774 005037 025774          CLR     PSERR       ;PASS SOFT ERR COUNT FOR EOP TYPEOUT
1634
1635 004000 004737 011664          JSR      PC,CLRBAD  ;CLEAR BAD SECTOR/TRACK TABLES
1636
1637 004004 005737 003132          TST     COMP1       ;COMPAT PASS 1?
1638 004010 001004          BNE     1$          ;BR IF YES
1639 004012 005737 003134          TST     COMP2       ;COMPAT PASS 2?
1640 004016 001001          BNE     1$          ;BR IF YES
1641 004020 000405          BR      2$          ;ELSE TEST FOR COPY
1642
1643 004022 012737 000114 003124  '$:     MOV      #114,MAXTRK
1644 004030 000137 006256          JMP     DXTS+1      ;COMPATABILITY TESTING
1645
1646 004034 005737 003130          2$:     TST     COPFLG   ;COPY UTILITY?
1647 004040 001402          BEQ     MEMTST      ;BR IF NO...NORMAL TESTING
1648 004042 000137 016354          JMP     COPY        ;ELSE GO COPY
1649

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1650 .SBTTL PROGRAM
1651 :*****
1652 :      MEMORY TESTS
1653 :
1654 :MEMORY FROM 0 TO THE LAST LOC OF PROGRAM (LSTAD) IS TESTED FOR TIMEOUT.
1655 :MEMORY FROM 'LSTAD' TO THE BOTTOM OF THE RT11 MONITOR/ABS LOADER
1656 :IS TESTED BY A PASS OF A 1010 PATT FOLLOWED BY A PASS OF 0101 PATTERN.
1657 :IF THE SYSTEM HAS A 28K MEMORY, 28K TO 30K WILL BE TESTED SIMILARLY.
1658 :*****
1659
1660 004046 004737 011102 MEMTST: JSR PC,EXAMKB
1661
1662 004052 012737 012142 000004 MOV #INTSRV,ERRVEC ;SETUP TIMEOUT TRAP ADDR
1663 004060 012737 000200 000006 MOV #200,ERRVEC+2
1664
1665 004066 013703 010766 MOV MAXMEM,R3
1666 004072 162703 000300 SUB #300,R3 ;TEST ONLY AS FAR AS ABS LOADER IF NOT RT-11
1667
1668 004076 005004 CLR R4 ;ADDR POINTER
1669 004100 005037 012150 1$: CLR INTFLG
1670 004104 005714 TST (R4) ;TEST LOCS 0 THRU END OF PGM.
1671 004106 005737 012150 TST INTFLG ;TIMEOUT?
1672 004112 001403 BEQ 2$ ;BR IF NO
1673 004114 010437 004462 MOV R4,ADDR ;FOR ERR TYP
1674 004120 104001 ERROR 1 ;TIMEOUT ON READ
1675 004122 062704 000002 2$: ADD #2,R4 ;BUMP ADDR
1676 004126 020427 026532 CMP R4,#LSTAD ;AT END?
1677 004132 001362 BNE 1$ ;BR IF NO
1678
1679 004134 005037 004454 CLR MEMCT
1680 004140 012737 125252 004460 MOV #125252,PAT ;DATA PATT FOR 1'ST PASS
1681 004146 012704 026532 8$: MOV #LSTAD,R4 ;ADDR POINTER. R/W LOCS LSTAD THRU
1682 ;BOT OF RT11 OR BOT OF ABS LOADER
1683 004152 005037 012150 3$: CLR INTFLG
1684 004156 013714 004460 MOV PAT,(R4) ;WRITE
1685 004162 005737 012150 TST INTFLG ;TIMEOUT?
1686 004166 001403 BEQ 4$ ;BR IF NO
1687 004170 010437 004462 MOV R4,ADDR ;FOR ERR TYP
1688 004174 104002 ERROR 2 ;TIMEOUT ON WRITE
1689 004176 011437 004456 4$: MOV (R4),MEMHLD ;READ
1690 004202 023737 004456 004460 CMP MEMHLD,PAT ;COMPARE
1691 004210 001403 BEQ 6$
1692 004212 010437 004462 MOV R4,ADDR ;FOR ERR TYP
1693 004216 104003 ERROR 3 ;COMPARE ERROR
1694
1695 004220 062704 000002 6$: ADD #2,R4 ;BUMP POINTER
1696 004224 023727 004464 001000 CMP HLD42,#1000 ;RT11 IF LOC 42 = 1000
1697 004232 001403 BEQ 7$ ;BR IF RT11
1698
1699 004234 020403 CMP R4,R3 ;ELSE AT BOT OF ABS LOADER?
1700 004236 001345 BNE 3$ ;BR IN NO
1701 004240 000403 BR 5$ ;ELSE EXIT
    
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1758 ;:*****
1759
1760 004466 032737 000200 001246 CLKTST: BIT #BIT7,$DEV0 ;DROP TEST?
1761 004474 001031 BNE PRTST ;BR IF YES
1762 004476 012737 012142 000100 MOV #INTSRV,CLKVEC ;SETUP VECTOR AREA
1763 004504 012737 000200 000102 MOV #200,CLKVEC+2 ;LOCKOUT OTHER INTER.
1764 004512 005037 012150 CLR INTFLG
1765 004516 052737 000100 177546 BIS #IE,CLK ;SET CLOCK LOOSE!
1766
1767 004524 004537 011316 JSR R5,TIMER ;SEE IF INTFLG GOES TO 100
1768 004530 012150 INTFLG
1769 004532 000100 100
1770 004534 104032 ERROR 32 ;CLK NOT RESPONDING
1771 004536 000410 BR PRTST
1772
1773 004540 032777 010000 174372 BIT #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
1774 004546 001404 BEQ PRTST
1775 004550 104401 017244 TYPE ,CLOCK
1776 004554 104401 017670 TYPE ,RJN
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1777
1778
1779
1780
1781
1782 004560 032737 100000 001246 PRST: BIT #BIT15,$DEV  ;DROP TEST?
1783 004566 001056 BNE SMTST ;BR IF YES
1784 004570 005737 010744 TST PRPRES ;PRINTER THERE?
1785 004574 001453 BEQ SMTST ;BR IF NO
1786
1787 004576 012737 027014 177420 2$: MOV #<PRT!B9600!CHAR8>,PARAM ;SETUP BAUD RATE & CHAR LENGTH
1788 004604 012737 012152 000200 MOV #PRSRV,PRVEC ;ELSE SETUP PRINTER VECTOR
1789 004612 012737 000200 000202 MOV #200,PRVEC+2 ;LOCKOUT INTERR
1790
1791 004620 005037 012300 CLR LINCT ;CLEAR LINE CTR
1792 004624 012737 000015 012276 MOV #CR,PRCHR ;CHAR TO BE PRINTED
1793 ;'DEL' (177) CAN BE USED TO CLR PRINTER BUFF
1794 004632 052737 000100 177514 BIS #IE,PRS ;SET PRINTER LOOSE!
1795 ;WILL PRINT CONTINUOUS 132 COLUMN LINES
1796 ;EA BEGINNING WITH ASCII 40 THRU 176
1797 004640 004537 011316 JSR R5,TIMER ;SEE IF LINCT GOES TO 5
1798 004644 012300 LINCT
1799 004646 000005 5
1800 004650 104033 ERROR 33 ;PRINTER NOT RESPONDING
1801 004652 000424 BR SMTST
1802
1803 004654 005737 010746 TST PRPORT ;EXT LOOPBACK MODE?
1804 004660 001403 BEQ 3$ ;BR IF NO
1805 004662 042737 000100 177514 BIC #IE,PRS ;ELSE SHUT DOWN PRINTER
1806
1807 004670 032777 010000 174242 3$: BIT #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
1808 004676 001412 BEQ SMTST
1809 004700 104401 017204 TYPE ,PRINT
1810 004704 005737 010746 TST PRPORT ;EXT LOOPBACK MODE?
1811 004710 001403 BEQ 4$ ;BR IF NO
1812 004712 104401 017215 TYPE ,PORT
1813 004716 000402 BR SMTST
1814 004720 104401 017670 4$: TYPE ,RUN
    
```

```

1815
1816
1817
1818
1819
1820 004724 032737 002000 001246 SMTST: BIT #BIT10,$DEV M ;DROP TEST?
1821 004732 001402 BEQ 8$ ;BR IF NO
1822 004734 000137 005200 JMP AMTST ;ELSE JUMP TEST
1823
1824 004740 123727 001210 000001 8$: CMPB $EN' #1 ;UNDER APT?
1825 004746 001003 BNE 9$ ;BR IF NO
1826 004750 005737 001176 TST $PASS ;ELSE 1'ST PASS?
1827 004754 001111 BNE AMTST ;EXIT TEST IF NO
1828
1829 004756 005037 012772 9$: CLR LSTCHR ;LAST CHAR FLAG FOR XMIT
1830 004762 052737 000400 176024 BIS #MR,SMXC ;MASTER RESET
1831 004770 052737 004000 176624 BIS #MCLK,SMXC ;MAINT CLOCK
1832
1833 004776 032737 000010 001246 BIT #BIT3,$DEV M ;EXT LOOPBACK?
1834 005004 001403 BEQ 1$ ;BR IF YES
1835 005006 052737 014000 176624 BIS #<MM!MCLK>,SMXC ;ELSE SET MAINT MODE FOR INT. LOOPBACK
1836 005014 012737 007026 176622 1$: MOV #<CHR8!ODDPAR!026>,SMPAR ;SETUP SYNC PARAMETER REGISTER
1837 005022 052737 000026 176620 BIS #<RTS!DTR!SR SYN>,SMRC ;SET REQ TO SEND, DATA TERM RDY
1838 ;& SEARCH SYNC
1839 005030 052737 000020 176624 BIS #SEND,SMXC ;ENABLE XMIT SEND
1840 005036 012737 000026 176626 MOV #026,SMXB ;XMIT SYNC CHAR
1841
1842 005044 004537 011600 JSR R5,TIMER? ;WAIT FOR DONE
1843 005050 176620 SMRC
1844 005052 000200 DONE
1845 005054 104045 ERROR 45 ;NO DONE
1846 005056 000435 BR 5$ ;EXIT
1847
1848 005060 013737 176622 012702 MOV SMRB,COMHLD ;READ WORD
1849 005066 023727 012702 000026 CMP COMHLD,#026 ;IS IT SYNC CHAR?
1850 005074 001402 BEQ 4$ ;BR IF YES
1851 005076 104006 ERROR 6 ;DID NOT REC SYNC CHAR
1852 005100 000424 BR 5$ ;EXIT
1853
1854 005102 004537 011272 4$: JSR R5,SETVEC ;SETUP VECTOR AREA
1855 005106 000340 SMRVEC
1856 005110 012774 SMRSRV
1857 005112 012704 SMXSRV
    
```

```
1858
1859 005114 012737 000027 012700      MOV    #027,COMCHR      ;1'ST CHAR TO BE XMITTED
1860 005122 052737 000100 176620      BIS    #IE,SMRC        ;SET SYNC MODEM LOOSE!
1861 005130 052737 000100 176624      BIS    #IE,SMXC
1862
1863 005136 004537 011316      JSR    R5,TIMER        ;SEE IF COMCHR GOES TO ALL 1'S (DONE)
1864 005142 012700      COMCHR
1865 005144 177777      177777
1866 005146 104037      ERROR  37              ;SYNC COMM NOT RESPONDING
1867 005150 000240      NOP
1868
1869 005152 012737 000400 176624 5$:  MOV    #MR,SMXC        ;MASTER RESET
1870 005160 032777 010000 173752  BIT    #BIT12,@SWR     ;DO TYPEOUT IF SET
1871 005166 001404      BEQ    AMTST           ;EXIT IF NOT
1872 005170 104401 017155      TYPE  ,SCOM
1873 005174 104401 017756      TYPE  ,DUN
```

```

1874
1875
1876          ;:*****
1877          ;: START ASYNC COMM PORT
1878          ;:*****
1879 005200 032737 004000 001246 AMTST: BIT    #BIT11,$DEV  ;DROP TEST?
1880 005206 001054          BNE    CL1TST  ;BR IF YES
1881
1882 005210 032737 000010 001246          BIT    #BIT3,$DEV  ;EXT LOOPBACK?
1883 005216 001404          BEQ    1$      ;BR IF YES
1884 005220 012737 037036 177420          MOV    #<AMOD!B9600!OPAR!CHAR8!MAINT> ,PARAM ;ELSE SET FOR INT LOOPBACK
1885 005226 000403          BR     3$
1886 005230 012737 037034 177420 1$: MOV    #<AMOD!B9600!OPAR!CHAR8> ,PARAM ;WAKE UP AMOD IF JUST DID SMOD
1887 005236 052737 000006 176610 3$: BIS    #<RTS!DTR> ,AMRC ;SET REQ TO SEND & DATA TERM RDY
1888
1889 005244 004537 011272          JSR    R5,SETVEC ;SETUP VECTOR AREA
1890 005250 000330          AMRVEC
1891 005252 012622          AMRSRV
1892 005254 012604          AMXSRV
1893
1894 005256 005037 012700          CLR    COMCHR ;CHAR TO BE XMITTED
1895 005262 013737 176612 012702          MOV    AMRB,COMHLD ;CLR OUT ANY PREVIOUS STORED WORD
1896 005270 052737 00010C 176610          BIS    #IE,AMRC ;SET ASYNC MODEM LOOSE!
1897 005276 052737 000100 176614          BIS    #IE,AMXC
1898
1899 005304 004537 011316          JSR    R5,TIMER ;SEE IF COMCHR GOES TO 377
1900 005310 012700          COMCHR
1901 005312 000377          377
1902 005314 104040          ERROR 40 ;ASYNC COMM NOT RESPONDING
1903 005316 000410          BR     CL1TST
1904
1905 005320 032777 010000 173612          BIT    #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
1906 005326 001404          BEQ    CL1TST
1907 005330 104401 017170          TYPE  ,ACOM
1908 005334 104401 017670          TYPE  ,RUN
    
```

```

1909
1910
1911      :*****
1912      :      START CLUSTER TERMINAL #1
1913      :*****
1914 005340 005737 010742      CL1TST: TST      CLPRES      :OPTION PRESENT?
1915 005344 001002      BNE      1$      :BR IF YES
1916 005346 000137 006014      JMP      DXTST0
1917
1918 005352 032737 004000 001246 1$:      BIT      #4000,$DEV      :DROP ASYNC?
1919 005360 001406      BEQ      4$      :BR IF NO
1920 005362 042737 000006 176610      BIC      #<RTS!DTR>,$AMRC :MUST BE TOGGLED
1921 005370 052737 000006 176610      BIS      #<RTS!DTR>,$AMRC :PRIME IT
1922
1923 005376 032737 010000 001246 4$:      BIT      #BIT12,$DEV      :DROP TEST?
1924 005404 001051      BNE      CL2TST      :BR IF YES
1925
1926 005406 032737 000001 001246      BIT      #BIT0,$DEV      :TERM #1 SET FOR EXT LOOPBACK?
1927 005414 001404      BEQ      2$      :BR IF YES
1928 005416 012737 005016 177420      MOV      #<CT1!B2400!CHAR8!MAINT>,$PARAM ;ELSE SET FOR INT LOOPBACK
1929 005424 000403      BR      3$
1930 005426 012737 005014 177420 2$:      MOV      #<CT1!B2400!CHAR8>,$PARAM ;SETUP FOR EXT LOOPBACK
1931
1932 005434 004537 011272      3$:      JSR      R5,$SETVEC      ;SETUP INTERR VECTORS
1933 005440 000300      TK1VEC
1934 005442 012322      TK1SRV
1935 005444 012304      TP1SRV
1936
1937 005446 005037 012400      CLR      T1CHR      ;CHAR TO BE XMITTED
1938 005452 013737 176502 012402      MOV      TK1B,T1HLD      ;READ CHAR (CLEAR STALE DATA)
1939 005460 052737 000100 176500      BIS      #IE,TK1S      ;SET CLUSTER TERM #1 LOOSE!
1940 005466 052737 000100 176504      BIS      #IE,TP1S
1941
1942 005474 004537 011316      JSR      R5,$TIMER      ;SEE IF T1CHR GOES TO 377
1943 005500 012400      T1CHR
1944 005502 000377      377
1945 005504 104034      ERROR      34      ;CLUSTER TERM 1 NOT RESPONDING
1946 005506 000410      BR      CL2TST
1947
1948 005510 032777 010000 173422      BIT      #BIT12,@SWR      ;SKIP TYPEOUT IF NOT SET
1949 005516 001404      BEQ      CL2TST
1950 005520 104401 017122      TYPE      ,CLT1
1951 005524 104401 017670      TYPE      ,RUN
    
```

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1952
1953
1954
1955
1956
1957 005530 032737 020000 001246 CL2TST: BIT #BIT13,$DEV  ;DROP TEST?
1958 005536 001051 BNE CL3TST ;BR IF YES
1959
1960 005540 032737 000002 001246 BIT #BIT1,$DEV ;TERM #2 SET FOR EXT LOOPBACK?
1961 005546 001404 BEQ 1$ ;BR IF YES
1962 005550 012737 055016 177420 MOV #<CT2!B2400!CHAR8!MAINT> ,PARAM ;ELSE SET FOR INT LOOPBACK
1963 005556 000403 BR 2$
1964 005560 012737 055014 177420 1$: MOV #<CT2!B2400!CHAR8> ,PARAM ;SETUP FOR EXT LOOPBACK
1965
1966 005566 004537 011272 2$: JSR R5,SETVEC ;SETUP INTERR VECTORS
1967 005572 000310 TK2VEC
1968 005574 012422 TK2SRV
1969 005576 012404 TP2SRV
1970
1971 005600 005037 012500 CLR T2CHR ;CHAR TO BE XMITTED
1972 005604 013737 176512 012502 MOV TK2B,T2HLD ;READ CHAR (CLEAR STALE DATA)
1973 005612 052737 000100 176510 BIS #IE,TK2S ;SET CLUSTER TERM #2 LOOSE.
1974 005620 052737 000100 176514 BIS #IE,TP2S
1975
1976 005626 004537 011316 JSR R5,TIMER ;SEE IF T2CHR GOES TO 377
1977 005632 012500 T2CHR
1978 005634 000377 377
1979 005636 104035 ERROR 35 ;CLUSTER TERM 2 NOT RESPONDING
1980 005640 000410 BR CL3TST
1981
1982 005642 032777 010000 173270 BIT #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
1983 005650 001404 BEQ CL3TST
1984 005652 104401 017133 TYPE ,CLT2
1985 005656 104401 017670 TYPE ,RUN
    
```

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1986
1987
1988
1989
1990
1991 005662 032737 040000 001246 CL3TST: BIT #BIT14,$DEV  ;DROP TEST?
1992 005670 001051 BNE DXTST0 ;BR IF YES
1993
1994 005672 032737 000004 001246 BIT #BIT2,$DEV ;TERM #3 SET FOR EXT LOOPBACK?
1995 005700 001404 BEQ 1$ ;BR IF YES
1996 005702 012737 065016 177420 MOV #<CT3!B2400!CHAR8!MAINT> ,PARAM ;ELSE SET FOR INT LOOPBACK
1997 005710 000403 BR 2$
1998 005712 012737 065014 177420 1$: MOV #<CT3!B2400.CHAR8> ,PARAM ;SETUP FOR EXT LOOPBACK
1999
2000 005720 004537 011272 2$: JSR R5,SETVEC ;SETUP INTERR VECTORS
2001 005724 000320 TK3VEC
2002 005726 012522 TK3SRV
2003 005730 012504 TP3SRV
2004
2005 005732 005037 012600 CLR T3CHR ;CHAR TO BE XMITTED
2006 005736 013737 176522 012602 MOV TK3B,T3HLD ;READ CHAR (CLEAR STALE DATA)
2007 005744 052737 000100 176520 BIS #IE,TK3S ;SET CLUSTER TERM #3 LOOSE.
2008 005752 052737 000100 176524 BIS #IE,TP3S
2009
2010 005760 004537 011316 JSR R5,TIMER ;SEE IF T3CHR GOES TO 377
2011 005764 012600 T3CHR
2012 005766 000377 377
2013 005770 104036 ERROR 36 ;CLUSTER TERM 3 NOT RESPONDING
2014 005772 000410 BR DXTST0
2015
2016 005774 032777 010000 173136 BIT #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
2017 006002 001404 BEQ DXTST0
2018 006004 104401 017144 TYPE ,CLT3
2019 006010 104401 017670 TYPE ,RUN
    
```

```

2020
2021
2022          :*****
2023          :          FILL & EMPTY BUFFER TEST
2024          :*****
2025          :A FILL BUFFER COMMAND IS ISSUED WITH ALTERNATING WORDS OF ALL 0'S & ALL 1'S.
2026          :AN EMPTY BUFFER COMMAND IS ISSUED TO FILL 'DOBUF'.
2027          :UPON COMPLETION, DOBUF IS CHECKED FOR ALTERNATING WORDS OF ALL 0'S & ALL 1'S.
2028          :ERRORS IN THIS TEST MAY INDICATE CABLE CROSS-TALK INTERFERENCE.
2029          :*****
2030 006014 005037 003120          DXTST0: CLR          DXTST          :0 = DXTST0
2031
2032 006020 032737 000400 001246          BIT          #BIT8,$DEV          :DROP DX0 TESTS?
2033 006026 001404          BEQ          7$          :BR IF NO
2034 006030 032737 001000 001246          BIT          #BIT9,$DEV          :DROP DX1 TESTS?
2035 006036 001107          BNE          DXTST1          :BR IF YES
2036
2037 006040 004537 011600          7$: JSR          R5,TIMER2          :WAIT FOR DISK DONE
2038 006044 177170          RXCS
2039 006046 000200          DONE
2040 006050 104075          ERROR          7$          :NO DONE
2041 006052 000474          BR          8$          :EXIT
2042
2043 006054 012737 000011 177170          MOV          #INITAL,RXCS          :DO AN INITIALIZE COMMAND
2044
2045 006062 004537 011600          JSR          R5,TIMER2          :WAIT FOR DONE
2046 006066 177170          RXCS
2047 006070 000200          DONE
2048 006072 104075          ERROR          7$          :NO DONE
2049 006074 000463          BR          8$
2050
2051 006076 012700 000100          MOV          #100,R0          :FILL BUFFER
2052 006102 005001          CLR          R1          :WORD CT
2053 006104 012737 000001 177170          MOV          #FBUF,RXCS          :WORD
2054 006112 010137 177172          1$: MOV          R1,RXDB          :ISSUE FILL BUFF COMMAND
2055 006116 005101          COM          R1          :COMPLEMENT WORD
2056 006120 005300          DEC          R0          :DONE ALL 100 WORDS?
2057 006122 001373          BNE          1$          :BR IF NO
2058
2059 006124 004537 011600          JSR          R5,TIMER2          :WAIT FOR DISK DONE
2060 006130 177170          RXCS
2061 006132 000200          DONE
2062 006134 104075          ERROR          7$          :NO DONE
2063 006136 000442          BR          8$          :EXIT
2064
2065
2066 006140 012700 000100          MOV          #100,R0          :EMPTY BUFFER
2067 006144 012701 002424          MOV          #DOBUF,R1          :WORD CT
2068 006150 012737 000003 177170          MOV          #EBUF,RXCS          :BUFFER ADDR
2069 006156 013721 177172          2$: MOV          RXDB,(R1)+          :ISSUE EMPTY BUFF COMMAND
2070 006162 005300          DEC          R0          :STORE WORD
2071 006164 001374          BNE          2$          :DONE?
                                :BR IF NO
    
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2072
2073 006166 004537 011600 JSR R5,TIMER2 ;WAIT FOR DISK DONE
2074 006172 177170 RXCS
2075 006174 000200 DONE
2076 006176 104075 ERROR 75 ;NO DONE
2077 006200 000421 BR 8$ ;EXIT
2078
2079 ;CHECK IT
2080 006202 012701 002424 MOV #DOBUF,R1 ;BUFFER ADDR
2081 006206 012137 006250 3$: MOV (R1)+,EBHLD ;STORE IT
2082 006212 001401 BEQ 4$ ;BR IF ZERO
2083 006214 104076 ERROR 76 ;WORD NOT ALL ZEROS
2084
2085 006216 012137 006250 4$: MOV (R1)+,EBHLD
2086 006222 023727 006250 177777 CMP EBHLD,#-1 ;ALL 1'S?
2087 006230 001401 BEQ 5$ ;BR IF YES
2088 006232 104077 ERROR 77 ;WORD NOT ALL ONES
2089
2090 006234 020127 002624 5$: CMP R1,#DOBUF+200 ;END OF DOBUFF?
2091 006240 001362 BNE 3$ ;BR IF NO
2092 006242 000405 BR DXTST1 ;GO TO NXT TST
2093
2094 006244 000137 010200 8$: JMP EOP ;EXIT ALL DISK TESTS
2095
2096 006250 000000 EBHLD: 0 ;STORAGE FOR ERROR REPORT
2097 006252 000000 EXPO: 0 ;EXPECT 0'S FOR ERROR REPORT
2098 006254 177777 EXP1: -1 ;EXPECT 1'S FOR ERROR REPORT
  
```

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2099
2100
2101
2102
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2104
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2106
2107
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2110
2111
2112
2113 006256 012737 000001 003120 DXTST1: MOV #1,DXTST ;1 - DATA PATT TESTS
2114
2115 006264 005037 002406 CLR D0TRK ;STARTING TRACK
2116 006270 005037 002656 CLR D1TRK
2117
2118 006274 005037 002400 12$: CLR DOPAT ;INIT DX0 FLAGS
2119 006300 005037 002404 CLR DOERR
2120 006304 005037 002414 CLR DOCERR
2121 006310 012737 000001 002410 MOV #1,D0SEC
2122
2123 006316 005037 002650 CLR D1PAT ;INIT DX1 FLAGS
2124 006322 005037 002654 CLR D1ERR
2125 006326 005037 002664 CLR D1CERR
2126 006332 012737 000001 002660 MOV #1,D1SEC
2127
2128 006340 032737 000400 001246 BIT #BIT8,$DEV0 ;DROP DX0 TESTS?
2129 006346 001031 BNE 2$ ;BR IF YES
2130
2131 006350 012737 013074 000264 MOV #RXSRV,RXVEC ;SETUP VECTOR AREA
2132 006356 012737 000200 000266 MOV #200,RXVEC+2
2133
2134 006364 005737 003134 1$: TST COMP2 ;DOING COMPAT PASS 2?
2135 006370 001404 BEQ 10$ ;BR IF NO
2136 006372 012737 013566 013174 MOV #DORSEC,DODISP ;ELSE DO READS ONLY
2137 006400 000403 BR 7$
2138
2139 006402 012737 013212 013174 10$: MOV #DOFBUF,DODISP ;DO NORMAL TESTING
2140 006410 005037 003122 7$: CLR FIN ;DO DX1 WHEN SET
2141 006414 052737 000100 177170 BIS #IE,RXCS ;LET INTERRUPTS LOOSE!
2142
2143 006422 004737 011402 JSR PC,TIMD0
2144 006426 104041 ERROR 41 ;DX0 NOT GETTING TRACK DONE FLAG
2145 006430 000240 NOP
2146
2147 006432 032737 001000 001246 2$: BIT #BIT9,$DEV0 ;DROP DX1 TESTS?
2148 006440 001031 BNE 4$ ;BR IF YES
2149
2150 006442 012737 013074 000264 MOV #RXSRV,RXVEC ;SETUP VECTOR AREA
2151 006450 012737 000200 000266 MOV #200,RXVEC+2
    
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2152
2153 006456 005737 003134      3$:   TST      COMP2      ;DOING COMPAT PASS 2?
2154 006462 001404              BEQ      11$          ;BR IF NO
2155 006464 012737 015352 013202   MOV     #D1RSEC,D1DISP ;ELSE DO READ ONLY
2156 006472 000403              BR       8$
2157
2158 006474 012737 014776 013202 11$:   MOV     #D1FBUF,D1DISP ;DO NORMAL TESTING
2159 006502 005037 003122      8$:   CLR      FIN          ;GO BACK TO DX0 WHEN SET
2160 006506 052737 000120 177170   BIS     #<IE.DX1>,RXCS ;LET INTERRUPTS LOOSE.
2161
2162 006514 004737 011476              JSR     PC,TIMD1
2163 006520 104042              ERROR   42           ;DX1 NOT GETTING TRACK DONE FLAG
2164 006522 000240              NOP
2165
2166 006524 032737 000400 001246 4$:   BIT     #BIT8,$DEV     ;DROP DX0?
2167 006532 001007              BNE     5$           ;BR IF YES
2168 006534 005737 002400              TST     DOPAT        ;ELSE IS DX0 ALL DONE?
2169 006540 001004              BNE     5$           ;BR IF YES
2170 006542 005737 011474              TST     DQTMO        ;TIMEOUT?
2171 006546 001706              BEQ     1$           ;BR IF NO
2172 006550 000717              BR      7$           ;ELSE CONT LAST COMMAND
2173
2174 006552 032737 001000 001246 5$:   BIT     #BIT9,$DEV     ;DROP DX1?
2175 006560 001007              BNE     6$           ;BR IF YES
2176 006562 005737 002650              TST     D1PAT        ;ELSE IS DX1 ALL DONE?
2177 006566 001004              BNE     6$           ;BR IF YES
2178 006570 005737 011564              TST     D1TMO        ;TIMEOUT?
2179 006574 001730              BEQ     3$           ;BR IF NO
2180 006576 000741              BR      8$           ;ELSE CONT LAST COMMAND
2181
2182 006600 005737 003132      6$:   TST     COMP1        ;DOING COMPAT PASS 1?
2183 006604 001402              BEQ     13$          ;BR IF NO
2184 006606 000137 010200              JMP     EOP          ;ELSE ALL DONE
2185
2186 006612 005737 001176      13$:  TST     $PASS        ;1'ST PASS?
2187 006616 001035              BNE     DXTST2       ;BR IF NO
2188
2189 006620 023727 003124 000004   CMP     MAXTRK,#4     ;JUST DID 5 OUTER TRACKS?
2190 006626 001012              BNE     14$          ;BR IF NO
2191 006630 012737 000050 002406   MOV     #40,,D0TRK    ;ELSE SETUP FOR 5 MIDDLE TRKS
2192 006636 012737 000050 002656   MOV     #40,,D1TRK
2193 006644 012737 000054 003124   MOV     #44,,MAXTRK
2194 006652 000610              BR      12$
2195
2196 006654 023727 003124 000054 14$:  CMP     MAXTRK,#44.   ;JUST DID 5 MIDDLE TRACKS?
2197 006662 001013              BNE     DXTST2       ;BR IF NO, MUST BE ALL DONE
2198 006664 012737 000110 002406   MOV     #72,,D0TRK    ;ELSE SETUP FOR 5 INNER TRKS
2199 006672 012737 000110 002656   MOV     #72,,D1TRK
2200 006700 012737 000114 003124   MOV     #76,,MAXTRK
2201 006706 000137 006274              JMP     12$
2202

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2203
2204
2205          :*****
2206          :          START DX0 & DX1 RANDOM SEEKS
2207          :
2208          :RANDOM SEEKS ARE PERFORMED ON EACH DISK.
2209          :DATA IS READ & VERIFIED TO BE CORRECT FROM THE PREVIOUS TEST.
2210          :HARD ERRORS ARE THOSE ERRORS AFTER 10 MORE RETRIES.
2211          :1'ST PASS PERFORMS 20 RANDOM SEEKS ON 1'ST 5 TRACKS.
2212          :SUBSEQUENT PASSES PERFORMS 500 RANDOM SEEKS BETWEEN ALL TRACKS.
2213          :*****
2214 006712 012737 000002 003120 DXTST2: MOV    #2,DXTST      ;2 = RANDOM SEEK TESTS
2215 006720 012737 000004 003124      MOV    #4,MAXTRK    ;INIT TO GO FROM TRKS 0-4
2216
2217 006726 005037 002404          CLR    DOERR        ;INIT DX0 FLAGS
2218 006732 005037 002414          CLR    DOCERR
2219 006736 005037 002402          CLR    DOCNT
2220
2221 006742 005037 002654          CLR    D1ERR        ;INIT DX1 FLAGS
2222 006746 005037 002664          CLR    D1CERR
2223 006752 005037 002652          CLR    D1CNT
2224
2225 006756 032737 000400 001246      BIT    #BIT8,$DEV   ;DROP DX0 TESTS?
2226 006764 001041          BNE    2$          ;BR IF YES
2227
2228 006766 005037 011072          1$:  CLR    LOLIM
2229 006772 013737 003124 011074      MOV    MAXTRK,HILIM
2230 007000 004737 010770          JSR    PC,RAND
2231 007004 010137 002406          MOV    R1,DOTRK    ;GET RANDOM TRACK #
2232
2233 007010 005237 011072          INC    LOLIM
2234 007014 012737 000032 011074      MOV    #32,HILIM
2235 007022 004737 010770          JSR    PC,RAND
2236 007026 010137 002410          MOV    R1,DOSEC    ;GET RANDOM SECTOR #
2237
2238 007032 004537 011754          JSR    R5,CKOBAD   ;SEE IF THIS TRK/SEC FLAGGED BAD
2239 007036 000753          BR     1$          ;BR IF RETURN HERE
2240
2241 007040 012737 013566 013174      MOV    #DORSEC,DODISP ;SET DISPATCH TABLE TO POINT TO
2242          ;READ SECTOR HANDLER.
2243 007046 005037 003122          CLR    FIN
2244 007052 052737 000100 177170      BIS    #IE,RXCS    ;DO DX1 WHEN SET
2245          ;LET INTERRUPTS LOOSE!
2246 007060 004737 011402          JSR    PC,TIMDO
2247 007064 104041          ERROR 41          ;DX0 NOT GETTING DONE FLAG
2248 007066 000240          NOP
    
```

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2249
2250 007070 032737 001000 001246 2$: BIT #BIT9,$DEV  ;DROP DX1 TESTS?
2251 007076 001041 BNE 4$ ;BR IF YES
2252
2253 007100 005037 011072 3$: CLR LOLIM
2254 007104 013737 003124 011074 MOV MAXTRK,HILIM
2255 007112 004737 010770 JSR PC,RAND
2256 007116 010137 002656 MOV R1,D1TRK ;GET RANDOM TRACK #
2257
2258 007122 005237 011072 INC LOLIM
2259 007126 012737 000032 011074 MOV #32,HILIM
2260 007134 004737 010770 JSR PC,RAND
2261 007140 010137 002660 MOV R1,D1SEC ;GET RANDOM SECTOR #
2262
2263 007144 004537 012066 JSR R5,CK1BAD ;SEE IF THIS TRK/SEC FLAGGED BAD
2264 007150 000753 BR 3$ ;BR IF RETURN HERE
2265
2266 007152 012737 015352 013202 MOV #D1RSEC,D1DISP ;SET DISPATCH TABLE TO POINT TO
2267 ;READ SECTOR HANDLER.
2268 007160 005037 003122 CLR FIN ;GO BACK TO DX0 WHEN SET
2269 007164 052737 000120 177170 BIS #<IE!DX1>,RXCS ;LET INTERRUPTS LOOSE!
2270
2271 007172 004737 011476 JSR PC,TIMD1
2272 007176 104042 ERROR 42 ;DX1 NOT GETTING DONE FLAG
2273 007200 000240 NOP
2274
2275 007202 032737 000400 001246 4$: BIT #BIT8,$DEV ;DROP DX0?
2276 007210 001004 BNE 5$ ;BR IF YES
2277 007212 023737 002402 003126 CMP DOCNT,MAXSK ;DID ALL SEEKS?
2278 007220 001262 BNE 1$ ;BR IF NO
2279
2280 007222 032737 001000 001246 5$: BIT #BIT9,$DEV ;DROP DX1?
2281 007230 001004 BNE 6$ ;BR IF YES
2282 007232 023737 002652 003126 CMP D1CNT,MAXSK ;DID ALL SEEKS?
2283 007240 001317 BNE 3$ ;BR IF NO
2284
2285 007242 005737 003134 6$: TST COMP2 ;DOING COMPAT PASS 2?
2286 007246 001402 BEQ DX1ST3 ;BR IF NO
2287 007250 000137 010200 JMP EOP ;ELSE ALL DONE
2288
    
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2289
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2299 007254 032737 000400 001246 DXTST3: BIT #BIT8,$DEV0 ;DROP DX0 TESTS?
2300 007262 001062 BNE DXTST4 ;BR IF YES
2301
2302 007264 012737 000003 003120 MOV #3,DXTST ;3 = INIT TEST
2303 007272 005037 002404 CLR DOERR ;FLAGS
2304 007276 005037 002414 CLR DOCERR
2305
2306 007302 *7 014632 013174 MOV #DOINIT,DODISP ;SET DISPATCH TABLE TO GO TO INIT HANDLER
2307
2308 007310 J5037 003122 CLR FIN
2309 007314 J52737 000100 177170 BIS #IE,RXCS ;LET LOOSE
2310
2311 007322 004737 011402 JSR PC,TIMD0
2312 007326 104046 ERROR 46 ;DX0 HUNG ON INITIALIZE COMMAND
2313 007330 000437 BR DXTST4
2314
2315 007332 005737 177170 TST RXCS ;ERROR?
2316 007336 100001 BPL 1$ ;BR IF NO
2317 007340 104063 ERROR 63 ;INIT COMMAND ERROR
2318
2319 007342 032737 000001 177172 1$: BIT #ID,RXES ;INIT DONE BIT SET?
2320 007350 001001 BNE 2$ ;BR IF YES
2321 007352 104055 ERROR 55 ;INIT DONE NOT SET
2322
2323 007354 005037 002404 2$: CLR DOERR
2324 007360 005037 002414 CLR DOCERR
2325 007364 012737 000001 002406 MOV #1,DOTRK ;EXP TRK & SEC
2326 007372 012737 000001 002410 MOV #1,DOSEC
2327
2328 007400 012737 014046 013174 MOV #DOEBUF,DODISP ;SETUP DISPATCH TABLE TO
2329 ;EMPTY BUFFER & VERIFY DATA
2330 007406 005037 003122 CLR FIN
2331 007412 052737 000100 177170 BIS #IE,RXCS ;LET LOOSE
2332
2333 007420 004737 011402 JSR PC,TIMD0
2334 007424 104056 ERROR 56 ;DX0 HUNG ON EMPTY BUFF COMMAND
2335 007426 000240 NOP
    
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2344 007430 032737 000400 001246 DXTST4: BIT #BIT8,$DEV8 ;DROP DX0 TESTS?
2345 007436 001121 BNE DXTST5 ;BR IF YES
2346
2347 007440 012737 000004 003120 MOV #4,DXTST ;4 = RESTORE TEST
2348 007446 012737 014656 013174 MCV #D0REST,DODISP ;SETUP DISPATCH TABLE
2349 007454 005037 003122 CLR FIN
2350 007460 052737 000100 177170 BIS #IE,RXCS
2351
2352 007466 004737 011402 JSR PC,TIMD0
2353 007472 104047 ERROR 47 ;DX0 HUNG ON RESTORE COMMAND
2354 007474 000431 BR 2$
2355
2356 007476 005737 177170 TST RXCS ;ERROR?
2357 007502 100001 BPL 1$ ;BR IF NO
2358 007504 104054 ERROR 54 ;DX0 RESTORE COMMAND ERROR
2359
2360 007506 005037 002406 1$: CLR D0TRK ;CHK FOR RECORD NOT FOUND (RNF)
2361 007512 012737 000001 002410 MOV #1,D0SEC ;SET TRK/SEC. SHOULD NOT MOVE
2362 ;LOGIC THINKS ITS ALREADY THERE.
2363 007520 005037 002404 CLR D0ERR
2364 007524 005037 002414 CLR D0CERR
2365 007530 005037 003122 CLR FIN
2366 007534 012737 013566 013174 MOV #D0RSEC,DODISP ;SETUP TO READ SECTOR
2367 007542 052737 000100 177170 BIS #IE,RXCS ;LET INTERR LOOSE
2368
2369 007550 004737 011402 JSR PC,TIMD0
2370 007554 104041 ERROR 41 ;DX0 HUNG ON READ CMD
2371 007556 000240 NOP
2372
2373 007560 032737 001000 001246 2$: BIT #BIT9,$DEV8 ;DROP DX1 TESTS?
2374 007566 001045 BNE DXTST5 ;BR IF YES
2375
2376 007570 012737 014674 013202 MOV #D1REST,D1DISP ;REPEAT FOR DX1
2377 007576 005037 003122 CLR FIN
2378 007602 052737 000120 177170 BIS #<IE!DX1>,RXCS ;LET INTERR LOOSE
2379
2380 007610 004737 011476 JSR PC,TIMD1
2381 007614 104042 ERROR 42 ;DX1 HUNG ON RESTORE CMD
2382 007616 000431 BR DXTST5
2383
2384 007620 005737 177170 TST RXCS ;ERROR?
2385 007624 100001 BPL 3$ ;BR IF NO
2386 007626 104074 ERROR 74 ;DX1 RESTORE CMD ERROR
  
```

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2387
2388 007630 005037 002656 3$: CLR D1TRK ;READ TO CHECK FOR RNF
2389 007634 012737 000001 002660 MOV #1,D1SEC
2390 007642 005037 002654 CLR D1ERR
2391 007646 005037 002664 CLR D1CERR
2392 007652 005037 003122 CLR FIN
2393 007656 012737 015352 013202 MOV #D1RSEC,D1DISP ;SETUP TO READ SECTOR
2394 007664 052737 000120 177170 BIS #<IE!DX1>,RXCS ;LET INTERR LOOSE
2395
2396 007672 004737 011476 JSR PC,TIMD1
2397 007676 104042 ERROR 42 ;DX1 HUNG ON READ CMD
2398 007700 000240 NOP
2399
2400
2401
2402 ;:*****
2403 ; WRITE SECTOR WITH DELETED DATA MARK TEST
2404 ;:
2405 ; THIS TEST VERIFIES THAT THE WRITE DELETED DATA COMMAND CAN BE ISSUED
2406 ; & THAT THE 'DELETED DATA' BIT 5 IS SET IN RXCS AFTER READY IS RECV'D.
2407 ; HARD ERRORS ARE THOSE ERRORS AFTER 10 MORE RETRIES.
2408 ;:*****
2409
2410 007702 032737 000400 001246 DXTST5: BIT #BIT8,$DEVM ;DROP DX0 TESTS?
2411 007710 001043 BNE DXTST6 ;BR IF YES
2412
2413 007712 012737 000005 003120 MOV #5,DXTST ;5 = WR DEL DATA TEST
2414 007720 005037 002404 CLR DOERR
2415 007724 005037 002414 CLR DOCERR
2416
2417 007730 012737 013212 013174 MOV #DOFBUF,DODISP ;SETUP DISPATCH TABLE
2418
2419 007736 005037 003122 CLR FIN
2420 007742 052737 000100 177170 BIS #IE,RXCS ;LET LOOSE
2421
2422 007750 004737 011402 JSR PC,TIMD0
2423 007754 104050 ERROR 50 ;DX0 HUNG ON WRITE DEL DATA CMD
2424 007756 000420 BR DXTST6
2425
2426 007760 012737 014712 013174 MOV #DOSTAT,DODISP ;SETUP DISPATCH TABLE
2427
2428 007766 005037 003122 CLR FIN
2429 007772 052737 000100 177170 BIS #IE,RXCS ;LET LOOSE
2430
2431 010000 004737 011402 JSR PC,TIMD0
2432 010004 104051 ERROR 51 ;DX0 HUNG ON READ STATUS
2433 010006 000404 BR DXTST6
2434
2435 010010 005737 177170 TST RXCS ;ERROR?
2436 010014 100001 BPL .+4 ;BR IF NO
2437 010016 104057 ERROR 57 ;READ STATUS ERROR
    
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*****  
: INVALID ADDRESS TESTS  
: A WRITE SECTOR COMMAND IS ISSUED TO INVALID TRACK 115(8)  
: & RXCS IS CHECKED FOR THE INVALID ADDR BIT 1 TO BE SET AFTER RDY.  
: THE ABOVE IS REPEATED FOR INVALID SECTOR 33(8).  
:*****
```

```
010020 032737 000400 001246 DXTST6: BIT #BIT8,$DEV  ;DROP DXO TESTS?  
010026 001062 BNE 4$ ;BR IF YES  
010030 005037 010176 CLR INVCT  
010034 012737 000006 003120 MOV #6,DXTST ;6 = INV ADDR TESTS  
010042 012737 000115 002406 MOV #115,DOTRK  
010050 012737 000001 002410 MOV #1,D0SEC  
010056 012737 046401 177174 MOV #46401,RXSA ;INVALID TRACK  
010064 012737 014730 013174 1$: MOV #D0INV,DODISP ;SETUP DISPATCH TABLE  
010072 005037 003122 CLR FIN  
010076 052737 000100 177170 BIS #IE,RXCS ;LET LOOSE  
010104 004737 011402 JSR PC,TIMDO  
010110 104060 ERROR 60 ;DXO HUNG ON INVALID ADDR  
010112 000432 BR EOP  
010114 032737 000002 177172 BIT #INVADR,RXES ;INV ADDR BIT SET?  
010122 001002 BNE 2$ ;BR IF YES  
010124 104061 ERROR 61 ;INVALID ADDR BIT NOT SET  
010126 000404 BR 3$  
010130 005737 177170 2$: TST RXCS ;ERROR BIT SET?  
010134 100401 BMI 3$ ;BR IF YES  
010136 104062 ERROR 62 ;ERROR BIT NOT SET  
010140 005737 010176 3$: TST INVCT ;DID WE JUST DO INV SECTOR?  
010144 001013 BNE 4$ ;BR IF YES...DONE  
010146 005237 010176 INC INVCT  
010152 005037 002406 CLR DOTRK  
010156 012737 000033 002410 MOV #33,D0SEC  
010164 012737 000033 177174 MOV #33,RXSA ;INVALID SECTOR  
010172 000734 BR 1$ ;REPEAT FOR INVALID SECTOR  
010174 000401 4$: BR .+4  
010176 000000 INVCT: 0 ;0 DOING INVALID TRACK  
 ;1 DOING INVALID SECTOR
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2492 010200 005237 001176
2493 010204 104401 017764
2494 010210 013746 001176
2495 010214 104405
2496 010216 104401 020001
2497 010222 013746 025766
2498 010226 104405
2499 010230 104401 020030
2500 010234 013746 025770
2501 010240 104405
2502 010242 104401 020064
2503 010246 013746 025772
2504 010252 104405
2505 010254 104401 020121
2506 010260 013746 025774
2507 010264 104405
2508 010266 104401 010336
2509 010272 012737 000114 003124
2510 010300 012737 000764 003126
2511
2512 010306 005737 003132
2513 010312 001407
2514 010314 104401 020350
2515 010320 000000
2516 010322 005037 003132
2517 010326 005237 003134
2518 010332 000137 003732
2519
2520 010336 377 377 000 NULL: .BYTE -1,-1,0
2521 010342 .EVEN
2522

```

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*****
: END OF PASS
*****
EOP: INC $PASS ;PASS CTR
TYPE ,ENDPAS
MOV $PASS,-(SP) ;;SAVE $PASS FOR TYPEOUT
TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
TYPE ,MSG1
MOV TERR,-(SP) ;;SAVE TERR FOR TYPEOUT
TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
TYPE ,MSG2
MOV TSERR,-(SP) ;;SAVE TSERR FOR TYPEOUT
TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
TYPE ,MSG3
MOV PERR,-(SP) ;;SAVE PERR FOR TYPEOUT
TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
TYPE ,MSG4
MOV PSERR,-(SP) ;;SAVE PSERR FOR TYPEOUT
TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
TYPE ,NULL ;NULL CHAR
MOV #114,MAXTRK ;FOR ALL SUBSEQUENT PASSES
MOV #500,MAXSK
TST COMP1 ;COMPAT PASS 1?
BEQ 1$ ;BR IF NO
TYPE ,COMPAT ;DONE MSG
HALT
CLR COMP1
INC COMP2
1$: JMP LOOP ;REPEAT
;NULL CHAR STRING

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2523
2524           .SBTTL PROGRAM SUBROUTINES
2525
2526
2527 010342 012737 012142 000004 SIZE: MOV #INTSRV,ERRVEC ;SETUP TIMEOUT TRAP ADDR
2528 010350 012737 000200 000006 MOV #200,ERRVEC+2 ;LOCKOUT INTERR
2529 010356 005037 012150 CLR INTFLG
2530
2531 010362 012700 017776 MOV #17776,R0 ;SIZE MEM. START WITH 4K
2532 010366 005001 CLR R1 ;MEM MAP, 1=4K, 2=8K, ETC
2533 010370 005037 012150 CLR INTFLG
2534
2535 010374 005710 1$: TST (R0)
2536 010376 005737 012150 TST INTFLG ;GOT TIMEOUT INTERR?
2537 010402 001007 BNE 2$ ;BR IF YES
2538 010404 005201 INC R1
2539 010406 020027 157776 CMP R0,#157776 ;DONE 28K MEM?
2540 010412 001403 BEQ 2$
2541 010414 062700 020000 ADD #20000,R0 ;GO TO NEXT 4K
2542 010420 000765 BR 1$
2543
2544 010422 010037 010766 2$: MOV R0,MAXMEM ;SAVE
2545 010426 162737 020000 010766 SUB #20000,MAXMEM ;GO BACK TO LAST VALID BLOCK
2546 010434 006301 ASL R1 ;MULT BY 2
2547 010436 016137 010746 010446 MOV MEMTBL-2(R1),3$
2548 010444 104401 TYPE
2549 010446 000000 3$: .WORD 0 ;MEM SIZE
2550 010450 104401 017314 TYPE ,MEM
2551
2552 010454 005000 CLR R0
2553 010456 005037 012150 CLR INTFLG
2554 010462 012700 176500 MOV #TK1S,R0 ;SETUP CLUSTER CSR ADDR
2555 010466 005710 4$: TST (R0) ;DARE IT TO TIMEOUT
2556 010470 005737 012150 TST INTFLG ;DID IT?
2557 010474 001011 BNE 6$ ;BR IF YES
2558 010476 020027 176520 CMP R0,#TK3S ;DID ALL 3?
2559 010502 001403 BEQ 5$ ;BR IF YES
2560 010504 062700 000010 ADD #10,R0 ;ELSE DO NEXT
2561 010510 000766 BR 4$
2562
2563 010512 005237 010742 5$: INC CLPRES ;OPTION PRESENT
2564 010516 000406 BR 7$ ;ALL 3 MUST RESPOND
2565
2566 010520 005037 010742 6$: CLR CLPRES ;OPTION NOT PRESENT
2567 010524 104401 017102 TYPE ,CLOPT
2568 010530 104401 017334 TYPE ,NOTPRES
2569
2570 010534 012737 000006 000004 7$: MOV #ERRVEC+2,ERRVEC ;RESET TMO VECTOR
2571 010542 005037 000006 CLR ERRVEC+2
    
```

```

2572
2573 010546 005000          CLR    R0
2574 010550 012701 000200  MOV    #BIT7,R1
2575
2576 010554 030137 001246  8$:    BIT    R1,$DEV0      ;DEVICE DROPPED?
2577 010560 001006          BNE    10$              ;BR IF YES
2578 010562 000241          CLC
2579 010564 006301          ASL    R1
2580 010566 103424          BCS    13$              ;BR IF ALL BITS TESTED
2581 010570 062700 000002  ADD    #2,R0            ;ELSE BUMP INDEX
2582 010574 000767          BR     8$
2583
2584 010576 016037 010616 010606 10$:    MOV    12$(R0),11$
2585 010604 104401          TYPE
2586 010606 000000          11$:    .WORD 0              ;DEVICE TO BE DROPPED
2587 010610 104401 017647  TYPE    .DROP
2588 010614 000762          BR     9$
2589
2590 010616 017244          12$:    CLOCK
2591 010620 017232          DRVO
2592 010622 017237          DRV1
2593 010624 017155          SCOM
2594 010626 017170          ACOM
2595 010630 017122          CLT1
2596 010632 017133          CLT2
2597 010634 017144          CLT3
2598 010636 017204          PRINT
2599
2600 010640 005037 010744          13$:    CLR    PRPRES
2601 010644 005037 010746          CLR    PRPORT
2602 010650 005737 177514          TST    PRS              ;SEE IF PRINTER ERR
2603 010654 100027          BPL    16$              ;BR IF NO
2604
2605 010656 032737 000010 001246  BIT    #BIT3,$DEV0      ;COMM PORT IN EXT LOOPBACK?
2606 010664 001405          BEQ    15$              ;BR IF YES
2607
2608 010666 104401 017204          14$:    TYPE    .PRINT
2609 010672 104401 017334          TYPE    .NOTPRES
2610 010676 000420          BR     17$
2611
2612 010700 012737 037034 177420 15$:    MOV    #<AMOD!B9600!OPAP.CHAR8>,PARAM
2613 010706 042737 000006 176610  BIC    #<RTS.DTR>,AMRC ;MUST BE TOGGLED
2614 010714 052737 000006 176610  BIS    #<RTS.DTR>,AMRC
2615 010722 005737 177514          TST    PRS              ;NOW ANY ERRORS?
2616 010726 100757          BMI    14$              ;BR IF YES
2617 010730 005237 010746          INC    PRPORT
2618 010734 005237 010744          16$:    INC    PRPRES      ;PRINTER PRESENT
2619
2620 010740 000207          17$:    RTS    PC

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2621
2622 010742 000000      CLPRES: 0          ;CLUSTER PRESENT = NON-ZERO
2623 010744 000000      PRPRES: 0          ;PRINTER PRESENT = NON-ZERO
2624 010746 000000      PRPORT: 0         ;1 = PRINTER ENABLED THRU LOOPBACK
2625
2626 010750 017253      MEMTBL: M4K        ;MSG ADDRESSES
2627 010752 017257      M8K
2628 010754 017263      M12K
2629 010756 017270      M16K
2630 010760 017275      M20K
2631 010762 017302      M24K
2632 010764 017307      M30K
2633
2634 010766 000000      MAXMEM: 0         ;MAX MEMORY
2635
2636
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2640
2641 010770 013700 011100  RAND:  MOV     LONUM,R0
2642 010774 013701 011076      MOV     HINUM,R1
2643 011000 012702 177771      MOV     #-7,R2
2644 011004 006300      1$:  ASL     RO
2645 011006 006101      ROL     R1          ;ROTATE CARRY TO R1
2646 011010 005202      INC     R2          ;DONE?
2647 011012 001374      BNE     1$         ;BR IN NO
2648 011014 063700 011100      ADD     LONUM,R0   ;ADD NUMBER TO MAKE X 129
2649 011020 005501      ADC     R1
2650 011022 063701 011076      ADD     HINUM,R1   ;ADD NUMBER TO MAKE X 129
2651 011026 062700 001057      ADD     #1057,R0   ;ADD LO CONSTANT
2652 011032 005501      ADC     R1
2653 011034 062701 047401      ADD     #47401,R1  ;ADD HI CONSTANT
2654 011040 010037 011100      MOV     RO,LONUM
2655 011044 010137 011076      MOV     R1,HINUM
2656
2657 011050 042701 177400      BIC     #177400,R1 ;SCALE TO BE WITHIN LIMITS
2658 011054 020137 011072      CMP     R1,LOLIM   ;SAVE LO BYTE ONLY
2659 011060 103743      BLO     RAND       ;BR IF N < LOLIM
2660 011062 020137 011074      CMP     R1,HILIM
2661 011066 101340      BHI     RAND       ;BR IF N > HILIM
2662 011070 000207      RTS     PC         ;ELSE EXIT WITH R1  N
2663
2664 011072 000000      LOLIM:  0
2665 011074 000000      HILIM:  0
2666
2667 011076 176543      HINUM:  .WORD 176543
2668 011100 123456      LONUM:  .WORD 123456
2669
2670
2671 011102 123727 001210 000001  EXAMKB: CMPB    $ENV,#1   ;APT?
2672 011110 001401      BEQ     1$         ;BR IF YES
2673 011112 104407      CKSWR
2674 011114 000207      1$:  RTS     PC
    
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2675
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2680 011116 104401 020445      GT$DEV: TYPE      ,DEVM      ;ELSE SHOW CURRENT
2681 011122 013746 001246      MOV      $DEV,-(SP) ;:SAVE $DEV FOR TYPEOUT
2682 011126 104402                      TYPOC                      ;:GO TYPE--OCTAL ASCII(ALL DIGITS)
2683 011130 104401 025136      TYPE      ,SMNEW      ;GET NEW
2684
2685 011134 005046                      1$:      CLR      -(SP)      ;CLR CTR
2686 011136 005046                      CLR      -(SP)      ;CLR NEW DEV
2687
2688 011140 105777 170000      2$:      TSTB     @STKS      ;CHAR THERE?
2689 011144 100375                      BPL      2$          ;BR IF NO
2690 011146 117746 167774      MOV      @STKB,-(SP) ;ELSE GET CHAR
2691 011152 042716 177600      BIC     #'C17,(SP) ;MAKE IT 7 BIT ASCII
2692
2693 011156 021627 000015      3$:      CMP      (SP),#15     ;<CR>?
2694 011162 001013                      BNE      7$          ;BR IF NO
2695 011164 005766 000004      TST     4(SP)        ;ELSE IS IT 1'ST CHAR?
2696 011170 001403                      BEQ      4$          ;BR IF YES
2697 011172 016637 000002      MOV      2(SP), $DEV  ;ELSE SAVE NEW DEV
2698 011200 062706 000006      4$:      ADD      #6,SP      ;RESTORE STACK
2699 011204 104401 001165      5$:      TYPE     , $CRLF
2700 011210 000002                      6$:      RTI
2701
2702 011212 004737 024236      7$:      JSR     PC, $TYPEC    ;ECHO CHAR
2703 011216 021627 000060      CMP     (SP),#60     ;CHAR < 0?
2704 011222 002420                      BLT     9$          ;BR IF YES
2705 011224 021627 000067      CMP     (SP),#67     ;CHAR >7?
2706 011230 003015                      BGT     9$          ;BR IF YES
2707 011232 042726 000060      BIC     #60,(SP)+    ;STRIP OFF ASCII
2708 011236 005766 000002      TST     2(SP)        ;IS IT 1'ST CHAR?
2709 011242 001403                      BEQ     8$          ;BR IF YES
2710 011244 006316                      ASL     (SP)         ;ELSE SHIFT PRESENT CHAR
2711 011246 006316                      ASL     (SP)         ;TO MAKE ROOM
2712 011250 006316                      ASL     (SP)         ;FOR NEW ONE
2713
2714 011252 005266 000002      8$:      INC     2(SP)        ;KEEP CHAR CT
2715 011256 056616 177776      BIS     -2(SP),(SP) ;SET IN NEW CHAR
2716 011262 000726                      BR      2$          ;GET NEW ONE
2717
2718 011264 104401 001164      9$:      TYPE     , $QUES     ;TYPE ?<CRLF>
2719 011270 000747                      BR      6$          ;DO ALL OVER
2720

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2729
    ;*****
    ;* ROUTINE TO SET 2 CONSECUTIVE INTERRUPT VECTORS
    ;* 3 ARGUMENTS ARE PASSED THRU R5:
    ;*   VECTOR ADDRESS
    ;*   INTERRUPT SERVICE ROUTINE ADDRESS FOR RECVR
    ;*   INTERRUPT SERVICE ROUTINE ADDRESS FOR XMITTER.
    ;* PRIORITY WILL BE SET TO DISABLE FURTHER INTERR.
    ;*****
    
```

```

2730 011272 010046 SETVEC: MOV R0, -(SP) ;SAVE
2731 011274 012500 MOV (R5)+, R0 ;GET VECTOR ADDR
2732 011276 012520 MOV (R5)+, (R0)+ ;PUT SERV ROUTINE ADDR THERE
2733 011300 012720 000200 MOV #200, (R0)+ ;DISABLE INTERR
2734 011304 012520 MOV (R5)+, (R0)+ ;GET XMIT SERV ADDR NEXT
2735 011306 012710 000200 MOV #200, (R0)
2736 011312 012600 MOV (SP)+, R0 ;RESTORE
2737 011314 000205 RTS R5
    
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2748
    ;*****
    ;WATCHDOG TIMER TO PREVENT DEVICES FROM ENTERING AN ENDLESS WAIT LOOP
    ;RETURN IF TIMED OUT
    ;RETURN +4 IF NOT TIMED OUT & JUMP OVER ERROR
    ;*****
    
```

```

2749 011316 012537 011376 TIMER: MOV (R5)+, FLGHL ;GET FLAG
2750 011322 012537 011400 MOV (R5)+, CTHLD ;GET COUNT THAT FLAG SHOULD GO TO
2751
2752 011326 012701 000010 MOV #10, R1
2753 011332 012700 177777 4$: MOV #-1, R0
2754 011336 027737 000034 011400 1$: CMP @FLGHL, CTHLD ;RESPONDING?
2755 011344 001411 BEQ 2$ ;BR IF YES
2756 011346 004737 011102 JSR PC, EXAMKB
2757 011352 005300 DEC R0 ;ELSE DEC COUNTER
2758 011354 001370 BNE 1$ ;BR IF NOT TIMED OUT
2759 011356 005237 001200 INC $DEVCT ;FOR APT
2760 011362 005301 DEC R1
2761 011364 001362 BNE 4$
2762 011366 000402 BR .+6 ;ELSE TIMED OUT
2763
2764 011370 062705 000004 2$: ADD #4, R5 ;JUMP OVER ERROR ON RETURN
2765 011374 000205 RTS R5
2766
    
```

```

2767 011376 000000 FLGHL: 0 ;FLAG
2768 011400 000000 CTHLD: 0 ;COUNT THAT FLAG MUST REACH
2769
    
```

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2776 011402 005037 011474
2777 011406 012737 000010 011472
2778 011414 012737 177777 011470
2779 011422 005737 003122
2780 011426 001015
2781 011430 004737 011102
2782 011434 005337 011470
2783 011440 001370
2784 011442 005237 001200
2785 011446 005337 011472
2786 011452 001360
2787 011454 005237 011474
2788 011460 000402
2789
2790 011462 062716 000004
2791 011466 000207
2792
2793 011470 000000
2794 011472 000000
2795 011474 000000
2796
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2800
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2804 011476 005037 011564
2805 011502 012737 000010 011472
2806 011510 012737 177777 011470
2807 011516 005737 003122
2808 011522 001015
2809 011524 004737 011102
2810 011530 005337 011470
2811 011534 001370
2812 011536 005237 001200
2813 011542 005337 011472
2814 011546 001360
2815 011550 005237 011564
2816 011554 000402
2817
2818 011556 062716 000004
2819 011562 000207
2820
2821 011564 000000
2822
    ;*****
    ;WATCHDOG TIMER TO PREVENT DX0 FROM ENTERING AN ENDLESS WAIT LOOP
    ;RETURN IF TIMED OUT
    ;RETURN +4 IF NOT TIMED OUT & JUMP OVER ERROR
    ;*****
TIMDO: CLR DOTMO
        MOV #10,CTREG1
4$: MOV #-1,CTREG
1$: TST FIN ;FINISHED?
    BNE 2$ ;BR IF YES
    JSR PC,EXAMKB
    DEC CTREG ;ELSE DEC CTR
    BNE 1$ ;BR IF NOT TIMED OUT
    INC $DEVCT ;FOR APT
    DEC CTREG1
    BNE 4$
    INC DOTMO ;SET FLAG
    BR .+5 ;TIMED OUT

2$: ADD #4,(SP) ;BUMP RET
    RTS PC

CTREG: 0
CTREG1: 0
DOTMO: 0 ;1 = TIMEOUT OCCURED
    
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2803
2804 011476 005037 011564
2805 011502 012737 000010 011472
2806 011510 012737 177777 011470
2807 011516 005737 003122
2808 011522 001015
2809 011524 004737 011102
2810 011530 005337 011470
2811 011534 001370
2812 011536 005237 001200
2813 011542 005337 011472
2814 011546 001360
2815 011550 005237 011564
2816 011554 000402
2817
2818 011556 062716 000004
2819 011562 000207
2820
2821 011564 000000
2822
    ;*****
    ;WATCHDOG TIMER TO PREVENT DX1 FROM ENTERING AN ENDLESS WAIT LOOP
    ;RETURN IF TIMED OUT
    ;RETURN +4 IF NOT TIMED OUT & JUMP OVER ERROR
    ;*****
TIMD1: CLR D1TMO
        MOV #10,CTREG1
4$: MOV #-1,CTREG
1$: TST FIN ;FINISHED?
    BNE 2$ ;BR IF YES
    JSR PC,EXAMKB
    DEC CTREG ;ELSE DEC CTR
    BNE 1$ ;BR IF NOT TIMED OUT
    INC $DEVCT ;FOR APT
    DEC CTREG1
    BNE 4$
    INC D1TMO ;SET FLAG
    BR .+6 ;TIMED OUT

2$: ADD #4,(SP) ;BUMP RET
    RTS PC

D1TMO: 0 ;1 = TIMEOUT OCCURED
    
```

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2823          ;:*****
2824          ;:          GENERAL TIMER
2825          ;:*****
2826
2827 011566 012700 177777  TIMER1: MOV    #-1,R0
2828 011572 005300          DEC    R0
2829 011574 001376          BNE   -2
2830 011576 000207          RTS   PC
2831
2832          ;:*****
2833          ;:WATCHDOG TIMER TO PREVENT DEVICES FROM ENTERING AN ENDLESS WAIT LOOP
2834          ;:RETURN    IF TIMED OUT
2835          ;:RETURN +4 IF NOT TIMED OUT & JUMP OVER ERROR
2836          ;:*****
2837
2838 011600 012537 011660  TIMER2: MOV    (R5)+,REGHLD ;GET REG
2839 011604 012537 011662          MOV    (R5)+,BITHLD  ;GET BIT TO BE TESTED
2840
2841 011610 012701 000010          MOV    #10,R1
2842 011614 012700 177777  4$:    MOV    #-1,R0
2843 011620 033777 011662 000032 1$:    BIT    BITHLD,@REGHLD ;BIT THERE?
2844 011626 001011          BNE   2$ ;BR IF YES
2845 011630 004737 011102          JSR   PC,EXAMKB
2846 011634 005300          DEC    R0 ;ELSE DEC COUNTER
2847 011636 001370          BNE   1$ ;BR IF NOT TIMED OUT
2848 011640 005237 001200          INC    $DEVCT ;FOR APT
2849 011644 005301          DEC    R1
2850 011646 001362          BNE   4$
2851 011650 000402          BR    .+6 ;ELSE TIMED OUT
2852
2853 011652 062705 000004  2$:    ADD    #4,R5 ;JUMP OVER ERROR ON RETURN
2854 011656 000205          RTS   R5
2855
2856 011660 000000          REGHLD: 0 ;DEVICE REG
2857 011662 000000          BITHLD: 0 ;DEV REG BIT TO BE TESTED
2858
2859
2860          ;:*****
2861          ;:ROUTINE TO CLEAR BOTH BAD TRACK/SECTOR TABLES
2862          ;:*****
2863
2864 011664 012700 002624  CLRBAD: MOV    #DOBAD,R0
2865 011670 005020 1$:    CLR    (R0)+
2866 011672 020027 002650          CMP    R0,#DOBAD+20.
2867 011676 001374          BNE   1$
2868
2869 011700 012700 003074  2$:    MOV    #D1BAD,R0
2870 011704 005020          CLR    (R0)+
2871 011706 020027 003120          CMP    R0,#D1BAD+20.
2872 011712 001374          BNE   2$
2873
2874 011714 000207          RTS   PC
2875

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2880 011716 010046
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2882 011720 012700 002624
2883 011724 005710
2884 011726 001003
2885 011730 013710 177174
2886 011734 000405
2887
2888 011736 005720
2889 011740 020027 002650
2890 011744 001367
2891 011746 104104
2892 011750 012600
2893 011752 000207
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2904 011754 010046
2905 011756 010146
2906
2907 011760 013701 002406
2908 011764 000301
2909 011766 053701 002410
2910
2911 011772 012700 002624
2912 011776 020027 002650
2913 012002 001405
2914 012004 005710
2915 012006 001403
2916 012010 022001
2917 012012 001371
2918 012014 000402
2919
2920 012016 062705 000002
2921 012022 012601
2922 012024 012600
2923 012026 000205

:*****
:LOAD DXO BAD TRACK/SECTOR TABLE
:*****
LDOBAD: MOV R0,-(SP) ;SAVE
1$: MOV #DOBAD,R0
TST (R0) ;ENTRY PRESENT?
BNE 2$ ;BR IF YES
MOV RXSA,(R0) ;ELSE STORE BAD RXSA IN TABLE
BR 3$ ;EXIT
2$: TST (R0)+ ;BUMP PTR
CMP R0,#DOBAD+20. ;AT END OF TABLE?
BNE 1$ ;BR IF NO
ERROR 104 ;10 BAD SECTORS...REPLACE
3$: MOV (SP)+,R0 ;RESTORE
RTS PC

:*****
:CHECK DXO BAD TRACK/SECTOR TABLE BEFORE DOING RANDOM SEEKS.
:IF TRK/SEC IN TABLE, RETURN TO RE-CALCULATE NEW TRACK & SECTOR.
:*****
CKOBAD: MOV R0,-(SP) ;SAVE
MOV R1,-(SP)
MOV D0TRK,R1
SWAB R1
BIS D0SEC,R1
1$: MOV #DOBAD,R0
CMP R0,#DOBAD+20. ;END OF TABLE?
BEQ 2$ ;BR IF YES
TST (R0) ;ELSE ANY ENTRY?
BEQ 2$ ;BR IF NO
CMP (R0)+,R1 ;ELSE COMPARE?
BNE 1$ ;BR IF NO
BR 3$ ;ELSE DONT BUMP RET ADDR
2$: ADD #2,R5 ;BUMP RET ADDR
3$: MOV (SP)+,R1 ;RESTORE
MOV (SP)+,R0
RTS R5
    
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2927
2928 012030 010046 LD1BAD: MOV R0,-(SP) ;SAVE
2929
2930 012032 012700 003074
2931 012036 005710 1$: MOV #D1BAD,R0
2932 012040 001003 BNE (R0) ;ENTRY PRESENT?
2933 012042 013710 177174 MOV 2$ ;BR IF YES
2934 012046 000405 BR RXSA,(R0) ;ELSE STORE BAD RXSA IN TABLE
2935
2936 012050 005720 2$: TST (R0)+ ;BUMP PTR
2937 012052 020027 003120 CMP R0,#D1BAD+20. ;AT END OF TABLE?
2938 012056 001367 BNE 1$ ;BR IF NO
2939 012060 104105 ERROR 105 ;10 BAD SECTORS...REPLACE
2940 012062 012600 3$: MOV (SP)+,R0 ;RESTORE
2941 012064 000207 RTS PC
2942
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2951
2952 012066 010046 CK1BAD: MOV R0,-(SP) ;SAVE
2953 012070 010146 MOV R1,-(SP)
2954
2955 012072 013701 002656 MOV D1TRK,R1
2956 012076 000301 SWAB R1
2957 012100 053701 002660 BIS D1SEC,R1
2958
2959 012104 012700 003074
2960 012110 020027 003120 1$: MOV #D1BAD,R0
2961 012114 001405 CMP R0,#D1BAD+20. ;END OF TABLE?
2962 012116 005710 BEQ 2$ ;BR IF YES
2963 012120 001403 TST (R0) ;ELSE ANY ENTRY?
2964 012122 022001 BEQ 2$ ;BR IF NO
2965 012124 001371 CMP (R0)+,R1 ;FLSE COMPARE?
2966 012126 000402 BNE 1$ ;BR IF NO
2967 BR 3$ ;ELSE DONT BUMP RET ADDR
2968 012130 062705 000002 2$: ADD #2,R5 ;BUMP RET ADDR
2969 012134 012601 3$: MOV (SP)+,R1 ;RESTORE
2970 012136 012600 MOV (SP)+,R0
2971 012140 000205 RTS R5
2972

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*****
:CHECK DX1 BAD TRACK/SECTOR TABLE BEFORE DOING RANDOM SEEKS.
:IF TRK/SEC IN TABLE, RETURN TO RE-CALCULATE NEW TRACK & SECTOR.
*****

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2973 .SBTTL INTERRUPT HANDLERS
2974 :*****
2975 : GENERAL SERVICE ROUTINE TO BUMP 'INTFLG'
2976 : CALLING ROUTINE WILL KNOW WHAT TO DO
2977 :*****
2978
2979 012142 005237 012150 INTSRV: INC INTFLG
2980 012146 000002 RTI
2981 012150 000000 INTFLG: 0
2982
2983
2984 :*****
2985 :PRINTER INTERRUPT HANDLER: VALUES FROM 40 THRU 176.
2986 :*****
2987
2988 012152 013737 177514 012302 PRSRV: MOV PRS,SPRS ;STORE
2989 012160 005737 012302 TST SPRS ;ERROR?
2990 012164 100002 BPL 1$ ;BR IF NO
2991 012166 104007 ERROR 7 ;PRINTER STATUS ERROR
2992 012170 000002 RTI
2993
2994 012172 013737 012276 177516 1$: MOV PRCHR,PRB ;ELSE PRINT CHAR
2995 012200 023727 012276 000015 CMP PRCHR,#CR ;JUST DID CR?
2996 012206 001413 BEQ 2$ ;BR IF YES
2997 012210 023727 012276 000012 CMP PRCHR,#LF ;JUST DID LF?
2998 012216 001413 BEQ 3$ ;BR IF YES
2999 012220 023727 012276 000176 CMP PRCHR,#176 ;JUST DID LAST CHAR?
3000 012226 001413 BEQ 4$ ;BR IF YES
3001 012230 005237 012276 INC PRCHR ;ELSE BUMP CHAR FOR NEXT INTERRUPT
3002 012234 000417 BR 5$ ;EXIT
3003
3004 012236 012737 000012 012276 2$: MOV #LF,PRCHR ;DO LF NEXT
3005 012244 000413 BR 5$
3006 012246 012737 000040 012276 3$: MOV #40,PRCHR ;DO SPACE NEXT
3007 012254 000407 BR 5$
3008 012256 012737 000015 012276 4$: MOV #CR,PRCHR ;DO CR NEXT & START OVER
3009 012264 005237 012300 INC LINCT
3010 012270 005237 001200 INC $DEVCT ;FOR APT
3011 012274 000002 5$: RTI
3012
3013 012276 000000 PRCHR: 0 ;CHAR TO BE PRINTED
3014 012300 000000 LINCT: 0 ;LINE CTR
3015 012302 000000 SPRS: 0 ;STORE PRINTER CSR
  
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3021 012304 042737 000100 176504 TP1SRV: BIC #IE,TP1S ;DISABLE INTER, RECV'R WILL TURN BACK ON
3022 012312 013737 012400 176506 MOV T1CHR,TP1B ;PRINT CHAR
3023 012320 000002 RTI
3024
3025 012322 013737 176502 012402 TK1SRV: MOV TK1B,T1HLD ;STORE CHAR
3026 012330 023737 012402 012400 CMP T1HLD,T1CHR ;OK?
3027 012336 001401 BEQ 1$ ;BR IF YES
3028 012340 104010 ERROR 10 ;CHAR COMP ERROR
3029
3030 012342 023727 012400 000377 1$: CMP T1CHR,#377 ;LAST CHAR?
3031 012350 001403 BEQ 2$ ;BR IF YES
3032 012352 005237 012400 INC T1CHR ;ELSE BUMP
3033 012356 000404 BR 3$
3034
3035 012360 005037 012400 2$: CLR T1CHR ;START OVER
3036 012364 005237 001200 INC $DEVCT ;FOR APT
3037 012370 052737 000100 176504 3$: BIS #IE,TP1S ;ALLOW PRINTER INTERR
3038 012376 000002 RTI
3039
3040 012400 000000 T1CHR: 0 ;CHAR TO XMITT
3041 012402 000000 T1HLD: 0 ;REC'D CHAR
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:*****
:CLUSTER TERMINAL #2 INTERRUPT HANDLER: LOOP VALUES 0 THRU 377.
:*****

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3048 012404 042737 000100 176514 TP2SRV: BIC #IE,TP2S ;DISABLE INTER, RECV'R WILL TURN BACK ON
3049 012412 013737 012500 176516 MOV T2CHR,TP2B ;PRINT CHAR
3050 012420 000002 RTI
3051
3052 012422 013737 176512 012502 TK2SRV: MOV TK2B,T2HLD ;STORE CHAR
3053 012430 023737 012502 012500 CMP T2HLD,T2CHR ;OK?
3054 012436 001401 BEQ 1$ ;BR IF YES
3055 012440 104011 ERROR 11 ;CHAR COMP ERROR
3056
3057 012442 023727 012500 000377 1$: CMP T2CHR,#377 ;LAST CHAR?
3058 012450 001403 BEQ 2$ ;BR IF YES
3059 012452 005237 012500 INC T2CHR ;ELSE BUMP
3060 012456 000404 BR 3$
3061
3062 012460 005037 012500 2$: CLR T2CHR ;START OVER
3063 012464 005237 001200 INC $DEVCT ;FOR APT
3064 012470 052737 000100 176514 3$: BIS #IE,TP2S ;ALLOW PRINTER INTERR
3065 012476 000002 RTI
3066
3067 012500 000000 T2CHR: 0 ;CHAR TO XMITT
3068 012502 000000 T2HLD: 0 ;REC'D CHAR

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012504 042737 000100 176524
012512 013737 012600 176526
012520 000002
012522 013737 176522 012602
012530 023737 012602 012600
012536 001401
012540 104012
012542 023727 012600 000377
012550 001403
012552 005237 012600
012556 000404
012560 005037 012600
012564 005237 001200
012570 052737 000100 176524
012576 000002
012600 000000
012602 000000
012604 042737 000100 176614
012612 013737 012700 176616
012620 000002
012622 013737 176612 012702
012630 023737 012702 012700
012636 001401
012640 104013
012642 023727 012700 000377
012650 001403
012652 005237 012700
012656 000404
012660 005037 012700
012664 005237 001200
012670 052737 000100 176614
012676 000002
012700 000000
012702 000000

:CLUSTER TERMINAL #3 INTERRUPT HANDLER: LOOP VALUES 0 THRU 377.

TP3SRV: BIC #IE,TP3S ;DISABLE INTER, RECV'R WILL TURN BACK ON
MOV T3CHR,TP3B ;PRINT CHAR
RTI
TK3SRV: MOV TK3B,T3HLD ;STORE CHAR
CMP T3HLD,T3CHR ;OK?
BEQ 1\$;BR IF YES
ERROR 12 ;CHAR COMP ERROR
1\$: CMP T3CHR,#377 ;LAST CHAR?
BEQ 2\$;BR IF YES
INC T3CHR ;ELSE BUMP
BR 3\$
2\$: CLR T3CHR ;START OVER
INC \$DEVCT ;FOR APT
3\$: BIS #IE,TP3S ;ALLOW PRINTER INTERR
RTI
T3CHR: 0 ;CHAR TO XMITT
T3HLD: 0 ;REC'D CHAR

:ASYNC COMM PORT INTERRUPT HANDLER: LOOP VALUES 0 THRU 377.

AMXSRV: BIC #IE,AMXC ;DISABLE INTER, RECV'R WILL TURN BACK ON
MOV COMCHR,AMXB ;XMITT CHAR
RTI
AMRSRV: MOV AMRB,COMHLD ;STORE CHAR
CMP COMHLD,COMCHR ;OK?
BEQ 1\$;BR IF YES
ERROR 13 ;CHAR COMPARE ERROR
1\$: CMP COMCHR,#377 ;LAST CHAR?
BEQ 2\$;BR IF YES
INC COMCHR ;ELSE BUMP
BR 3\$
2\$: CLR COMCHR ;START OVER
INC \$DEVCT ;FOR APT
3\$: BIS #IE,AMXC ;ALLOW XMIT INTERR
RTI
COMCHR: 0 ;XMIT CHAR
COMHLD: 0 ;REC'D CHAR

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*****
:SYNC COMM PORT INTERRUPT HANDLER: LOOP VALUES 27 THRU 377.
*****
012704 042737 000100 176624 SMXSRV: BIC #IE,SMXC ;DISABLE INTER, RECV'R WILL TURN BACK ON
012712 013737 012700 176626 MOV COMCHR,SMXB ;XMITT CHAR
012720 023727 012700 000377 CMP COMCHR,#377 ;LAST CHAR?
012726 001020 BNE 2$ ;BR IF NO
012730 005737 012772 TST LSTCHR
012734 001010 BNE 1$
012736 005237 012772 INC LSTCHR
012742 052737 000100 176624 BIS #IE,SMXC ;ALLOW RDY INTR SO CAN SHUT DOWN FAST
012750 005237 001200 INC $DEVCT ;FOR APT
012754 000002 RTI
012756 042737 000020 176624 1$: BIC #SEND,SMXC ;NO MORE TO SEND
012764 005237 001200 INC $DEVCT ;FOR APT
012770 000002 2$: RTI
012772 000000 LSTCHR: 0 ;SET WHEN LAST CHAR XMIT
012774 013737 176622 012702 SMRSRV: MOV SMRB,COMHLD ;STORE CHAR
013002 123727 012702 000026 CMPB COMHLD,#026 ;IGNORE SYNC CHARS
013010 001430 BEQ 4$
013012 023737 012702 012700 CMP COMHLD,COMCHR ;OK?
013020 001401 BEQ 1$ ;BR IF YES
013022 104014 ERROR 14 ;CHAR COMPARE ERROR
013024 023727 012700 000377 1$: CMP COMCHR,#377 ;LAST CHAR?
013032 001403 BEQ 2$ ;BR IF YES
013034 005237 012700 INC COMCHR ;ELSE BUMP
013040 000411 BR 3$
013042 012737 177777 012700 2$: MOV #-1,COMCHR ;INDICATE DONE
013050 042737 000100 176620 BIC #IE,SMRC ;ALL DONE
013056 005237 001200 INC $DEVCT ;FOR APT
013062 000403 BR 4$
013064 052737 000100 176624 3$: BIS #IE,SMXC ;ALLOW XMIT INTERR
013072 000002 4$: RTI

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013074 105737 177170
 013100 100413
 013102 013737 177170 013204
 013110 013737 177172 013206
 013116 013737 177174 013210
 013124 104015
 013126 000002
 013130 005737 177170
 013134 100011
 013136 013737 177170 013204
 013144 013737 177172 013206
 013152 013737 177174 013210
 013160 032737 000020 177170
 013166 001003
 013170 000177 000000
 013174 000000
 013176 000177 000000
 013202 000000
 013204 000C00
 013206 000000
 013210 000000

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:*****
:          DISK INTERRUPT HANDLERS
: ALL DISK INTERRUPTS ENTER THRU RXSRV & DISPATCH TO THE
: CURRENT SERVICE ROUTINE POINTED TO BY:
:          DODISP FOR DX0 INTERRUPTS
:          D1DISP FOR DX1 INTERRUPTS
: WILL GENERALLY BE IN THE ORDER OF SERVICE ROUTINES BELOW.
:*****
    
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RXSRV:  TSTB   RXCS       :CONTR RDY?
        BMI    1$         :BR IF YES
        MOV   RXCS,SRXCS  :ELSE SAVE FOR ERROR TYPEOUTS
        MOV   RXES,SRXES
        MOV   RXSA,SRXSA
        ERROR 15         :UNEXPECTED INTERRUPT
        RTI                :GO BACK

1$:    TST   RXCS       :ERROR?
        BPL  2$         :BR IF NO

        MOV   RXCS,SRXCS  :ELSE SAVE FOR ERROR TYPEOUTS
        MOV   RXES,SRXES
        MOV   RXSA,SRXSA

2$:    BIT   #USEL,RXCS  :CHECK UNIT SELECT BIT
        BNE  D1INT      :BR IF INTER FROM DX1

        JMP   @DODISP    :ELSE DISPATCH TO DX0 SERVICE ROUTINE
DODISP: 0

D1INT:  JMP   @D1DISP   :DX1 INTERRUPT DISPATCH
D1DISP: 0

SRXCS:  0             :SAVE RXCS
SRXES:  0             :SAVE RXES
SRXSA:  0             :SAVE RXSA
    
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3214 013212 012703 000100 DOFBUF: MOV #100,R3 ;WORD CT
3215 013216 013701 002406 MOV D0TRK,R1
3216 013222 000301 SWAB R1
3217 013224 053701 002410 BIS D0SEC,R1
3218 013230 012737 013256 013174 MOV #DOWSEC,DODISP ;POINT TO WRITE SECTOR AFTER RTI
3219 013236 012737 000101 177170 MOV #<FBUF!IE>,RXCS ;ISSUE FILL BUFFER CMD
3220 013244 010137 177172 1$: MOV R1,RXDB ;FILL ENTIRE SECTOR WITH ITS ADDRESS
3221 013250 005303 DEC R3
3222 013252 001374 BNE 1$
3223 013254 000002 RTI
3224
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3232
3233 013256 013701 002406 DOWSEC: MOV D0TRK,R1
3234 013262 000301 SWAB R1
3235 013264 053701 002410 BIS D0SEC,R1
3236 013270 010137 177174 MOV R1,RXSA ;LOAD TRACK & SECTOR ADDR
3237 013274 012737 013332 013174 MOV #DOWCHK,DODISP ;POINT TO WRITE CHECK HANDLER
3238 013302 023727 003120 000005 CMP DXTST,#5
3239 013310 001004 BNE 1$
3240 013312 012737 000115 177170 MOV #<WDDSEC!IE>,RXCS ;ONLY FOR WRITE DELETED DATA TEST
3241 013320 000403 BR 2$
3242 013322 012737 000105 177170 1$: MOV #<WSEC!IE>,RXCS ;ISSUE WRITE SECTOR COMMAND
3243 013330 000002 2$: RTI
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3253 013332 005737 177170          DOWCHK: TST      RXCS      ;ERROR?
3254 013336 100024          BPL      1$          ;BR IN NC
3255 013340 023727 002404 000012    CMP      DOERR,#10.  ;10 ERRORS?
3256 013346 001072          BNF      6$          ;BR IF NO & TRY AGAIN
3257 013350 004737 011716          JSR      PC,LDOBAD  ;LOAD BAD TRK/SEC TABLE
3258 013354 032737 000020 013206    BIT      #RNF,SRXES ;SEEK ERROR?
3259 013362 001410          BEQ      7$          ;BR IF NO
3260 013364 104064          ERROR   64          ;HARD SEEK ERROR WRITE SECTOR
3261 013366 012737 013444 013174    MOV      #2$,DODISP ;GO TO 2$ AFTER RESTORE
3262 013374 012737 000117 177170    MOV      #<RESTOR!IE>,RXCS
3263 013402 000002          RTI
3264
3265 013404 104016          7$:     ERROR   16          ;HARD ERROR WRITE SECTOR
3266 013406 000416          BR      2$          ;GO TO NEXT SECTOR
3267
3268 013410 005737 002404          1$:     TST      DOERR      ;ANY PREV ERRORS?
3269 013414 001413          BEQ      2$          ;BR IF NO
3270 013416 005237 025770          INC      TSERR      ;TOTAL SOFT ERR CT
3271 013422 005237 025774          INC      PSERR      ;PASS SOFT ERR CT
3272 013426 032737 000020 013206    BIT      #RNF,SRXES ;SEEK ERROR?
3273 013434 001402          BEQ      8$          ;BR IF NO
3274 013436 104065          ERROR   65          ;SOFT SEEK ERROR WRITE SECTOR
3275 013440 000401          BR      2$
3276 013442 104017          8$:     ERROR   17          ;SOFT ERROR WRITE SECTOR
3277
3278 013444 005037 002404          2$:     CLR      DOERR
3279 013450 023727 002410 000031    CMP      DOSEC,#31  ;LAST ODD SECTOR?
3280 013456 001004          BNE      3$          ;BR IF NO
3281 013460 012737 000002 002410    MOV      #2,DOSEC  ;ELSE DO EVEN SECTORS NOW
3282 013466 000407          BR      4$
3283 013470 023727 002410 000032    3$:     CMP      DOSEC,#32 ;LAST EVEN SECTOR?
3284 013476 001405          BEQ      5$          ;BR IF YES
3285 013500 062737 000002 002410    ADD      #2,DOSEC  ;ELSE BUMP SECTOR
3286 013506 000137 013212          4$:     JMP      DOFBUF    ;GO TO FILL BUFFER & DO ANOTHER
3287
3288 013512 012737 000001 002410    5$:     MOV      #1,DOSEC ;ALL SECTORS DONE...CHECK DATA
3289 013520 005037 002404          CLR      DOERR
3290 013524 005037 002412          CLR      DCCMER
3291 013530 000137 013566          JMP      DORSEC    ;GO TO READ SECTOR HANDLER
3292
3293 013534 005237 002404          6$:     INC      DOERR
3294 013540 032737 000020 013206    BIT      #RNF,SRXES ;SEEK ERROR?
3295 013546 001757          BEQ      4$          ;BR IN NO
3296 013550 012737 013212 013174    MOV      #DOFBUF,DODISP ;GOTO FILL BUFF AFTER RESTORE
3297 013556 012737 000117 177170    MOV      #<RESTOR!IE>,RXCS
3298 013564 000002          RTI
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3305 013566 013701 002406 DORSEC: MOV D0TRK,R1
3306 013572 000301 SWAB R1
3307 013574 053701 002410 BIS D0SEC,R1
3308 013600 010137 177174 MOV R1,RXSA ;LOAD TRK & SECTOR ADDR
3309
3310 013604 012737 013622 013174 MOV #DORCHK,DODISP ;POINT TO READ CHECK HANDLER
3311 013612 012737 000107 177170 MOV #<RSEC!IE>,RXCS ;ISSUE READ SECTOR COMMAND
3312 013620 000002 RTI
3313
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3323 013622 005737 177170 DORCHK: TST RXCS ;ERROR?
3324 013626 100054 BPL 1$ ;BR IF NO
3325 013630 023727 002404 000012 CMP DOERR,#10. ;10 ERRORS?
3326 013636 001415 BEQ 3$ ;BR IF YES
3327 013640 005237 002404 INC DOERR ;ELSE DO AGAIN
3328 013644 032737 000020 013206 BIT #RNF,SRXES ;SEEK ERROR?
3329 013652 001745 BEQ DORSEC ;BR IF NO
3330 013654 012737 013566 013174 MOV #DORSEC,DODISP ;ELSE DO RESTORE & RET TO RD SEC
3331 013662 012737 000117 177170 MOV #<RESTOR!IE>,RXCS
3332 013670 000002 RTI
3333
3334 013672 004737 011716 3$: JSR PC,!DOBAD ;LOAD BAD TRK/SEC TABLE
3335 013676 032737 000020 013206 BIT #RNF,SRXES ;SEEK ERROR?
3336 013704 001410 BEQ 7$ ;BR IF NO
3337 013706 104066 ERROR 66 ;SEEK ERROR READ SECTOR
3338
3339 013710 012737 014610 013174 MOV #DONEXT,DODISP ;DO RESTORE
3340 013716 012737 000117 177170 MOV #<RESTOR.IE>,RXCS
3341 013724 000002 RTI
3342
3343 013726 032737 000010 013206 7$: BIT #CRC,SRXES ;CRC ERROR?
3344 013734 001404 BEQ 10$ ;BR IF NO
3345 013736 005237 002422 INC D0CRC ;ELSE SET FLAG
3346 013742 104106 ERROR 106 ;HARD CRC ERROR
3347 013744 000423 BR 2$ ;& GO TO EMP BUFF TO CHK DATA
3348
3349 013746 005037 002422 10$: CLR D0CRC
3350 013752 104020 ERROR 20 ;HARD READ ERROR
3351 013754 000137 014610 JMP DONEXT
    
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3352
3353 013760 005737 002404 1$: TST DOERR ;ANY PREV ERRORS?
3354 013764 001413 BEQ 2$ ;BR IF NO
3355 013766 005237 025770 INC TSERR ;TOTAL SOFT ERR CT
3356 013772 005237 025774 INC PSERR ;PASS SOFT ERR CT
3357 013776 032737 000020 013206 BIT #RNF,SRXES ;SEEK ERROR?
3358 014004 001402 BEQ 9$ ;BR IF NO
3359 014006 104067 ERROR 67 ;SEEK ERROR READ SECTOR
3360 014010 000401 BR 2$
3361 014012 104021 9$: ERROR 21 ;SOFT ERROR READ SECTOR
3362
3363 014014 005037 002404 2$: CLR DOERR
3364 014020 023727 003120 000005 CMP DXTST,#5 ;DOING WRITE DELETED DATA TESTS?
3365 014026 001005 BNE 6$ ;BR IF NO
3366 014030 032737 000040 177172 BIT #DD,RXES ;'DELETED DATA' SET?
3367 014036 001001 BNE 6$ ;BR IF YES
3368 014040 104052 ERROR 52 ;DD NOT SET
3369
3370 014042 000137 014046 6$: JMP DC'BUF ;GO TO EMPTY BUFFER
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3378 ;*****
3379 ; HANDLER TO EMPTY THE DRIVE BUFFER FOR DXO
3380 ; & POINT TO THE CHECK DATA HANDLER.
3381 ;*****
3382 014046 012703 000100 DOEBUF: MOV #100,R3 ;WORD CT
3383 014052 012701 002424 MOV #DOBUF,R1 ;BUFFER ADDRESS
3384 014056 012737 014104 013174 MOV #DOCDAT,DODISP ;POINT TO CHK DATA AFT INTER.
3385 014064 012737 000103 177170 MOV #<EBUF!IE>,RXCS ;ISSUE EMPTY BUFFER CMD
3386 014072 013721 177172 1$: MOV RXDB,(R1)+ ;GET WORD & STORE IT
3387 014076 005303 DEC R3
3388 014100 001374 BNE 1$
3389 014102 000002 RTI
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3399 014104 005037 002412
3400 014110 012703 000100
3401 014114 013701 002406
3402 014120 000301
3403 014122 053701 002410
3404 014126 012702 002424
3405 014132 020112
3406 014134 001407
3407 014136 010137 002416
3408 014142 011237 00242C
3409 014146 005237 002412
3410 014152 000405
3411
3412 014154 005303
3413 014156 001403
3414 014160 062702 000002
3415 014164 000762
3416
3417 014166 005737 002412
3418 014172 001421
3419 014174 005737 002422
3420 014200 001402
3421 014202 104107
3422 014204 000431
3423
3424 014206 023727 002414 000012
3425 014214 001033
3426 014216 023727 003120 000003
3427 014224 001002
3428 014226 104053
3429 014230 000417
3430
3431 014232 104022
3432 014234 000415
3433
3434 014236 005737 002422
3435 014242 001402
3436 014244 104110
3437 014246 000410
3438
3439 014250 005737 002414
3440 014254 001405
3441 014256 005237 025770
3442 014262 005237 025774
3443 014266 104023

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:*****
: HANDBLER TO CHECK DATA AFTER EMPTY BUFFER CMD ON DX0.
: WILL GO TO NEXT SECTOR HANDBLER WHEN NO ERR OR HARD ERR.
: OR TO READ SECTOR (SAME) WHEN SOFT ERR.
: THIS ROUTINE IS ALSO ENTERED FROM A CRC ERROR FROM A READ COMMAND.
:*****
DOCDAT: CLR      DOCMER
          MOV      #100,R3          ;WORD CTR
          MOV      D0TRK,R1
          SWAB     R1
          BIS      D0SEC,R1        ;R1 NOW HAS EXPECTED DATA
          MOV      #D0BUF,R2       ;GET BUFFER ADDR
1$:      CMP      R1,(R2)          ;COMPARE OK?
          BEQ      2$              ;BR IF YES
          MOV      R1,D0EXP        ;ELSE SAVE
          MOV      (R2),D0REC
          INC      DOCMER
          BR       3$
2$:      DEC      R3
          BEQ      3$
          ADD      #2,R2
          BR       1$
3$:      TST      DOCMER          ;ANY COMP ERR?
          BEQ      4$              ;BR IF NO
          TST      D0CRC          ;HERE FROM CRC ERROR?
          BEQ      14$             ;BR IF NO
          ERROR   107             ;DATA CRC ERROR
          BR       5$
14$:     CMP      D0CERR,#10.      ;ELSE, 10 ERRS YET?
          BNE      7$              ;BR IF NO
          CMP      DXTST,#3        ;DOING INIT TEST?
          BNE      8$              ;BR IN NO
          ERROR   53              ;INITIALIZE ERROR
          BR       5$
8$:      ERROR   22                ;HARD ERROR DATA COMPARE
          BR       5$
4$:      TST      D0CRC          ;HERE FROM CRC ERROR?
          BEQ      15$             ;BR IF NO
          ERROR   110             ;CRC ERR WITH DATA OK
          BR       5$
15$:     TST      D0CERR          ;ANY PREV ERR?
          BEQ      5$              ;BR IF NO
          INC      TSERR          ;TOTAL SOFT ERR CT
          INC      PSERR          ;PASS SOFT ERR CT
          ERROR   23              ;SOFT ERROR DATA COMP

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3444
3445 014270 005037 002414      5$:   CLR   DOCERR
3446 014274 005037 002422      CLR   DOCRC
3447 014300 000137 014610      JMP   DONEXT
3448
3449 014304 005237 002414      7$:   INC   DOCERR
3450 014310 023727 003120 000003  CMP   DXTST,#3 ;DOING INIT TEST?
3451 014316 001402      BEQ   12$      ;BR IF YES
3452 014320 000137 013566      JMP   DORSEC  ;ELSE READ SECTOR OVER AGAIN
3453
3454 014324 000137 014746      12$:  JMP   DODUN   ;ALL DONE
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3464
3465 014330 005037 002404      DONXT1: CLR   DOERR
3466 014334 005037 002412      CLR   DOCMER
3467 014340 023727 002410 000031  CMP   DOSEC,#31 ;LAST ODD SECTOR?
3468 014346 001004      BNE   1$      ;BR IF NO
3469 014350 012737 000002 002410  MOV   #2,DOSEC ;ELSE DO EVEN SECTORS NOW
3470 014356 000407      BR    2$
3471 014360 023727 002410 000032  1$:   CMP   DOSEC,#32 ;LAST EVEN SECTOR?
3472 014366 001405      BEQ   3$      ;BR IF YES
3473 014370 062737 000002 002410  ADD   #2,DOSEC ;ELSE BUMP SECTOR
3474 014376 000137 013566      2$:   JMP   DORSEC  ;GO READ SECTOR
3475
3476 014402 032777 010000 164530  3$:   BIT   #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
3477 014410 001411      BEQ   6$
3478 014412 104401 017232      TYPE  ,DRVO
3479 014416 104401 017705      TYPE  ,TRK
3480 014422 013746 002406      MOV   DOTRK,-(SP) ;:SAVE DOTRK FOR TYPEOUT
3481 014426 104405      TYPDS ;:GO TYPE--DECIMAL ASCII WITH SIGN
3482 014430 104401 017756      TYPE  ,DUN
3483 014434 005237 003122      6$:   INC   FIN     ;SETUP TO GO TO DX1
3484 014440 023737 002406 003124  CMP   DOTRK,MAXTRK ;:LAST TRACK?
3485 014446 001406      BEQ   4$      ;BR IF YES
3486 014450 005237 002406      INC   DOTRK   ;BUMP TRACK
3487 014454 012737 000001 002410  MOV   #1,DOSEC ;INIT SECTOR
3488 014462 000414      BR    5$
3489
3490 014464 032777 010000 164446  4$:   BIT   #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
3491 014472 001406      BEQ   7$
3492 014474 104401 017232      TYPE  ,DRVO
3493 014500 104401 017712      TYPE  ,PATT
3494 014504 104401 017756      TYPE  ,DUN
3495 014510 005237 002400      7$:   INC   DOPAT  ;PATT DONE FLAG
3496 014514 042737 000100 177170  5$:   BIC   #IE,RXCS ;DISABLE DX0 INTERRUPTS
3497 014522 000002      RTI
    
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014524 005037 002404
014530 005037 002412
014534 005237 003122
014540 005237 002402
014544 023737 002402 003126
014552 001012
014554 032777 010000 164356
014562 001406
014564 104401 017232
014570 104401 017725
014574 104401 017756
014600 042737 000100 177170 \$:
014606 000002

014610 023727 003120 000001
014616 001644
014620 023727 003120 000002
014626 001736
014630 000446

:HANDLER TO SETUP TO GO TO NEXT RANDOM TRACK/SECTOR FOR DX0.

```
DONXT2: CLR      DOERR
        CLR      DOCMER
        INC      FIN          ;SETUP TO GO TO DX1
        INC      DDCNT
        CMP      DDCNT,MAXSK ;DID ALL SEEKS?
        BNE      1$          ;BR IF NO
        BIT      #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
        BEQ      1$
        TYPE     ,DRVO
        TYPE     ,RANDOM
        TYPE     ,DUN
        BIC      #IE,RXCS    ;DISABLE DX0 INTERRUPTS
        RTI
```

```
DONEXT: CMP      DXTST,#1
        BEQ      DONXT1
        CMP      DXTST,#2
        BEQ      DONXT2
        BR       DODUN
```

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3529      :*****
3530      :HANDLER TO SETUP INITIALIZE COMMAND TEST
3531      :*****
3532 014632 012737 046032 177174 DOINIT: MOV      #46032,RXSA      ;TRY TO FAKE DRIVE TO GO TO TRK 76 SEC 26
3533                                     ;INIT SHOULD GO TO TRK 1, SEC 1.
3534 014640 012737 014746 013174         MOV      #DODUN,DODISP ;POINT TO DONE HANDLER
3535 014646 012737 000111 177170         MOV      #<INITAL!IE>,RXCS ;DO INIT COMMAND
3536 014654 000002
3537
3538
3539      :*****
3540      :HANDLERS TO SETUP RESTORE COMMAND TEST
3541      :*****
3542
3543 014656 012737 014746 013174 DOREST: MOV      #DODUN,DODISP ;POINT TO DONE HANDLER
3544 014664 012737 000117 177170         MOV      #<RESTOR!IE>,RXCS
3545 014672 000002
3546
3547 014674 012737 014762 013202 DIREST: MOV      #D1DUN,D1DISP
3548 014702 012737 000137 177170         MOV      #<RESTOR!IE!DX1>,RXCS
3549 014710 000002
3550
3551      :*****
3552      :HANDLER TO SETUP READ STATUS COMMAND TEST
3553      :*****
3554
3555 014712 012737 014746 013174 DOSTAT: MOV      #DODUN,DODISP ;POINT TO DONE
3556 014720 012737 000113 177170         MOV      #<RSTAT!IE>,RXCS ;DO READ STATUS COMMAND
3557 014726 000002
3558
3559      :*****
3560      :HANDLER TO START INVALID ADDRESS TESTS
3561      :*****
3562
3563 014730 012737 014746 013174 DUINV:  MOV      #DODUN,DODISP ;POINT TO DONE
3564 014736 012737 000105 177170         MOV      #<WSEC!IE>,RXCS ;DO WRITE SECTOR COMMAND
3565 014744 000002
3566
3567
3568      :*****
3569      :HANDLERS TO FINISH INITIALIZE, RESTORE, WRITE DELETED DATA,
3570      :READ STATUS & INVALID ADDRESS TESTS.
3571      :*****
3572
3573 014746 005237 003122 DODUN:  INC      FIN      ;SET DONE FLAG
3574 014752 042737 000100 177170         BIC      #IE,RXCS      ;DISABLE FURTHUR DX0 INTERRUPTS
3575 014760 000002
3576
3577 014762 005237 003122 D1DUN:  INC      FIN
3578 014766 042737 000120 177170         BIC      #<IE!DX1>,RXCS
3579 014774 000002
3580
  
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3588 014776 012703 00010C D1FBUF: MOV #100,R3 ;WORD CT
3589 015002 013701 002656 MOV D1TRK,R1
3590 015006 000301 SWAB R1
3591 015010 053701 002660 BIS D1SEC,R1
3592
3593 015014 005737 003132 TST COMP1 ;DONT SET BIT15 IN COMPATABILITY TESTS
3594 015020 001005 BNE 2$
3595 015022 005737 003134 TST COMP2
3596 015026 001002 BNE 2$
3597 015030 052701 100000 BIS #BIT15,R1 ;TO DISTINGUISH DX1 DATA FROM DX0 DATA
3598
3599 015034 012737 015062 013202 2$: MOV #D1WSEC,D1DISP ;POINT TO WRITE SECTOR AFTER R1I
3600 015042 012737 000121 177170 MOV #<FBUF!IE!DX1>,RXCS ;ISSUE FILL BUFFER CMD
3601 015050 010137 177172 1$: MOV R1,RXDB ;FILL ENTIRE SECTOR WITH ITS ADDRESS
3602 015054 005303 DEC R3 ;& BIT 15 SET
3603 015056 001374 BNE 1$
3604 015060 000002 RTI
3605
3606
3607
3608
3609
3610
3611 015062 013701 002656 D1WSEC: MOV D1TRK,R1
3612 015066 000301 SWAB R1
3613 015070 053701 002660 BIS D1SEC,R1
3614 015074 010137 177174 MOV R1,RXSA ;LOAD TRACK & SECTOR ADDR
3615 015100 012737 015116 013202 MOV #D1WCHK,D1DISP ;POINT TO WRITE CHECK HANDLER
3616 015106 012737 000125 177170 MOV #<WSEC!IE!DX1>,RXCS ;ISSUE WRITE SECTOR COMMAND
3617 015114 000002 RTI
3618

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```
3619
3620
3621
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3623
3624
3625
3626
3627 015116 005737 177170          D1WCHK: TST      RXCS      ;ERROR?
3628 015122 100024          BPL      1$           ;BR IN NC
3629 015124 023727 002654 000012    CMP      D1ERR,#10.   ;10 ERRORS?
3630 015132 001072          BNE      6$           ;BR IF NO & TRY AGAIN
3631 015134 004737 012030          JSR      PC,LD1BAD    ;LOAD BAD TRK/SEC TABLE
3632 015140 032737 000020 013206    BIT      #RNF,SRXES  ;SEEK ERROR?
3633 015146 001410          BEQ      7$           ;BR IF NO
3634 015150 104070          ERROR   70           ;SEEK ERROR WRITE SECTOR
3635 015152 012737 015230 013202    MOV      #2$,D1DISP  ;RET TO 2$ AFT RESTORE
3636 015160 012737 000137 177170    MOV      #<RESTOR!IE!DX1>,RXCS
3637 015166 000002
3638
3639 015170 104024          7$:  ERROR   24       ;ERROR WRITE SECTOR
3640 015172 000416          BR      2$           ;GO TO NEXT SECTOR
3641
3642 015174 005737 002654          1$:  TST      D1ERR    ;ANY PREV ERRORS?
3643 015200 001413          BEQ      2$           ;BR IF NO
3644 015202 005237 025770          INC      TSERR       ;TOTAL SOFT ERR CT
3645 015206 005237 025774          INC      PSERR       ;PASS SOFT ERR CT
3646 015212 032737 000020 013206    BIT      #RNF,SRXES  ;SEEK ERROR?
3647 015220 001402          BEQ      8$           ;BR IF NO
3648 015222 104071          ERROR   71           ;SEEK ERROR WRITE SECTOR
3649 015224 000401          BR      2$           ;SEEK ERROR WRITE SECTOR
3650 015226 104025          8$:  ERROR   25       ;ERROR WRITE SECTOR
3651
3652 015230 005037 002654          2$:  CLR      D1ERR     ;LAST ODD SECTOR?
3653 015234 023727 002660 000031    CMP      D1SEC,#31   ;BR IF NO
3654 015242 001004          BNE      3$           ;ELSE DO EVEN SECTORS NOW
3655 015244 012737 000002 002660    MOV      #2,D1SEC
3656 015252 000407          BR      4$           ;LAST EVEN SECTOR?
3657 015254 023727 002660 000032    3$:  CMP      D1SEC,#32 ;BR IF YES
3658 015262 001405          BEQ      5$           ;ELSE BUMP SECTOR
3659 015264 062737 000002 002660    ADD      #2,D1SEC    ;GO TO FILL BUFFER & DO ANOTHER
3660 015272 000137 014776          4$:  JMP      D1FBUF
3661
3662 015276 012737 000001 002660    5$:  MOV      #1,D1SEC   ;ALL SECTORS DONE...CHECK DATA
3663 015304 005037 002654          CLR      D1ERR
3664 015310 005037 002662          CLR      D1CMER
3665 015314 000137 015352          JMP      D1RSEC      ;GO TO READ SECTOR HANDLER
3666
3667 015320 005237 002654          6$:  INC      D1ERR
3668 015324 032737 000020 013206    BIT      #RNF,SRXES  ;SEEK ERROR?
3669 015332 001757          BEQ      4$           ;BR IF NO
3670 015334 012737 014776 013202    MOV      #D1FBUF,D1DISP ;RET TO FILL BUFF AFT RESTORE
3671 015342 012737 000137 177170    MOV      #<RESTOR!IE!DX1>,RXCS
3672 015350 000002
3673
3674
```

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3675 ;HANDLER TO READ A SECTOR ON DX1 & POINT TO CHECK.
3676 ;:*****
3677
3678 015352 013701 002656 D1RSEC: MOV D1TRK,R1
3679 015356 000301 SWAB R1
3680 015360 053701 002660 BIS D1SEC,R1
3681 015364 010137 177174 MOV R1,RXSA ;LOAD TRK & SECTOR ADDR
3682
3683 015370 012737 015406 013202 MOV #D1RCHK,D1DISP ;POINT TO READ CHECK HANDLER
3684 015376 012737 000127 177170 MOV #<RSEC!IE!DX1>,RXCS ;ISSUE READ SECTOR COMMAND
3685 015404 000002 RTI
3686
3687
3688
3689 ;:*****
3690 ;HANDLER TO READ CHECK ON DX1.
3691 ;WILL GO TO NEXT SECTOR/TRK IF HARD ERROR.
3692 ;WILL GO TO EMPTY BUFFER IF NO ERROR OR SOFT ERROR.
3693 ;WILL GO TO READ SECTOR (SAME) ON ERROR.
3694 ;A RESTORE IS PERFORMED AFTER ANY SEEK ERROR (RNF).
3695 ;:*****
3696
3697 015406 005737 177170 D1RCHK: TST RXCS ;ERROR?
3698 015412 100054 BPL 1$ ;BR IF NO
3699 015414 023727 002654 000012 CMP D1ERR,#10. ;10 ERRORS?
3700 015422 001415 BEQ 3$ ;BR IF YES
3701 015424 005237 002654 INC D1ERR ;ELSE TRY AGAIN
3702 015430 032737 000020 013206 BIT #RNF,SRXES ;SEEK ERROR?
3703 015436 001745 BEQ D1RSEC ;BR IF NO
3704 015440 012737 015352 013202 MOV #D1RSEC,D1DISP ;ELSE DO RESTORE & RET TO RD SEC
3705 015446 012737 000137 177170 MOV #<RESTOR!IE!DX1>,RXCS
3706 015454 000002 RTI
3707
3708 015456 004737 012030 3$: JSR PC,!D1BAD ;LOAD BAD TRK/SEC TABLE
3709 015462 032737 000020 013206 BIT #RNF,SRXES ;SEEK ERROR?
3710 015470 001410 BEQ 7$ ;BR IF NO
3711 015472 104072 ERROR 72 ;SEEK ERROR READ SECTOR
3712
3713 015474 012737 016342 013202 MOV #D1NEXT,D1DISP ;DO RESTORE
3714 015502 012737 000137 177170 MOV #<RESTOR!IE!DX1>,RXCS
3715 015510 000002 RTI
3716
3717 015512 032737 000010 013206 7$: BIT #CRC,SRXES ;CRC ERROR?
3718 015520 001404 BEQ 10$ ;BR IF NO
3719 015522 005237 002672 INC D1CRC ;ELSE SET FLAG
3720 015526 104111 ERROR 111 ;HARD CRC ERROR
3721 015530 000423 BR 2$ ;& GO TO EMP BUFF TO CHK DATA
3722
3723 015532 005037 002672 10$: CLR D1CRC
3724 015536 104026 ERROR 26 ;HARD READ ERROR
3725 015540 000137 016342 JMP D1NEXT

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3726
3727 015544 005737 002654      1$:   TST      D1ERR      ;ANY PREV ERRORS?
3728 015550 001413              BEQ      2$           ;BR IF NO
3729 015552 005237 025770      INC      TSERR       ;TOTAL SOFT ERR CT
3730 015556 005237 025774      INC      PSERR       ;PASS SOFT ERR CT
3731 015562 032737 000020 013206 BIT      #RNF,SRXES  ;SEEK ERROR?
3732 015570 001402              BEQ      9$           ;BR IF NO
3733 015572 104073              ERROR    73          ;SEEK ERROR READ SECTOR
3734 015574 000401              BR       2$           ;
3735 015576 104027      9$:   ERROR    27          ;SOFT ERROR READ SECTOR
3736
3737 015600 005037 002654      2$:   CLR      D1ERR     ;
3738 015604 000137 015610      JMP      D1EBUF      ;GO TO EMPTY BUFFER
3739
3740
3741
3742
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3744
3745
3746
3747
3748
3749
3750 015610 012703 000100      D1EBUF: MOV      #100,R3      ;WORD CT
3751 015614 012701 002674      MOV      #D1BUF,R1      ;BUFFER ADDRESS
3752 015620 012737 015646 013202  MOV      #D1CDAT,D1DISP ;POINT TO CHK DATA AFT INTER.
3753 015626 012737 000123 177170  MOV      #<EBUF!IE.DX1>,RXCS ;ISSUE EMPTY BUFFER CMD
3754 015634 013721 177172      1$:   MOV      RXDB,(R1)+   ;GET WORD & STORE IT
3755 015640 005303              DEC      R3
3756 015642 001374              BNE     1$
3757 015644 000002              RTI
3758
    
```

```
3759 ;:*****
3760 ;:HANDLER TO CHECK DATA AFTER EMPTY BUFFER CMD ON DX1.
3761 ;:WILL GO TO NEXT SECTOR HANDLER WHEN NO ERR OR HARD ERR.
3762 ;:OR TO READ SECTOR (SAME) WHEN SOFT ERR.
3763 ;:THIS ROUTINE IS ALSO ENTERED FROM A CRC ERROR FROM A READ COMMAND.
3764 ;:*****
3765
3766 015646 005037 002662 D1CDAT: CLR D1CMER
3767 015652 012703 000100 MOV #100,R3 ;WORD CTR
3768 015656 013701 002656 MOV D1TRK,R1
3769 015662 000301 SWAB R1
3770 015664 053701 002660 BIS D1SEC,R1
3771
3772 015670 005737 003132 TST COMP1 ;DONT SET BIT15 IN COMPATABILITY TESTS
3773 015674 001005 BNE 6$
3774 015676 005737 003134 TST COMP2
3775 015702 001002 BNE 6$
3776 015704 052701 100000 BIS #BIT15,R1 ;TO DISTINGUISH DX1 DATA FROM DX0 DATA
3777
3778 015710 012702 002674 6$: MOV #D1BUF,R2 ;GET BUFFER ADDR
3779 015714 020112 1$: CMP R1,(R2) ;COMPARE OK?
3780 015716 001407 BEQ 2$ ;BR IF YES
3781 015720 010137 002666 MOV R1,D1EXP ;ELSE SAVE
3782 015724 011237 002670 MOV (R2),D1REC
3783 015730 005237 002662 INC D1CMER
3784 015734 000405 BR 3$
3785 015736 005303 2$: DEC R3
3786 015740 001403 BEQ 3$
3787 015742 062702 000002 ADD #2,R2
3788 015746 000762 BR 1$
3789
3790 015750 005737 002662 3$: TST D1CMER ;ANY COMP ERR?
3791 015754 001413 BEQ 4$ ;BR IF NO
3792 015756 005737 002672 TST D1CRC ;HERE FROM CRC ERROR?
3793 015762 001402 BEQ 14$ ;BR IF NO
3794 015764 104112 ERROR 112 ;DATA CRC ERROR
3795 015766 000423 BR 5$
3796 015770 023727 002664 0000^2 14$: CMP D1CERR,#10. ;ELSE, 10 ERRS YET?
3797 015776 001025 BNE 7$ ;BR IF NO
3798 016000 104030 ERROR 30 ;HARD ERROR DATA COMP
3799 016002 000415 BR 5$
3800
3801 016004 005737 002672 4$: TST D1CRC ;HERE FROM CRC ERROR?
3802 016010 001402 BEQ 15$ ;BR IF NO
3803 016012 104113 ERROR 113 ;CRC ERR WITH DATA OK
3804 016014 000410 BR 5$
3805 016016 005737 002664 15$: TST D1CERR ;ANY ERR?
3806 016022 001405 BEQ 5$
3807 016024 005237 025770 INC TSERR ;TOTAL SOFT ERR CT
3808 016030 005237 025774 INC PSERR ;PASS SOFT ERR CT
3809 016034 104031 ERROR 31 ;SOFT ERROR DATA COMP
```

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3810
3811 016036 005037 002664      5$: CLR D1CERR
3812 016042 005037 002672      CLR D1CRC
3813 016046 000137 016342      JMP D1NEXT
3814
3815 016052 005237 002664      7$: INC D1CERR
3816 016056 000137 015352      JMP D1RSEC      ;READ SECTOR OVER AGAIN
3817
3818
3819
3820
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3822
3823
3824
3825
3826 016062 005037 002654      D1NXT1: CLR D1ERR
3827 016066 005037 002662      CLR D1CMER
3828 016072 023727 002660 000031  CMP D1SEC,#31      ;LAST ODD SECTOR?
3829 016100 001004      BNE 1$      ;BR IF NO
3830 016102 012737 000002 002660  MOV #2,D1SEC      ;ELSE DO EVEN SECTORS NOW
3831 016110 000407      BR 2$
3832 016112 023727 002660 000032 1$: CMP D1SEC,#32      ;LAST EVEN SECTOR?
3833 016120 001405      BEQ 3$      ;BR IF YES
3834 016122 062737 000002 002660  ADD #2,D1SEC      ;ELSE BUMP SECTOR
3835 016130 000137 015352      2$: JMP D1RSEC      ;GO READ SECTOR
3836
3837 016134 032777 010000 162776 3$: BIT #BIT12,@SWR      ;SKIP TYPEOUT IF NOT SET
3838 016142 001411      BEQ 6$
3839 016144 104401 017237      TYPE ,DRV1
3840 016150 104401 017705      TYPE ,TRK
3841 016154 013746 002656      MOV D1TRK,-(SP)      ;;SAVE D1TRK FOR TYPEOUT
3842 016160 104405      TYPDS      ;;GO TYPE--DECIMAL ASCII WITH SIGN
3843 016162 104401 017756      TYPE ,DUN
3844 016166 005237 003122      6$: INC FIN      ;SETUP TO GO TO DX0
3845 016172 023737 002656 003124  CMP D1TRK,MAXTRK      ;LAST TRACK?
3846 016200 001406      BEQ 4$      ;BR IF YES
3847 016202 005237 002656      INC D1TRK      ;BUMP TRACK
3848 016206 012737 000001 002660  MOV #1,D1SEC      ;INIT SECTOR
3849 016214 000414      BR 5$
3850
3851 016216 032777 010000 162714 4$: BIT #BIT12,@SWR      ;SKIP TYPEOUT IF NOT SET
3852 016224 001406      BEQ 7$
3853 016226 104401 017237      TYPE ,DRV1
3854 016232 104401 017712      TYPE ,PATT
3855 016236 104401 017756      TYPE ,DUN
3856 016242 005237 002650      7$: INC D1PAT      ;PATT DONE FLAG
3857 016246 042737 000120 177170 5$: BIC #<IE.DX1>,RXCS      ;DISABLE DX1 INTERRUPTS
3858 016254 000002      RTI
3859
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3864
3865 016256 005037 002654      D1NX12: CLR      D1ERR
3866 016262 005037 002662      CLR      D1CMER
3867 016266 005237 003122      INC      FIN          ;SETUP TO GO TO DX0
3868 016272 005237 002652      INC      D1CNT
3869 016276 023737 002652 003126    CMP      D1CNT,MAXSK ;DID ALL SEEKS?
3870 016304 001012          BNE      1$          ;BR IF NO
3871 016306 032777 010000 162624    BIT      #BIT12,@SWR ;SKIP TYPEOUT IF NOT SET
3872 016314 001406          BEQ      1$
3873 016316 104401 017237      TYPE     ,DRV1
3874 016322 104401 017725      TYPE     ,RANDOM
3875 016326 104401 017756      TYPE     ,DUN
3876 016332 042737 000120 177170    $:      BIC      #<IE.DX1>,RXCS ;DISABLE DX1 INTERRUPTS
3877 016340 000002          RTI
3878
3879
3880
3881
3882 016342 023727 003120 000001    D1NEXT: CMP      DXTST,#1
3883 016350 001644          BEQ      D1NXT1
3884 016352 000741          BR       D1NXT2
3885

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3895 016354 005037 003130
3896 016360 104401 020155
3897 016364 000000
3898
3899 016366 004737 016674
3900
3901 016372 005037 016666
3902 016376 012737 000001 016670
3903 016404 012737 000001 016672
3904 016412 105737 177170
3905 016416 100375
3906
3907 016420 004537 016744
3908 016424 000007
3909
3910 016426 005737 177170
3911 016432 100011
3912 016434 005237 016666
3913 016440 023727 016666 000012
3914 016446 001364
3915 016450 104100
3916 016452 000000
3917 016454 000776
3918
3919 016456 005037 016666
3920 016462 004537 017004
3921 016466 002424
3922
3923 016470 004537 016744
3924 016474 000025
3925
3926 016476 005737 177170
3927 016502 100011
3928 016504 005237 016666
3929 016510 023727 016666 000012
3930 016516 001364
3931 016520 104101
3932 016522 000000
3933 016524 000776

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:*****
:THE FOLLOWING CODE, UP TO THE PROGRAM MESSAGES, IS A UTILITY TO COPY
:THE DISKETTE CONTAINING ONLY THE BOOT & THE EXERCISER FROM DX0 TO DX1.
:THE OPERATOR CAN TYPE 'P' TO DO ANOTHER COPY OR
:TYPE '240G' TO ENTER NORMAL TESTING.
:ENTIRE CODE, INCLUDING TEXT & ERROR TABLE, IS 400(10) WORDS.
:*****
COPY:  CLR      COPFLG      ;DONT NEED FLAG ANY MORE
      TYPE     .COPMSG      ;INSERT SCRATCH IN DX1 & TYPE P
      HALT                               ;WAIT FOR PROCEED
      JSR      PC,GETSEC      ;CALCULATE MAX SECTORS TO BE COPIED
      CLR      ERFLG          ;INITIALIZE
      MOV      #1,TRACK
      MOV      #1,SECT
      TSTB     RXCS           ;DONE? (CTL RDY)
      BPL      .-4           ;BR IF NO & TRY AGAIN
1$:   JSR      R5,RDWR        ;READ DX0
      RSEC
      TST      RXCS          ;ERROR?
      BPL      2$           ;BR IF NO
      INC      ERFLG
      CMP      ERFLG,#10.    ;10 ERRORS?
      BNE      1$           ;BR IF NO & TRY AGAIN
      ERROR   100           ;HARD ERR READ SECTOR DX0
      HALT
      BR      .-2          ;FORCE A RESTART FROM 250
2$:   CLR      FRFLG
      JSR      R5,EBUFF      ;EMPTY BUFFER INTO DOBUF
      DOBUF
3$:   JSR      R5,RDWR        ;WRITE DX1
      <WSEC!DX1>
      TST      RXCS          ;ERROR?
      BPL      4$           ;BR IF NO
      INC      ERFLG
      CMP      ERFLG,#10.    ;10 ERRORS?
      BNE      3$           ;BR IF NO & TRY AGAIN
      ERROR   101           ;ERROR WRITE SECTOR
      HALT
      BR      .-2          ;FORCE RESTART AT 250

```

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3934
3935 016526 005037 016666      4$: CLR ERFLG
3936 016532 004537 016744      JSR R5,RDWR ;READ DX1
3937 016536 000027              <RSEC!DX1>
3938
3939 016540 005737 177170      TST RXCS ;ERROR?
3940 016544 100011      BPL 5$ ;BR IF NO
3941 016546 005237 016666      INC ERFLG
3942 016552 023727 016666 000012  CMP ERFLG,#10. ;10 ERRORS?
3943 016560 001362      BNE 4$ ;BR IF NO & TRY AGAIN
3944 016562 104103      ERROR 103 ;HARD ERR READ SECTOR DX1
3945 016564 000000      HALT
3946 016566 000776      BR -2 ;FORCE 250 RESTART
3947
3948 016570 004537 017004      5$: JSR R5,EBUFF ;EMPTY BUFFER INTO D1BUF
3949 016574 002674              D1BUF
3950
3951 016576 004737 017046      JSR PC,DATCHK ;COMPARE DOBUF WITH D1BUF
3952
3953 016602 005237 016664      INC SECCNT ;TOTAL DONE
3954
3955 016606 023737 016664 016662  CMP SECCNT,MAXSEC ;DID TOTAL # SECTORS?
3956 016614 001415      BEQ 8$ ;BR IF YES
3957
3958 016616 023727 016672 000032  CMP SECT,#32 ;ELSE DID WE DO LAST SECTOR ON TRACK?
3959 016624 001403      BEQ 6$ ;BR IF YES
3960 016626 005237 016672      INC SECT ;ELSE BUMP & DO ANOTHER
3961 016632 000672      BR 1$
3962
3963 016634 005237 016670      6$: INC TRACK ;BUMP TRK
3964 016640 012737 000001 016672  MOV #1,SECT ;INIT SECTOR
3965 016646 000664      BR 1$ ;& DO ANOTHER
3966
3967 016650 104401 020256      8$: TYPE .COPDUN ;DONE MSG
3968 016654 000000      HALT
3969 016656 000137 016354      JMP COPY ;DO AGAIN IF 'P' TYPED
3970
3971 016662 000000      MAXSEC: 0 ;TOTAL # SECTORS TO READ FROM DX0
3972 016664 000000      SECCNT: 0 ;TOTAL # SECTORS WRITTEN TO DX1
3973 016666 000000      ERFLG: 0
3974 016670 000000      TRACK: 0
3975 016672 000000      SECT: 0
    
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3981 016674 012700 026532
3982 016700 006200
3983 016702 005500
3984 016704 062700 000377
3985 016710 042700 000377
3986
3987 016714 000300
3988 016716 006300
3989 016720 006300
3990
3991 016722 062700 000074
3992 016726 062700 000010
3993
3994 016732 010037 016662
3995
3996
3997 016736 005037 016664
3998 016742 000207
3999
4000
4001
4002
4003
4004
4005
4006 016744 013700 016670
4007 016750 000300
4008 016752 053700 016672
4009 016756 010037 177174
4010 016762 012537 177170
4011 016766 004537 011600
4012 016772 177170
4013 016774 000200
4014 016776 104075
4015 017000 000000
4016 017002 000205
4017

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```

:*****
:ROUTINE TO CALCULATE THE MAX # OF SECTORS TO READ FROM DX0
:*****
GETSEC: MOV    #LSTAD,RO      ;GET MAX ADDR
        ASR    RO           ;GET WORD CT
        ADC    RO           ;DONT LOOSE ANY
        ADD    #377,RO
        BIC    #377,RO      ;ROUND OFF TO NEAREST WHOLE WORD
        SWAB   RO
        ASL    RO
        ASL    RO          ;DIVIDE BY 100(8) FOR SECTOR CT.
        ADD    #<15.*4>,RO  ;ADD SECTOR CT FOR BLOCKS 0 - 14 OF DX0
        ADD    #8.,RO      ;2 MORE BLOCKS (NECESSARY FUDGE FACTOR)
        MOV    RC,MAXSEC   ;SAVE
                                ;THIS IS THE MAX SECTORS WE WILL READ OFF DX0
                                ;& WRITE TO DX1 STARTING AT TRK 1, SECT 1
                                ;CCUNT OF TOTAL SECTORS WRITTEN TO DX1
        CLR    SECCNT
        RTS    PC
:*****
:ROUTINE TO READ OF WRITE DX0 OR DX1
:R5 POINTS TO THE COMMAND & DISK #
:*****
RDWR:  MOV    TRACK,RO
        SWAB   RO
        BIS    SECT,RO
        MOV    RO,RXSA      ;LOAD TRK/SEC
        MOV    (R5)+,RXLS   ;ISSUE COMMAND
        JSR    R5,TIMER2    ;WAIT FOR DONE
                                ;
        RXCS
        DONE
        ERROR  75          ;NO DONE
        HALT
        RTS    R5

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4018
4019
4020      ;*****
4021      ;ROUTINE TO EMPTY BUFFER INTO DOBUF OR D1BUF
4022      ;R5 POINTS TO IT
4023      ;*****
4024 017004 012700 000100      EBUFF:  MOV      #100,R0          ;WD CT
4025 017010 012501              MOV      (R5)+,R1          ;BUFFER ADDR
4026 017012 012737 000003 177170  MOV      #EBUF,RXCS      ;ISSUE EMPTY BUFFER COMMAND
4027 017020 013721 177172      1$:  MOV      RXDB,(R1)+      ;PUT IT IN TABLE
4028 017024 005300              DEC      R0
4029 017026 001374              BNE     1$
4030 017030 004537 011600      JSR     R5,TIMER2        ;WAIT FOR DONE
4031 017034 177170              RXCS
4032 017036 000200              DONE
4033 017040 104075              ERROR  75              ;NO DONE
4034 017042 000000              HALT
4035 017044 000205              RTS      R5
4036
4037
4038      ;*****
4039      ;ROUTINE TO COMPARE DOBUF WITH D1BUF
4040      ;*****
4041
4042 017046 012700 000100      DATCHK: MOV      #100,R0          ;WD CT
4043 017052 012701 002424      MOV      #DOBUF,R1
4044 017056 012702 002674      MOV      #D1BUF,R2
4045 017062 022122              1$:  CMP      (R1)+,(R2)+      ;COMPARE?
4046 017064 001403              BEQ     2$              ;BR IF YES
4047 017066 104102              ERROR  102             ;MISCOMPARE
4048 017070 000000              HALT
4049 017072 000776              BR      -2
4050
4051 017074 005300      2$:  DEC      R0
4052 017076 001371              BNE     1$
4053 017100 000207              RTS      PC
4054
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.SBTTL PROGRAM MESSAGES

::*****
: MESSAGES & ERROR FORMATS
:*****

.NLIST BEX

017102	041600	052514	052123	CLOPT:	.ASCIZ	<CRLF>/CLUSTER OPTION/			
017122	052200	051105	020115	CLT1:	.ASCIZ	<CRLF>/TERM #1/			
017133	200	042524	046522	CLT2:	.ASCIZ	<CRLF>/TERM #2/			
017144	052200	051105	020115	CLT3:	.ASCIZ	<CRLF>/TERM #3/			
017155	200	054523	041516	SCOM:	.ASCIZ	<CRLF>/SYNC COMM/			
017170	040600	054523	041516	ACOM:	.ASCIZ	<CRLF>/ASYN COMM/			
017204	050200	044522	052116	PRINT:	.ASCIZ	<CRLF>/PRINTER/			
017215	040	047520	052122	PORT:	.ASCIZ	/ PORT TESTED/			
017232	042200	030130	000	DRV0:	.ASCIZ	<CRLF>/DX0/			
017237	200	054104	000061	DRV1:	.ASCIZ	<CRLF>/DX1/			
017244	041600	047514	045503	CLOCK:	.ASCIZ	<CRLF>/CLOCK/			
017253	200	045464	000	M4K:	.ASCIZ	<CRLF>/4K/			
017257	200	045470	000	M8K:	.ASCIZ	<CRLF>/8K/			
017263	200	031061	000113	M12K:	.ASCIZ	<CRLF>/12K/			
017270	030600	045466	000	M16K:	.ASCIZ	<CRLF>/16K/			
017275	200	030062	000113	M20K:	.ASCIZ	<CRLF>/20K/			
017302	031200	045464	000	M24K:	.ASCIZ	<CRLF>/24K/			
017307	200	030063	000113	M30K:	.ASCIZ	<CRLF>/30K/			
017314	046440	046505	051117	MEM:	.ASCIZ	/ MEMORY PRESENT/			
017334	047040	052117	050040	NOTPRES:	.ASCIZ	/ NOT PRESENT/			
017351	200	044412	051516	WARNING:	.ASCII	<CRLF><LF>/INSERT SCRATCH DISKS, TYPE 'P' FOR NORMAL TESTING/			
017434	023600	032062	043460		.ASCII	<CRLF>/'240G' FOR NORMAL RESTARTS/			
017467	200	031047	030065		.ASCII	<CRLF>/'250G' TO COPY SYS EXERCISER DISK/			
017531	200	031047	030066		.ASCII	<CRLF>/'260G' FOR COMPATABILITY PASS 1: WRITE/			
017600	023600	033462	043460		.ASCII	<CRLF>/'270G' FOR COMPATABILITY PASS 2: READ/			
017647	040	042524	052123	DROP:	.ASCIZ	/ TESTING DROPPED/			
017670	051040	047125	044516	RUN:	.ASCIZ	/ RUNNING/			
017701	040	045517	000	OK:	.ASCIZ	/ OK/			
017705	040	051124	000113	TRK:	.ASCIZ	/ TRK/			
017712	042040	052101	020001	PATT:	.ASCIZ	/ DATA PATT/			
017725	040	040522	042116	RANDOM:	.ASCIZ	/ RANDOM SEEKS/			
017743	200	042515	020115	MEMORY:	.ASCIZ	<CRLF>/MEM TESTS/			
017756	042040	047117	000105	DUN:	.ASCIZ	/ DONE/			
017764	005200	047105	020104	ENDPAS:	.ASCIZ	<CRLF><LF>/END PASS #/			
020001	011	047524	040524	MSG1:	.ASCIZ	/ TOTAL ERRORS: /			
020030	004600	004411	047524	MSG2:	.ASCIZ	<CRLF>/	TOTAL SOFT ERRORS: /		
020064	005200	004411	052011	MSG3:	.ASCIZ	<CRLF><LF>/	TOTAL ERRORS THIS PASS:/		
020121	200	004411	051411	MSG4:	.ASCIZ	<CRLF>/	SOFT ERRORS THIS PASS:/		
020155	200	047503	054520	COPMSG:	.ASCII	<CRLF>/COPY DX0 TO DX1/			
020175	200	047111	042523		.ASCII	<CRLF>/INSERT SCRATCH DISK IN DX1, TYPE 'P' TO PROCEED/			
020256	042200	047117	027105	COPDUN:	.ASCIZ	<CRLF>/DONE...TYPE 'P' TO DO AGAIN OR '240G' FOR NORMAL TESTING/			
020350	005200	047503	050115	COMPAT:	.ASCII	<CRLF><LF>/COMPATABILITY PASS 1 (WRITE) DONE/			
020413	200	047504	023440		.ASCIZ	<CRLF>/DO 'P' FOR PASS 2 (READ)/			
020445	200	042504	046526	DEVM:	.ASCIZ	<CRLF>/DEVM - /			
020456	042515	047515	054522	EM1:	.ASCIZ	/MEMORY TIMEOUT/			

020475	115	046505	042040	EM2:	.ASCIZ	/MEM DATA COMP ERR/
020517	123	047131	020103	EM3:	.ASCIZ	/SYNC COMM DID NOT RECEIVE SYNC CHAR/
020563	120	044522	052116	EM4:	.ASCIZ	/PRINTER STATUS ERR/
020606	042524	046522	021440	EM5:	.ASCIZ	/TERM #1 DATA COMP ERR/
020634	042524	046522	021440	EM6:	.ASCIZ	/TERM #2 DATA COMP ERR/
020662	042524	046522	021440	EM7:	.ASCIZ	/TERM #3 DATA COMP ERR/
020710	051501	047131	020103	EM8:	.ASCIZ	/ASYNC COMM DATA COMP ERR/
020741	123	047131	020103	EM9:	.ASCIZ	/SYNC COMM DATA COMP ERR/
020771	125	042516	050130	EM10:	.ASCIZ	/UNEXP DISK INTERRUPT/
021016	054104	020060	051127	EM11:	.ASCIZ	/DX0 WRITE ERR/
021034	054104	020060	040510	EM13:	.ASCIZ	/DX0 HARD ERR - READ SECT/
021065	104	030130	051440	EM14:	.ASCIZ	/DX0 SOFT ERR - READ SECT/
021116	054104	020060	040510	EM15:	.ASCIZ	/DX0 HARD ERR - DATA COMP/
021147	104	030130	051440	EM16:	.ASCIZ	/DX0 SOFT ERR - DATA COMP/
021200	054104	020061	051127	EM17:	.ASCIZ	/DX1 WRITE ERR/
021216	054104	020061	040510	EM19:	.ASCIZ	/DX1 HARD ERR - READ SECT/
021247	104	030530	051440	EM20:	.ASCIZ	/DX1 SOFT ERR - READ SECT/
021300	054104	020061	040510	EM21:	.ASCIZ	/DX1 HARD ERR - DATA COMP/
021331	104	030530	051440	EM22:	.ASCIZ	/DX1 SOFT ERR - DATA COMP/
021362	046103	020113	052510	EM23:	.ASCIZ	/CLK HUNG/
021373	120	044522	052116	EM24:	.ASCIZ	/PRINTER HUNG/
021410	042524	046522	021440	EM25:	.ASCIZ	/TERM #1 HUNG/
021425	124	051105	020115	EM26:	.ASCIZ	/TERM #2 HUNG/
021442	042524	046522	021440	EM27:	.ASCIZ	/TERM #3 HUNG/
021457	123	047131	020103	EM28:	.ASCIZ	/SYNC COMM HUNG/
021476	051501	047131	020103	EM29:	.ASCIZ	/ASYNC COMM HUNG/
021516	054104	020060	052510	EM30:	.ASCIZ	/DX0 HUNG/
021527	104	030530	044040	EM31:	.ASCIZ	/DX1 HUNG/
021540	054523	041516	041440	EM32:	.ASCIZ	/SYNC COMM - DATA NOT AVAIL NOT SET/
021603	123	047131	020103	EM33:	.ASCIZ	/SYNC COMM - RECVR ACTIVE NOT SET/
021644	054523	041516	041440	EM34:	.ASCIZ	/SYNC COMM - RECVR DONE NOT SET/
021703	104	030130	023440	EM35:	.ASCIZ	/DX0 'DEL DATA' BIT 5 NOT SET IN RXES/
021750	054104	020060	047111	EM36:	.ASCIZ	/DX0 INIT CMD DID NOT READ TRK 1, SEC 1/
022017	104	030130	051040	EM37:	.ASCIZ	/DX0 RESTORE CMD ERR/
022043	104	030130	023440	EM38:	.ASCIZ	/DX0 'INIT DONE' BIT 0 NOT SET IN RXES/
022111	104	030130	051040	EM39:	.ASCIZ	/DX0 READ STATUS CMD ERR/
022141	104	030130	044440	EM40:	.ASCIZ	/DX0 INV ADDR BIT 1 NOT SET IN RXES/
022204	054104	020060	051105	EM41:	.ASCIZ	/DX0 ERR BIT NOT SET IN RXCS/
022240	054104	020060	047111	EM42:	.ASCIZ	/DX0 INIT CMD ERR/
022261	104	030130	051440	EM43:	.ASCIZ	/DX0 SEEK ERR - WRITE SECT/
022313	104	030130	051440	EM45:	.ASCIZ	/DX0 SEEK ERR - PEAD SECT/
022344	054104	020061	042523	EM47:	.ASCIZ	/DX1 SEEK ERR - WRITE SECT/
022376	054104	020061	042523	EM49:	.ASCIZ	/DX1 SEEK ERR - READ SECT/
022427	104	030530	051040	EM51:	.ASCIZ	/DX1 RESTORE CMD ERR/
022453	104	051511	020113	EM52:	.ASCIZ	/DISK 'DONE' NOT SET/
022477	106	046111	020114	EM53:	.ASCIZ	/FILL & EMPTY BUFF TEST... DATA MISCOMP/
022546	040504	040524	046440	EM54:	.ASCIZ	/DATA MISCOMP/
022563	122	050105	040514	EM55:	.ASCIZ	/REPLACE DX0...10 BAD SECTORS/
022620	042522	046120	041501	EM56:	.ASCIZ	/REPLACE DX1...10 BAD SECTORS/
022655	104	030130	044040	EM57:	.ASCIZ	/DX0 HARD CRC ERR/
022676	054104	020060	040504	EM58:	.ASCIZ	/DX0 DATA CRC ERR/
022717	104	030130	050040	EM59:	.ASCIZ	/DX0 PREV CRC ERR WITH DATA OK/
022755	104	030530	044040	EM60:	.ASCIZ	/DX1 HARD CRC ERR/
022776	054104	020061	040504	EM61:	.ASCIZ	/DX1 DATA CRC ERR/
023017	104	030530	050040	EM62:	.ASCIZ	/DX1 PREV CRC ERR WITH DATA OK/

023055	105	051122	051117	DH1:	.ASCIZ	/ERROR	#	ERR PC/										
023074	051105	047522	020122	DH2:	.ASCIZ	/ERROR	#	ERR PC	ADDR/									
023120	051105	047522	020122	DH3:	.ASCIZ	/ERROR	#	ERR PC	ADDR	EXPECT	RECDV/							
023162	051105	047522	020122	DH4:	.ASCIZ	/ERROR	#	ERR PC	PR STATUS/									
023213	105	051122	051117	DH5:	.ASCIZ	/ERROR	#	ERR PC	EXPECT	RECDV/								
023250	051105	047522	020122	DH6:	.ASCIZ	/ERROR	#	DXTST#	ERR PC	RXCS	RXES	RXSA/						
023315	105	051122	051117	DH7:	.ASCIZ	/ERROR	#	DXTST#	ERR PC	RXCS	RXES	TRACK	SECTOR	#	RETRIE			
023404	054104	051524	020124	DH8:	.ASCIZ	/DXTST	#	ERR PC	RXCS	RXES	RXSA	EXPECT	RECVD	#	RETRIES			

023474 .EVEN

023474	025764	001116	000000	DT1:	.WORD	ERRNUM,\$ERRPC,0												
023502	025764	001116	004462	DT2:	.WORD	ERRNUM,\$ERRPC,ADDR,0												
023512	025764	001116	004462	DT3:	.WORD	ERRNUM,\$ERRPC,ADDR,PAT,MEMHLD,0												
023526	025764	001116	012302	DT4:	.WORD	ERRNUM,\$ERRPC,SPRS,0												
023536	025764	001116	012400	DT5:	.WORD	ERRNUM,\$ERRPC,T1CHR,T1HLD,0												
023550	025764	001116	012500	DT6:	.WORD	ERRNUM,\$ERRPC,T2CHR,T2HLD,0												
023562	025764	001116	012600	DT7:	.WORD	ERRNUM,\$ERRPC,T3CHR,T3HLD,0												
023574	025764	001116	012700	DT8:	.WORD	ERRNUM,\$ERRPC,COMCHR,COMHLD,0												
023606	025764	003120	001116	DT9:	.WORD	ERRNUM,DXTST,\$ERRPC,SRXCS,SRXES,SRXSA,0												
023624	025764	003120	001116	DT10:	.WORD	ERRNUM,DXTST,\$ERRPC,SRXCS,SRXES,DOTRK,DOSEC,DOERR,0												
023646	003120	001116	177170	DT11:	.WORD	DXTST,\$ERRPC,RXCS,RXES,RXSA,DOEXP,DORÉC,DOCERR,0												
023670	025764	003120	001116	DT12:	.WORD	ERRNUM,DXTST,\$ERRPC,SRXCS,SRXES,D1TRK,D1SEC,D1ERR,0												
023712	003120	001116	177170	DT13:	.WORD	DXTST,\$ERRPC,RXCS,RXES,RXSA,D1EXP,D1REC,D1CERR,0												
023734	025764	003120	001116	DT14:	.WORD	ERRNUM,DXTST,\$ERRPC,RXCS,RXES,RXSA,0												
023752	025764	001116	006252	DT15:	.WORD	ERRNUM,\$ERRPC,EXPO,EBHLD,0												
023764	025764	001116	006254	DT16:	.WORD	ERRNUM,\$ERRPC,EXP1,EBHLD,0												

023776	000000			DF:	.WORD	0												
024000	000000				.WORD	0												
024002	000000				.WORD	0												

024004	000000			DF1:	.WORD	0												
024006	000000				.WORD	0												
024010	000400				.WORD	400												
024012	000401				.WORD	401												

024014	000000			DF2:	.WORD	0												
024016	000000				.WORD	0												
024020	000000				.WORD	0												
024022	000400				.WORD	400												

.LIST BEX

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4063      .SBTTL  TYPE ROUTINE
4064
4065      ;:*****
4066      ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
4067      ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
4068      ;*NOTE1:      $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
4069      ;*NOTE2:      $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
4070      ;*NOTE3:      $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
4071      ;*
4072      ;*CALL:
4073      ;*1) USING A TRAP INSTRUCTION
4074      ;*      TYPE      ,MESADR      ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
4075      ;*OR
4076      ;*      TYPE
4077      ;*      MESADR
4078      ;*
4079
4080 024024 105737 001157      $TYPE:  TSTB      $TPFLG      ;; IS THERE A TERMINAL?
4081 024030 100002      BPL      1$      ;; BR IF YES
4082 024032 000000      HALT      ;; HALT HERE IF NO TERMINAL
4083 024034 000430      BR      3$      ;; LEAVE
4084 024036 010046      1$:  MOV      RO,-(SP)      ;; SAVE RO
4085 024040 017600 000002      MOV      @2(SP),RO      ;; GET ADDRESS OF ASCIZ STRING
4086 024044 122737 000001 001210      CMPB     #APTENV,$ENV      ;; RUNNING IN APT MODE
4087 024052 001011      BNE      62$      ;; NO,GO CHECK FOR APT CONSOLE
4088 024054 132737 000100 001211      BITB     #APTPOOL,$ENVM      ;; SPOOL MESSAGE TO APT
4089 024062 001405      BEQ      62$      ;; NO,GO CHECK FOR CONSOLE
4090 024064 010037 024074      MOV      RO,61$      ;; SETUP MESSAGE ADDRESS FOR APT
4091 024070 004737 025156      JSR      PC,$ATY3      ;; SPOOL MESSAGE TO APT
4092 024074 000000      61$:  .WORD     0      ;; MESSAGE ADDRESS
4093 024076 132737 000040 001211      62$:  BITB     #APTCSUP,$ENVM      ;; APT CONSOLE SUPPRESSED
4094 024104 001003      BNE      60$      ;; YES,SKIP TYPE OUT
4095 024106 112046      2$:  MOVB     (RO)+,-(SP)      ;; PUSH CHARACTER TO BE TYPED ONTO STACK
4096 024110 001005      BNE      4$      ;; BR IF IT ISN'T THE TERMINATOR
4097 024112 005726      TST     (SP)+      ;; IF TERMINATOR POP IT OFF THE STACK
4098 024114 012600      60$:  MOV      (SP)+,RO      ;; RESTORE RO
4099 024116 062716 000002      3$:  ADD      #2,(SP)      ;; ADJUST RETURN PC
4100 024122 000002      RTI      ;; RETURN
4101 024124 122716 000011      4$:  CMPB     #HT,(SP)      ;; BRANCH IF <HT>
4102 024130 001430      BEQ      8$
4103 024132 122716 000200      CMPB     #CRLF,(SP)      ;; BRANCH IF NOT <CRLF>
4104 024136 001006      BNE      5$
4105 024140 005726      TST     (SP)+      ;; POP <CR><LF> EQUIV
4106 024142 104401      TYPE      ;; TYPE A CR AND LF
4107 024144 001165      $CRLF
4108 024146 105037 024302      CLRB     $CHARCNT      ;; CLEAR CHARACTER COUNT
4109 024152 000755      BR      2$      ;; GET NEXT CHARACTER
4110 024154 004737 024236      5$:  JSR      PC,$TYPEC      ;; GO TYPE THIS CHARACTER
4111 024160 123726 001156      6$:  CMPB     $FILLC,(SP)+      ;; IS IT TIME FOR FILLER CHARS.?
4112 024164 001350      BNE      2$      ;; IF NO GO GET NEXT CHAR.
4113 024166 013746 001154      MOV      $NULL,-(SP)      ;; GET # OF FILLER CHARS. NEEDED
4114      ;; AND THE NULL CHAR.
4115 024172 105366 000001      7$:  DECB     1(SP)      ;; DOES A NULL NEED TO BE TYPED?
4116 024176 002770      BLT     6$      ;; BR IF NO--GO POP THE NULL OFF OF STACK
4117 024200 004737 024236      JSR      PC,$TYPEC      ;; GO TYPE A NULL
4118 024204 105337 024302      DECB     $CHARCNT      ;; DO NOT COUNT AS A COUNT
    
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4119 024210 000770          BR      7$          ;;LOOP
4120
4121          ;HORIZONTAL TAB PROCESSOR
4122
4123 024212 112716 000040      8$:      MOVB   #' (SP)          ;;REPLACE TAB WITH SPACE
4124 024216 004737 024236      9$:      JSR    PC,$TYPEC          ;;TYPE A SPACE
4125 024222 132737 000007 024302      BITB   #7,$CHARCNT          ;;BRANCH IF NOT AT
4126 024230 001372          BNE    9$          ;;TAB STOP
4127 024232 005726          TST   (SP)+          ;;POP SPACE OFF STACK
4128 024234 000724          BR     2$          ;;GET NEXT CHARACTER
4129 024236 105777 154706      $TYPEC: TSTB  @2$TPS          ;;WAIT UNTIL PRINTER IS READY
4130 024242 100375          BPL   $TYPEC
4131 024244 116677 000002 154700      MOVB  2(SP),@2$TPB          ;;LOAD CHAR TO BE TYPED INTO DATA REG.
4132 024252 122766 000015 000002      CMPB  #CR,2(SP)          ;;IS CHARACTER A CARRIAGE RETURN?
4133 024260 001003          BNE   1$          ;;BRANCH IF NO
4134 024262 105037 024302      CLRB  $CHARCNT          ;;YES--CLEAR CHARACTER COUNT
4135 024266 000406          BR    $TYPEX          ;;EXIT
4136 024270 122766 000012 000002 1$:      CMPB  #LF,2(SP)          ;;IS CHARACTER A LINE FEED?
4137 024276 001402          BEQ  $TYPEX          ;;BRANCH IF YES
4138 024300 105227          INCB (PC)+          ;;COUNT THE CHARACTER
.139 024302 000000          $CHARCNT: .WORD 0          ;;CHARACTER COUNT STORAGE
4140 024304 000207          $TYPEX: RTS   PC
4141

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4142      .SBTTL  TTY INPUT ROUTINE
4143
4144      ::*****
4145      .ENABL  LSB
4146
4147      ::*****
4148      ::*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
4149      ::*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
4150      ::*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
4151      ::*WHEN OPERATING IN TTY FLAG MODE.
4152 024306 022737 000176 001140 $CKSWR: CMP      #SWREG,SWR      ;; IS THE SOFT-SWR SELECTED?
4153 024314 001114          BNE      15$          ;; BRANCH IF NO
4154 024316 105777 154622          TSTB     @STKS          ;; CHAR THERE?
4155 024322 100111          BPL      15$          ;; IF NO, DON'T WAIT AROUND
4156 024324 117746 154616          MOVB    @STKB,-(SP)      ;; SAVE THE CHAR
4157 024330 042716 177600          BIC     #^C177,(SP)    ;; STRIP-OFF THE ASCII
4158 024334 022726 000007          CMP     #7,(SP)+      ;; IS IT A CONTROL G?
4159 024340 001102          BNE      15$          ;; NO, RETURN TO USER
4160 024342 123727 001134 000001  CMPB    $AUTOS,#1      ;; ARE WE RUNNING IN AUTO-MODE?
4161 024350 001476          BEQ     15$          ;; BRANCH IF YES
4162
4163 024352 104401 025120          $GTSWR: TYPE    , $CNTLG      ;; ECHO THE CONTROL-G (^G)
4164 024356 104401 025125          TYPE    , $MSWR        ;; TYPE CURRENT CONTENTS
4165 024362 013746 000176          MOV     SWREG,-(SP)    ;; SAVE SWREG FOR TYPEOUT
4166 024366 104402          TYPOC          ;; GO TYPE--OCTAL ASCII(ALL DIGITS)
4167 024370 104401 025136          TYPE    , $MNEW      ;; PROMPT FOR NEW SWR
4168 024374 005046          19$:  CLR     -(SP)      ;; CLEAR COUNTER
4169 024376 005046          CLR     -(SP)      ;; THE NEW SWR
4170 024400 105777 154540          7$:  TSTB    @STKS      ;; CHAR THERE?
4171 024404 100375          BPL     7$          ;; IF NOT TRY AGAIN
4172
4173 024406 117746 154534          MOVB    @STKB,-(SP)    ;; PICK UP CHAR
4174 024412 042716 177600          BIC     #^C177,(SP)    ;; MAKE IT 7-BIT ASCII
4175
4176 024416 021627 000003          CMP     (SP),#3      ;; IS IT A CONTROL-C?
4177 024422 001015          BNE     9$          ;; BRANCH IF NOT
4178 024424 104401 025106          TYPE    , $CNTLC      ;; YES, ECHO CONTROL-C (^C)
4179 024430 062706 000006          ADD     #6,SP        ;; CLEAN UP STACK
4180 024434 123727 001135 000001  CMPB    $INTAG,#1     ;; REENABLE TTY KEYBOARD INTERRUPTS?
4181 024442 001003          BNE     8$          ;; BRANCH IF NO
4182 024444 012777 000100 154472  MOV     #100,@STKS    ;; ALLOW TTY KEYBOARD INTERRUPTS
4183 024452 000137 011116          8$:  JMP     GT$DEV      ;; CONTROL-C RESTART
4184
4185
4186 024456 021627 000025          9$:  CMP     (SP),#25    ;; IS IT A CONTROL-U?
4187 024462 001005          BNE     10$         ;; BRANCH IF NOT
4188 024464 104401 025113          TYPE    , $CNTLU      ;; YES, ECHO CONTROL-U (^U)
4189 024470 062706 000006          20$: ADD     #6,SP        ;; IGNORE PREVIOUS INPUT
4190 024474 000737          BR      19$         ;; LET'S TRY IT AGAIN
4191
4192
4193 024476 021627 000015          10$: CMP     (SP),#15    ;; IS IT A <CR>?
4194 024502 001022          BNE     16$         ;; BRANCH IF NO
4195 024504 005766 000004          TST     4(SP)        ;; YES, IS IT THE FIRST CHAR?
4196 024510 001403          BEQ     11$         ;; BRANCH IF YES
4197 024512 016677 000002 154420  MOV     2(SP),@SWR    ;; SAVE NEW SWR

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4198 024520 062706 000006      11$:  ADD      #6,SP      ;;CLEAR UP STACK
4199 024524 104401 001165      14$:  TYPE     $CRLF     ;;ECHO <CR> AND <LF>
4200 024530 123727 001135 000001  CMPB    $INTAG,#1     ;;RE-ENABLE TTY KBD INTERRUPTS?
4201 024536 001003                BNE     15$           ;;BRANCH IF NOT
4202 024540 012777 000100 154376  MOV     #100,@$TKS    ;;RE-ENABLE TTY KBD INTERRUPTS
4203 024546 000002                RTI                    ;;RETURN
4204 024550 004737 024236      15$:  RTI                    ;;ECHO CHAR
4205 024554 021627 000060      16$:  JSR     PC,$TYPEC   ;;CHAR < 0?
4206 024560 002420                CMP     (SP),#60     ;;CHAR < 0?
4207 024562 021627 000067                BLT     18$           ;;BRANCH IF YES
4208 024566 003015                CMP     (SP),#67     ;;CHAR > 7?
4209 024570 042726 000060                BGT     18$           ;;BRANCH IF YES
4210 024574 005766 000002                BIC     #60,(SP)+    ;;STRIP-OFF ASCII
4211 024600 001403                TST     2(SP)        ;;IS THIS THE FIRST CHAR
4212 024602 006316                BEQ     17$           ;;BRANCH IF YES
4213 024604 006316                ASL     (SP)         ;;NO, SHIFT PRESENT
4214 024606 006316                ASL     (SP)         ;;CHAR OVER TO MAKE
4215 024610 005266 000002      17$:  INC     2(SP)        ;;ROOM FOR NEW ONE.
4216 024614 056616 177776                BIS     -2(SP),(SP)  ;;KEEP COUNT OF CHAR
4217 024620 000667                BR      7$           ;;SET IN NEW CHAR
4218 024622 104401 001164      18$:  TYPE     $QUES     ;;GET THE NEXT ONE
4219 024626 000720                BR      20$         ;;TYPE ?<CR><LF>
4220                .DSABL  LSB      ;;SIMULATE CONTROL-U
4221
4222
4223                ;*****
4224                ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
4225                ;*CALL:
4226                ;*      RDCHR                ;;INPUT A SINGLE CHARACTER FROM THE TTY
4227                ;*      RETURN HERE          ;;CHARACTER IS ON THE STACK
4228                ;*                          ;;WITH PARITY BIT STRIPPED OFF
4229                ;
4230
4231 024630 011646                $RDCHR: MOV     (SP),-(SP)  ;;PUSH DOWN THE PC
4232 024632 016666 000004 000002  MOV     4(SP),2(SP)   ;;SAVE THE PS
4233 024640 105777 154300      1$:  TSTB    @$TKS        ;;WAIT FOR
4234 024644 100375                BPL     1$           ;;A CHARACTER
4235 024646 117766 154274 000004  MOVB    @$TKB,4(SP)   ;;READ THE TTY
4236 024654 042766 177600 000004  BIC     #^C<177>,4(SP) ;;GET RID OF JUNK IF ANY
4237 024662 026627 000004 000023  CMP     4(SP),#23    ;;IS IT A CONTROL-S?
4238 024670 001013                BNE     3$           ;;BRANCH IF NO
4239 024672 105777 154246      2$:  TSTB    @$TKS        ;;WAIT FOR A CHARACTER
4240 024676 100375                BPL     2$           ;;LOOP UNTIL ITS THERE
4241 024700 117746 154242  MOVB    @$TKB,-(SP)   ;;GET CHARACTER
4242 024704 042716 177600  BIC     #^C177,(SP)  ;;MAKE IT 7-BIT ASCII
4243 024710 022627 000021  CMP     (SP)+,#21    ;;IS IT A CONTROL-Q?
4244 024714 001366                BNE     2$           ;;IF NOT DISCARD IT
4245 024716 000750                BR      1$           ;;YES, RESUME
4246 024720 026627 000004 000140  3$:  CMP     4(SP),#140   ;;IS IT UPPER CASE?
4247 024726 002407                BLT     4$           ;;BRANCH IF YES
4248 024730 026627 000004 000175  CMP     4(SP),#175   ;;IS IT A SPECIAL CHAR?
4249 024736 003003                BGT     4$           ;;BRANCH IF YES
4250 024740 042766 000040 000004  BIC     #40,4(SP)    ;;MAKE IT UPPER CASE
4251 024746 000002      4$:  RTI                    ;;GO BACK TO USER
4252
4253                ;*****
                ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
    
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4254          ;*CALL:
4255          ;*      RDLIN          ;;INPUT A STRING FROM THE TTY
4256          ;*      RETURN HERE   ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
4257          ;*                    ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
4258
4259 024750 010346 $RDLIN: MOV      R3,-(SP)      ;;SAVE R3
4260 024752 012703 025076 1$:      MOV      #$TTYIN,R3      ;;GET ADDRESS
4261 024756 022703 025106 2$:      CMP      #$TTYIN+8.,R3      ;;BUFFER FULL?
4262 024762 101415      BLOS      4$              ;;BR IF YES
4263 024764 104410      RDCHR      ;;GO READ ONE CHARACTER FROM THE TTY
4264 024766 112613      MOVB     (SP)+,(R3)      ;;GET CHARACTER
4265 024770 122713 000003      CMPB     #3,(R3)      ;;IS IT A CONTROL-C?
4266 024774 001005      BNE      10$          ;;BRANCH IF NO
4267 024776 104401 025106      TYPE     ,%CNTLC      ;;TYPE A CONTROL-C (^C)
4268 025002 012603      MOV      (SP)+,R3      ;;RESTORE R3
4269 025004 000137 011116      JMP      GT$DEV      ;;GOTO CONTROL-C RESTART
4270 025010 122713 000177      0$:      CMPB     #177,(R3)      ;;IS IT A RUBOUT
4271 025014 001003      BNE      3$              ;;SKIP IF NOT
4272 025016 104401 001164      4$:      TYPE     ,%QUES      ;;TYPE A '?'
4273 025022 000753      BR       1$              ;;CLEAR THE BUFFER AND LOOP
4274 025024 111337 025074      3$:      MOVB     (R3),9$      ;;ECHO THE CHARACTER
4275 025030 104401 025074      TYPE     ,9$
4276 025034 122723 000015      CMPB     #15,(R3)+      ;;CHECK FOR RETURN
4277 025040 001346      BNE      2$              ;;LOOP IF NOT RETURN
4278 025042 105063 177777      CLRB     -1(R3)        ;;CLEAR RETURN (THE 15)
4279 025046 104401 001166      TYPE     ,%LF         ;;TYPE A LINE FEED
4280 025052 012603      MOV      (SP)+,R3      ;;RESTORE R3
4281 025054 011646      MOV      (SP),-(SP)     ;;ADJUST THE STACK AND PUT ADDRESS OF THE
4282 025056 016666 000004 000002 MOV      4(SP),2(SP)    ;;FIRST ASCII CHARACTER ON IT
4283 025064 012766 025076 000004 MOV      #$TTYIN,4(SP)
4284 025072 000002      RTI
4285 025074 000      9$:      .BYTE     0          ;;RETURN
4286 025075 000      .BYTE     0          ;;STORAGE FOR ASCII CHAR. TO TYPE
4287 025076 000010      $TTYIN: .BLKB     8.    ;;TERMINATOR
4288 025106 041536 005015 000      $CNTLC: .ASCIZ   /^C/<15><12>  ;;RESERVE 8 BYTES FOR TTY INPUT
4289 025113 0136 006525 000012      $CNTLU: .ASCIZ   /^U/<15><12>  ;;CONTROL 'C'
4290 025120 043536 005015 000      $CNTLG: .ASCIZ   /^G/<15><12>  ;;CONTROL 'U'
4291 025125 015 051412 051127      $MSWR:  .ASCIZ   <15><12>/SWR - /  ;;CONTROL 'G'
4292 025132 036440 000040
4293 025136 020040 042516 020127      $MNEW:  .ASCIZ   / NEW = /
4294 025144 020075 000
4295 025150      .EVEN
    
```

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4296 .SBTTL APT COMMUNICATIONS ROUTINE
4297
4298
4299 025150 112737 000001 025414 $ATY1: MOVB #1,$FFLG ;;TO REPORT FATAL ERROR
4300 025156 112737 000001 025412 $ATY3: MOVB #1,$MFLG ;;TO TYPE A MESSAGE
4301 025164 000403 BR $ATYC
4302 025166 112737 000001 025414 $ATY4: MOVB #1,$FFLG ;;TO ONLY REPORT FATAL ERROR
4303 025174 $ATYC:
4304 025174 010046 MOV R0,-(SP) ;;PUSH R0 ON STACK
4305 025176 010146 MOV R1,-(SP) ;;PUSH R1 ON STACK
4306 025200 105737 025412 TSTB $MFLG ;;SHOULD TYPE A MESSAGE?
4307 025204 001450 BEQ 5$ ;;IF NOT: BR
4308 025206 122737 000001 001210 CMPSB #APTENV,$ENV ;;OPERATING UNDER APT?
4309 025214 001031 BNE 3$ ;;IF NOT: BR
4310 025216 132737 000100 001211 BITB #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
4311 025224 001425 BEQ 3$ ;;IF NOT: BR
4312 025226 017600 000004 MOV @4(SP),R0 ;;GET MESSAGE ADDR.
4313 025232 062766 000002 000004 ADD #2,4(SP) ;;BUMP RETURN ADDR.
4314 025240 005737 001170 1$: TST $MSGTYPE ;;SEE IF DONE W/ LAST XMISSION?
4315 025244 001375 BNE 1$ ;;IF NOT: WAIT
4316 025246 010037 001204 MOV R0,$MSGAD ;;PUT ADDR IN MAILBOX
4317 025252 105720 2$: TSTB (R0)+ ;;FIND END OF MESSAGE
4318 025254 001376 BNE 2$
4319 025256 163700 001204 SUB $MSGAD,R0 ;;SUB START OF MESSAGE
4320 025262 006200 ASR R0 ;;GET MESSAGE LNTH IN WORDS
4321 025264 010037 001206 MOV R0,$MSGGLT ;;PUT LENGTH IN MAILBOX
4322 025270 012737 000004 001170 MOV #4,$MSGTYPE ;;TELL APT TO TAKE MSG.
4323 025276 000413 BR 5$
4324 025300 017637 000004 025324 3$: MOV @4(SP),4$ ;;PUT MSG ADDR IN JSR LINKAGE
4325 025306 062766 000002 000004 ADD #2,4(SP) ;;BUMP RETURN ADDRESS
4326 025314 013746 177776 MOV 177776,-(SP) ;;PUSH 177776 ON STACK
4327 025320 004737 024024 JSP PC,$TYPE ;;CALL TYPE MACRO
4328 025324 000000 4$: .WORD 0
4329 025326 5$:
4330 025326 105737 025414 10$: TSTB $FFLG ;;SHOULD REPORT FATAL ERROR?
4331 025332 001416 BEQ 12$ ;;IF NOT: BR
4332 025334 005737 001210 TST $ENV ;;RUNNING UNDER API?
4333 025340 001413 BEQ 12$ ;;IF NOT: BR
4334 025342 005737 001170 11$: TST $MSGTYPE ;;FINISHED LAST MESSAGE?
4335 025346 001375 BNE 11$ ;;IF NOT: WAIT
4336 025350 017637 000004 001172 MOV @4(SP),$FATAL ;;GET ERROR #
4337 025356 062766 000002 000004 ADD #2,4(SP) ;;BUMP RETURN ADDR.
4338 025364 005237 001170 INC $MSGTYPE ;;TELL APT TO TAKE ERROR
4339 025370 105037 025414 12$: CLRB $FFLG ;;CLEAR FATAL FLAG
4340 025374 105037 025413 CLRB $LFLG ;;CLEAR LOG FLAG
4341 025400 105037 025412 CLRB $MFLG ;;CLEAR MESSAGE FLAG
4342 025404 012601 MOV (SP)+,R1 ;;POP STACK INTO R1
4343 025406 012600 MOV (SP)+,R0 ;;POP STACK INTO R0
4344 025410 000207 RTS PC ;;RETURN
4345 025412 000 $MFLG: .BYTE 0 ;;MESSG. FLAG
4346 025413 000 $LFLG: .BYTE 0 ;;LOG FLAG
4347 025414 000 $FFLG: .BYTE 0 ;;FATAL FLAG
4348 025416 .EVEN
4349 000200 APTSIZE=200
4350 000001 APTENV=001
4351 000100 APTSPOOL=100

```

PDT-11 EXERCISER MACY11 30G(1063) 17-NOV-78 10:00 PAGE 98^{H 8}
CVKDAB.P11 17-NOV-78 10:00 APT COMMUNICATIONS ROUTINE

SEQ 0098

4352

000040

APTSUP=040

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4353      .SBTTL  ERROR HANDLER ROUTINE
4354
4355      ;*****
4356      ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
4357      ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
4358      ;*AND GO TO MYTYPE ON ERROR
4359      ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
4360      ;*SW15=1      HALT ON ERROR
4361      ;*SW13=1      INHIBIT ERROR TYPEOUTS
4362      ;*SW10=1      BELL ON ERROR
4363      ;*CALL
4364      ;*      ERROR  N      ;;ERROR=EMT AND N=ERROR ITEM NUMBER
4365
4366      $ERROR:
4367      025416 104407          CKSWR          ;;TEST FOR CHANGE IN SOFT-SWR
4368      025420 105237 001103 7$:      INCB      $ERFLG          ;;SET THE ERROR FLAG
4369      025424 001775          BEQ      7$          ;;DON'T LET THE FLAG GO TO ZERO
4370      025426 013777 001102 153506  MOV      $STNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
4371      025434 032777 002000 153476  BIT      #BIT10,@SWR    ;;BELL ON ERROR?
4372      025442 001402          BEQ      1$          ;;NO - SKIP
4373      025444 104401 001160          TYPE      ,SBELL        ;;RING BELL
4374      025450 005237 001112 1$:      INC      $ERTTL        ;;COUNT THE NUMBER OF ERRORS
4375      025454 011637 001116          MOV      (SP),$ERRPC    ;;GET ADDRESS OF ERROR INSTRUCTION
4376      025460 162737 000002 001116  SUB      #2,$ERRPC
4377      025466 117737 153424 001114  MOVB    @$ERRPC,$ITEMB ;;STRIP AND SAVE THE ERROR ITEM CODE
4378      025474 032777 020000 153436  BIT      #BIT13,@SWR    ;;SKIP TYPEOUT IF SET
4379      025502 001004          BNE      20$         ;;SKIP TYPEOUTS
4380      025504 004737 025732          JSR      PC,MYTYPE     ;;GO TO USER ERROR ROUTINE
4381      025510 104401 001165          TYPE      ,SRLF
4382      025514          20$:      CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
4383      025514 122737 000001 001210  BNE      2$          ;;NO,SKIP APT ERROR REPORT
4384      025522 001007          MOVB    $ITEMB,21$   ;;SET ITEM NUMBER AS ERROR NUMBER
4385      025524 113737 001114 025536  JSR      PC,$ATY4    ;;REPORT FATAL ERROR TO APT
4386      025532 004737 025166          .BYTE   0
4387      025536      000          21$:      .BYTE   0
4388      025537      000          22$:      BR      22$          ;;APT ERROR LOOP
4389      025540 000777          2$:      TST      @SWR        ;;HALT ON ERROR
4390      025542 005777 153372          BPL      3$          ;;SKIP IF CONTINUE
4391      025546 100002          HALT
4392      025550 000000          CKSWR        ;;HALT ON ERROR!
4393      025552 104407          3$:      CKSWR        ;;TEST FOR CHANGE IN SOFT-SWR
4394      025554          RTI
4395      025554 000002          ;;RETURN

```

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4396          .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
4397
4398          ;*****
4399          ;*THIS ROUTINE USES THE 'ITEM CONTROL BYTE' ($ITEMB) TO DETERMINE WHICH
4400          ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE 'ERROR TABLE' ($ERRTB),
4401          ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
4402
4403          $ERRTYP:
4404          TYPE      , $CRLF          ;:'CARRIAGE RETURN' & 'LINE FEED'
4405          MOV      RO,-(SP)        ;:SAVE RO
4406          CLR      RO              ;:PICKUP THE ITEM INDEX
4407          BISB    @#$ITEMB,RO
4408          BNE     1$              ;:IF ITEM NUMBER IS ZERO, JUST
4409                                     ;:TYPE THE PC OF THE ERROR
4410          MOV     $ERRPC,-(SP)     ;:SAVE $ERRPC FOR TYPEOUT
4411                                     ;:ERROR ADDRESS
4412          TYPDC  10$              ;:GO TYPE--OCTAL ASCII(ALL DIGITS)
4413          BR      10$             ;:GET OUT
4414          1$:    DEC     RO          ;:ADJUST THE INDEX SO THAT IT WILL
4415          ASL     RO              ;:      WORK FOR THE ERROR TABLE
4416          ASL     RO
4417          ASL     RO
4418          ADD     # $ERRTB,RO      ;:FORM TABLE POINTER
4419          MOV     (RO)+,2$        ;:PICKUP 'ERROR MESSAGE' POINTER
4420          BEQ     3$              ;:SKIP TYPEOUT IF NO POINTER
4421          TYPE    'ERROR MESSAGE' ;:TYPE THE 'ERROR MESSAGE'
4422          2$:    .WORD 0          ;:'ERROR MESSAGE' POINTER GOES HERE
4423          TYPE    , $CRLF        ;:'CARRIAGE RETURN' & 'LINE FEED'
4424          3$:    MOV     (RO)+,4$  ;:PICKUP 'DATA HEADER' POINTER
4425          BEQ     5$              ;:SKIP TYPEOUT IF 0
4426          TYPE    'DATA HEADER'  ;:TYPE THE 'DATA HEADER'
4427          4$:    .WORD 0          ;:'DATA HEADER' POINTER GOES HERE
4428          TYPE    , $CRLF        ;:'CARRIAGE RETURN' & 'LINE FEED'
4429          5$:    MOV     R1,-(SP)  ;:SAVE R1
4430          MOV     (RO)+,R1        ;:PICKUP 'DATA TABLE' POINTER
4431          BEQ     9$              ;:BR IF NO DATA TO BE TYPED
4432          MOV     (RO)+,RO        ;:PICKUP 'DATA FORMAT' POINTER
4433          6$:    TSTB   (RO)+      ;:'OCTAL' OR 'DECIMAL'
4434          BNE     7$              ;:BR IF DECIMAL
4435          MOV     @ (R1)+,-(SP)   ;:SAVE @ (R1)+ FOR TYPEOUT
4436          TYPDC  8$              ;:GO TYPE--OCTAL ASCII(ALL DIGITS)
4437          BR      8$
4438          7$:    MOV     @ (R1)+,-(SP) ;:SAVE @ (R1)+ FOR TYPEOUT
4439          TYPDS  (R1)            ;:GO TYPE--DECIMAL ASCII WITH SIGN
4440          8$:    TST     9$        ;:IS THERE ANOTHER NUMBER?
4441          BEQ     9$              ;:BR IF NO
4442          TYPE    ,11$           ;:TYPE TWO(2) SPACES
4443          BR      6$             ;:LOOP
4444
4445          9$:    MOV     (SP)+,R1   ;:RESTORE R1
4446          10$:   MOV     (SP)+,RO  ;:RESTORE RO
4447          TYPE    , $CRLF        ;:'CARRIAGE RETURN' & 'LINE FEED'
4448          RTS     PC              ;:RETURN
4449          11$:   .ASCIIZ / /     ;:TWO(2) SPACES
4450          .EVEN
4451

```

```
4452
4453
4454
4455 025732 113737 001114 025764 MYTYPE: MOVB $ITEMB,ERRNUM ;FOR ERROR TYPEOUT
4456 025740 013737 013210 001174 MOV SRXSA,$TESTN ;FOR APT
4457 ;APT PRINTS $TESTN & $FATAL IN THAT ORDER.
4458 ;$TESTN WILL BE FLOPPY RXSA
4459 ;$FATAL IS ERR #
4460 025746 004737 025556 JSR PC,$ERRTYP ;TYPE ERR MSG
4461 025752 005237 025766 INC TERR
4462 025756 005237 025772 INC PERR
4463 025762 000207 RTS PC
4464
4465 025764 000000 ERRNUM: 0 ;FOR ERR TYPEOUT
4466
4467 025766 000000 TERR: 0 ;TOTAL ERROR COUNT
4468 025770 000000 SERR: 0 ;TOTAL SOFT ERR COUNT
4469 025772 000000 PERR: 0 ;PASS ERR COUNT
4470 025774 000000 PSERR: 0 ;PASS SOFT ERR COUNT... ALL FOR EOP TYPEOUT
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4471 .SBTTL CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
4472
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4483 025776
4484 025776 010046
4485 026000 010146
4486 026002 010246
4487 026004 010346
4488 026006 010546
4489 026010 012746 020200
4490 026014 016605 000020
4491 026020 100004
4492 026022 005405
4493 026024 112766 000055 000001
4494 026032 005000 1$:
4495 026034 012703 026212
4496 026040 112723 000040
4497 026044 005002 2$:
4498 026046 016001 026202
4499 026052 160105 3$:
4500 026054 002402
4501 026056 005202
4502 026060 000774
4503 026062 060105 4$:
4504 026064 005702
4505 026066 001002
4506 026070 105716
4507 026072 100407
4508 026074 106316 5$:
4509 026076 103003
4510 026100 116663 000001 177777
4511 026106 052702 000060 6$:
4512 026112 052702 000040 7$:
4513 026116 110223
4514 026120 005720
4515 026122 020027 000010
4516 026126 002746
4517 026130 003002
4518 026132 010502
4519 026134 000764
4520 026136 105726 8$:
4521 026140 100003
4522 026142 116663 177777 177776
4523 026150 105013 9$:
4524 026152 012605
4525 026154 012603
4526 026156 012602

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*****
*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
*REPLACED WITH SPACES.
*CALL:
*      MOV      NUM,-(SP)      ;;PUT THE BINARY NUMBER ON THE STACK
*      TYPDS      ;;GO TO THE ROUTINE

$TYPDS:
MOV      R0,-(SP)      ;;PUSH R0 ON STACK
MOV      R1,-(SP)      ;;PUSH R1 ON STACK
MOV      R2,-(SP)      ;;PUSH R2 ON STACK
MOV      R3,-(SP)      ;;PUSH R3 ON STACK
MOV      R5,-(SP)      ;;PUSH R5 ON STACK
MOV      #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
MOV      20(SP),R5      ;;GET THE INPUT NUMBER
BPL      1$            ;;BR IF INPUT IS POS.
NEG      R5            ;;MAKE THE BINARY NUMBER POS.
MOVB     #'-,1(SP)     ;;MAKE THE ASCII NUMBER NEG.
CLR      R0            ;;ZERO THE CONSTANTS INDEX
MOV      #$DBLK,R3     ;;SETUP THE OUTPUT POINTER
MOVB     #' ,(R3)+     ;;SET THE FIRST CHARACTER TO A BLANK
CLR      R2            ;;CLEAR THE BCD NUMBER
MOV      $DTBL(R0),R1  ;;GET THE CONSTANT
SUB      R1,R5         ;;FORM THIS BCD DIGIT
BIT      4$            ;;BR IF DONE
INC      R2            ;;INCREASE THE BCD DIGIT BY 1
BR       3$
ADD      R1,R5         ;;ADD BACK THE CONSTANT
TST      R2            ;;CHECK IF BCD DIGIT=0
BNE      5$            ;;FALL THROUGH IF 0
TSTB    (SP)          ;;STILL DOING LEADING 0'S?
BMI      7$            ;;BR IF YES
ASLB    (SP)          ;;MSD?
BCC      6$            ;;BR IF NO
MOVB     1(SP),-1(R3)  ;;YES--SET THE SIGN
BIS      #'0,R2       ;;MAKE THE BCD DIGIT ASCII
BIS      #' ,R2       ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
MOVB     R2,(R3)+     ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
TST      (R0)+        ;;JUST INCREMENTING
CMP      R0,#10       ;;CHECK THE TABLE INDEX
BLT      2$            ;;GO DO THE NEXT DIGIT
BGT      8$            ;;GO TO EXIT
MOV      R5,R2        ;;GET THE LSD
BR       6$            ;;GO CHANGE TO ASCII
TSTB    (SP)+         ;;WAS THE LSD THE FIRST NON-ZERO?
BPL      9$            ;;BR IF NO
MOVB     -1(SP),-2(R3) ;;YES--SET THE SIGN FOR TYPING
CLRB    (R3)          ;;SET THE TERMINATOR
MOV      (SP)+,R5     ;;POP STACK INTO R5
MOV      (CP)+,R3     ;;POP STACK INTO R3
MOV      (SP)+,R2     ;;POP STACK INTO R2

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4527 026160 012601          MOV      (SP)+,R1      ;;POP STACK INTO R1
4528 026162 012600          MOV      (SP)+,R0      ;;POP STACK INTO R0
4529 026164 104401 026212  TYPE      $DBLK      ;;NOW TYPE THE NUMBER
4530 026170 016666 000002 000004  MOV      2(SP),4(SP)   ;;ADJUST THE STACK
4531 026176 012616          MOV      (SP)+,(SP)
4532 026200 000002          RTI                    ;;RETURN TO USER
4533 026202 023420          $DTBL: 10000.
4534 026204 001750          1000.
4535 026206 000144          100.
4536 026210 000012          10.
4537 026212 000004          $DBLK: .BLKW 4
  
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026222 017646 000000
 026226 116637 000001 026445
 026234 112637 026447
 026240 062716 000002
 026244 000406
 026246 112737 000001 026445
 026254 112737 000006 026447
 026262 112737 000005 026444
 026270 010346
 026272 010446
 026274 010546
 026276 113704 026447
 026302 005404
 026304 062704 000006
 026310 110437 026446
 026314 113704 026445
 026320 016605 000012
 026324 005003
 026326 006105
 026330 000404
 026332 006105
 026334 006105
 026336 006105
 026340 010503
 026342 006103
 026344 105337 026446
 026350 109016
 026352 042703 177770
 026356 001002
 026360 005704
 026362 001403

```
.SBTTL BINARY TO OCTAL (ASCII) AND TYPE
:*****
*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
*OCTAL (ASCII) NUMBER AND TYPE IT.
*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
*CALL:
*   MOV     NUM,-(SP)      ;;NUMBER TO BE TYPED
*   TYPOS   ;;CALL FOR TYPEOUT
*   .BYTE  N              ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
*   .BYTE  M              ;;M=1 OR 0
*                               ;;1=TYPE LEADING ZEROS
*                               ;;0=SUPPRESS LEADING ZEROS
*$TYPON---ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
*$TYPOS OR $TYPOC
*CALL:
*   MOV     NUM,-(SP)      ;;NUMBER TO BE TYPED
*   TYPON   ;;CALL FOR TYPEOUT
*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
*CALL:
*   MOV     NUM,-(SP)      ;;NUMBER TO BE TYPED
*   TYPOC   ;;CALL FOR TYPEOUT
*$TYPOS: MOV     @(SP),-(SP)  ;;PICKUP THE MODE
        MOVVB  1(SP), $OFILL  ;;LOAD ZERO FILL SWITCH
        MOVVB  (SP)+, $OMODE+1 ;;NUMBER OF DIGITS TO TYPE
        ADD    #2,(SP)      ;;ADJUST RETURN ADDRESS
        BR     $TYPON
*$TYPOC: MOVVB  #1, $OFILL   ;;SET THE ZERO FILL SWITCH
        MOVVB  #6, $OMODE+1  ;;SET FOR SIX(6) DIGITS
*$TYPON: MOVVB  #5, $OCNT    ;;SET THE ITERATION COUNT
        MOV    R3,-(SP)     ;;SAVE R3
        MOV    R4,-(SP)     ;;SAVE R4
        MOV    R5,-(SP)     ;;SAVE R5
        MOVVB  $OMODE+1,R4  ;;GET THE NUMBER OF DIGITS TO TYPE
        NEG    R4
        ADD    #6,R4        ;;SUBTRACT IT FOR MAX. ALLOWED
        MOVVB  R4, $OMODE   ;;SAVE IT FOR USE
        MOVVB  $OFILL,R4   ;;GET THE ZERO FILL SWITCH
        MOV    12(SP),R5   ;;PICKUP THE INPUT NUMBER
        CLR    R3          ;;CLEAR THE OUTPUT WORD
1$:    ROL    R5            ;;ROTATE MSB INTO 'C'
        BR    3$          ;;GO DO MSB
2$:    ROL    R5            ;;FORM THIS DIGIT
        ROL    R5
        ROL    R5
3$:    MOV    R5,R3
        ROL    R3          ;;GET LSB OF THIS DIGIT
        DECB  $OMODE      ;;TYPE THIS DIGIT?
        BPL  7$           ;;BR IF NO
        BIC  #177770,R3  ;;GET RID OF JUNK
        BNE  4$           ;;TEST FOR 0
        TST  R4          ;;SUPPRESS THIS 0?
        BEQ  5$           ;;BR IF YES
```

4594	026364	005204		4\$:	INC	R4	::DON'T SUPPRESS ANYMORE 0'S
4595	026366	052703	000060		BIS	#'0,R3	::MAKE THIS DIGIT ASCII
4596	026372	052703	000040	5\$:	BIS	#',R3	::MAKE ASCII IF NOT ALREADY
4597	026376	110337	026442		MOVB	R3,8\$::SAVE FOR TYPING
4598	026402	104401	026442		TYPE	,8\$::GO TYPE THIS DIGIT
4599	026406	105337	026444	7\$:	DECB	\$OCNT	::COUNT BY 1
4600	026412	003347			BGT	2\$::BR IF MORE TO DO
4601	026414	002402			BLT	6\$::BR IF DONE
4602	026416	005204			INC	R4	::INSURE LAST DIGIT ISN'T A BLANK
4603	026420	000744			BR	2\$::GO DO THE LAST DIGIT
4604	026422	012605		6\$:	MOV	(SP)+,R5	::RESTORE R5
4605	026424	012604			MOV	(SP)+,R4	::RESTORE R4
4606	026426	012603			MOV	(SP)+,R3	::RESTORE R3
4607	026430	016666	000002 000004		MOV	2(SP),4(SP)	::SET THE STACK FOR RETURNING
4608	026436	012616			MOV	(SP)+,(SP)	
4609	026440	000002			RTI		::RETURN
4610	026442	000		8\$:	.BYTE	0	::STORAGE FOR ASCII DIGIT
4611	026443	000			.BYTE	0	::TERMINATOR FOR TYPE ROUTINE
4612	026444	000		\$OCNT:	.BYTE	0	::OCTAL DIGIT COUNTER
4613	026445	000		\$OFILL:	.BYTE	0	::ZERO FILL SWITCH
4614	026446	000000		\$UMODE:	.WORD	0	::NUMBER OF DIGITS TO TYPE

4615
4616
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4618
4619
4620
4621
4622
4623 026450 010046
4624 026452 016600 000002
4625 026456 005740
4626 026460 111000
4627 026462 006300
4628 026464 016000 026504
4629 026470 000200
4630
4631
4632
4633
4634 026472 011646
4635 026474 016666 000004 000002
4636 026502 000002
4637
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4644
4645 026504 026472
4646 026506 024024
4647 026510 026246
4648 026512 026222
4649 026514 026262
4650 026516 025776
4651
4652 026520 024356
4653
4654 026522 024306
4655 026524 024630
4656 026526 024750
4657 026530 011116
4658
4659 026532
4660
4661
4662 003174

.SBTTL TRAP DECODER

```

:*****
:*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE 'TRAP' INSTRUCTION
:*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
:*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
:*GO TO THAT ROUTINE.

```

```

$TRAP: MOV    R0,-(SP)      ;;SAVE R0
        MOV    2(SP),R0    ;;GET TRAP ADDRESS
        TST   -(R0)       ;;BACKUP BY 2
        MOVB  (R0),R0      ;;GET RIGHT BYTE OF TRAP
        ASL   R0           ;;POSITION FOR INDEXING
        MOV   $TRPAD(R0),R0 ;;INDEX TO TABLE
        RTS   R0          ;;GO TO ROUTINE

```

;;THIS IS USE TO HANDLE THE 'GETPRI' MACRO

```

$TRAP2: MOV   (SP),-(SP)  ;;MOVE THE PC DOWN
        MOV   4(SP),2(SP) ;;MOVE THE PSW DOWN
        RTI                    ;;RESTORE THE PSW

```

.SBTTL TRAP TABLE

```

:*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
:*BY THE 'TRAP' INSTRUCTION.

```

```

:      ROUTINE
:      -----
$TRPAD: .WORD  $TRAP2
        $TYPE  ;;CALL=TYPE      TRAP+1(104401)  TTY TYPEOUT ROUTINE
        $TYPOC ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
        $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
        $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
        $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

        $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

        $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
        $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
        $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
        GT$DEV  ;;CALL=GTDEVM   TRAP+12(104412) ^C WILL OPEN UP $DEVM

```

```

LSTAD:      ;MAX ADDR FOR 8K WITH APT = 37400
            ;MAX ADDR FOR 8K NO APT BUT TO SAVE ABS LOADER = 37500
.END      START

```


DH2	023074	1213	1216	1222	4062#										
DH3	023120	1219	1225	4062#											
DH4	023162	1231	1291	4062#											
DH5	023213	1234	1237	1240	1243	1246	1396	1399	4062#						
DH6	023250	1249	1309	1312	1324	1327	1330	1333	1336	1342	1345	1348	1351	1354	
		1357	1360	1363	1390	1393	1405	1408	1411	1414	4062#				
DH7	023315	1252	1255	1258	1261	1270	1273	1276	1279	1366	1369	1372	1375	1378	
		1381	1384	1387	1429	1438	4062#								
DH8	023404	1264	1267	1282	1285	1339	1432	1441	4062#						
DISPLA	001142	1134#	1547*	1555*	4370*										
DISPRE	000174	1061#	1555												
DNA =	100000	1008#													
DNAIE =	000040	1014#													
DONE =	000200	938#	973#	1028#	1844	2039	2047	2061	2075	4013	4032				
DROP	017647	2587	4062#												
DRVO	017232	2591	3478	3492	3511	4062#									
DRV1	017237	2592	3839	3853	3873	4062#									
DSC =	100000	965#													
DSI =	100000	932#													
DSIE =	000040	940#	975#												
DSRDY =	001000	937#	971#												
DSWR =	177570	709#	1133	1546											
DTR =	000002	943#	979#	1596	1597	1627	1837	1887	1920	1921	2613	2614			
DT1	023474	1228	1288	1294	1297	1300	1303	1306	1315	1318	1321	4062#			
DT10	023624	1252	1255	1258	1261	1366	1369	1372	1375	1429	4062#				
DT11	023646	1264	1267	1339	1432	4062#									
DT12	023670	1270	1273	1276	1279	1378	1381	1384	1387	1438	4062#				
DT13	023712	1282	1285	1441	4062#										
DT14	023734	1309	1312	1324	1327	1330	1333	1348	1354	1393	1405	1408	1411	1414	
		4062#													
DT15	023752	1396	4062#												
DT16	023764	1399	4062#												
DT2	023502	1213	1216	1222	4062#										
DT3	023512	1219	1225	4062#											
DT4	023526	1231	1291	4062#											
DT5	023536	1234	4062#												
DT6	023550	1237	4062#												
DT7	023562	1240	4062#												
DT8	023574	1243	1246	4062#											
DT9	023606	1249	1336	1342	1345	1351	1357	1360	1363	1390	4062#				
DUN	017756	1743	1873	3482	3494	3513	3843	3855	3875	4062#					
DXTST	003120	1481#	2030*	2113*	2214*	2302*	2347*	2413*	2451*	3238	3364	3426	3450	3521	
		3523	3882	4062											
DXTST0	006014	1916	1992	2014	2017	2030#									
DXTST1	006256	1644	2035	2092	2113#										
DXTST2	006712	2187	2197	2214#											
DXTST3	007254	2286	2299#												
DXTST4	007430	2300	2313	2344#											
DXTST5	007702	2345	2374	2382	2410#										
DXTST6	010020	2411	2424	2433	2447#										
DX1 =	000020	1030#	2160	2269	2378	2394	3548	3578	3600	3616	3636	3671	3684	3705	
		3714	3753	3857	3876	3924	3937								
DOBAD	002624	1461#	2864	2866	2882	2889	2911	2912							
DOBUF	002424	1460#	2067	2080	2090	3383	3404	3921	4043						
DOC DAT	014104	3384	3399#												
DOCERR	002414	1456#	2120*	2218*	2304*	2324*	2364*	2415*	3424	3439	3445*	3449*	4062		

.\$APT8	669#	1148#
.\$APTH	669#	1084
.\$APTY	669#	4296
.\$CATC	669#	
.\$CMTA	669#	1106
.\$EOP	669#	
.\$ERRO	669#	4353
.\$ERRT	669#	4396
.\$READ	669#	4142
.\$SCOP	669#	
.\$STRAP	669#	4615
.\$TYPD	669#	4471
.\$TYPE	669#	4063
.\$TYPO	669#	4538

. ABS. 026532 000 CON RO ABS GBL I

ERRORS DETECTED: 0

Z:CVKDAB/I,Z:CVKDAB.SEQ/CRF/SOL-CVKDAB.P11
RUN-TIME: 22 13 1 SECONDS
RUN-TIME RATIO: 129/37-3.4
CORE USED: 24K (47 PAGES)