

VT105

ACCEPTANCE TEST
CZVTNA0

AH-E760A-MC
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FICHE 1 OF 1

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The image shows a grid of 48 small, illegible test data tables arranged in 8 rows and 6 columns on the left side of the page. Each table appears to contain numerical data and possibly some text labels, but the text is too small to read. The tables are separated by thin lines, and the overall layout is organized and systematic.

IDENTIFICATION

B 1

SEQ 0001

PRODUCT CODE: AC-E759A-MC
PRODUCT NAME: CZVTNAO VT105 ACCEPTANCE TEST
DATE: AUGUST 1978
MAINTAINER: DIAGNOSTIC GROUP

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1.0 ABSTRACT

** The program will run on non-switch register CPU types **

This program is an acceptance test of the VT105 video terminal. The program consists of 19 test patterns displayed on the VT105 screen. Each pattern requires operator inspection for error detection. A description of the correct visual display for each test can be found in section 9.

The program is capable of handling multiple VT105's in a sequential DL-11 fashion, however:

ONLY ONE VT105 IS TESTED AT ONE TIME.

2.0 REQUIREMENTS

2.1 Equipment

PDP-11 family computer with 9K of memory.
VT105 VIDEO GRAPHIC TERMINAL
DL-11 TYPE SERIAL INTERFACE

2.2 Storage

This program LOADS INTO 4K BUT uses 9K of memory.

3.0 LOADING PROCEDURE

Procedure for normal binary tapes should be followed.

4.0 STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

STANDARD PDP-11 Format

SW 14 = 1	Loop on CURRENT Test
SW 12 = 1	Inhibit Program Sub-Test Delay
SW 11 = 1	FORCE ASPECT RATIO VIA SW 10
SW 10 = 0	VT55 (RECTANGLE) RATIO
SW 10 = 1	VT105 (SQUARE) RATIO
SW 08 = 1	Loop on Test in SWR <4:0> WHEN EXECUTED
SW 07 = 1	Keyboard Control of the Test <SW 8 AND SW 7 = 1 is INCORRECT>

4.2 STARTING ADDRESS OR ADDRESSES

200 is the starting address of the Acceptance Test
204 is the restart address of the Acceptance Test
210 is the special starting address for VT105 Production

SA 200 INFORM THE OPERATOR OF THE PROGRAM NAME, REQUEST DEVICE
BUS ADDRESS IF NON-SWITCH REGISTER CPU, AND THEN RUN THE TEST.
SA 204 USE THE SAME DEVICE BUS ADDRESS AND RUN THE TEST.
SA 210 USE THE DEFAULT BUS ADDRESS AND SHORTEN THE SUB-TEST DELAY.

5.0 OPERATING PROCEDURE

THE VT105 SHOULD BE INITIALIZED TO 'ASCII' MODE. WHEN RUNNING ON A NON-VT105 OR A VT105 ASCII MODE CONSOLE, THE OPERATOR MAY NOTICE THE FOLLOWING CHARACTERS ARE TYPED '?', '2 AND A LOWER CASE 'L'. THESE ARE THE CODES TO SWITCH INTO ASCII MODE.

Once started, the test will run in its normal manner without operator intervention or switch changes.

This program allows the operator two modes of test pattern selection. These modes are selected by the state of SW 07 at the beginning of the program. When SW 07 is a zero, the program is under switch register control for test pattern selection. If SW 07 is equal to a one, the program is under keyboard control of the test pattern selection. In this mode the operator will be required to type in on the Console ITY the first and last octal base address of the DL-11's to which VT105's are connected. THE PROGRAM WILL USE THE DEFAULT IF A 'CR' IS TYPED.

Keyboard control is assumed if running on a switch register less CPU type (i.e., 11/04 LSI-11).

In the Keyboard Select Mode, two characters are used to select the 'STARTING WITH' or 'LOOPING ON' a particular test pattern by '/' or '\' respectfully.

The '/' key is used to suspend the current test and ask the operator at which test pattern he/she wishes to start. The operator now depresses the letter which represents the test pattern to be started with. Refer to the program listing table of contents for the test letter of each pattern.

The '\' key is used to suspend the current test and ask the operator which test pattern he/she wishes to loop on. The operator now depresses the letter of the test to loop on.

If during the execution of a test pattern, a key is depressed and SW 07 equals a zero, THE CHARACTER WILL BE IGNORED.

If SW 07 equals a one, and the character received was not a '/' or '\', IT WILL BE IGNORED. The codes 'X-OFF' and 'X-ON' are the only exceptions.

CHANGING THE SOFTWARE SWITCH REGISTER, THE OPERATOR MUST FIRST TYPE '/' OR '\'. THESE KEYS WILL SUSPEND THE CURRENT TEST AND ENSURE THE VT105 IS IN A NON-GRAPHIC MODE. THE OPERATOR MAY NOW TYPE 'CTRL G' TO CHANGE THE SWITCH REGISTER. UPON COMPLETION OF THE SWITCH CHANGE, THE PROGRAM WILL RETYPE THE PROMPT HEADER MESSAGE.

6.0 ERRORS

NO HARDWARE ERRORS ARE REPORTED.

7.0 MISCELLANEOUS

1. UNLESS USING THE DEDICATED HARDWARE TESTER, Only one VT105 can be tested at one time.
2. Execution Time
Execution time will vary with the 'BAUD' rate.
3. Device Address Program Locations

The location '\$BASE' contains the first DL11 address if several VT105's are being tested. The default is the Console address <177560>. The location 'LAST' contains the last DL11 address if several VT105's are being tested. Location VTNOW contains the current DL11 base address.

THE LOCATION '\$CDW1' CONTAINS THE TESTER'S FIRST ADDRESS. THE DEFAULT VALUE IS 176500.

*NOTE: If these locations are changed, the operator must start the test again at Loc. 200. The program will use the base address to update the actual program values.

4. Program is chainable under XXDP/ACT-11. APT Hooks have been provided but not tested.

8.0 RESTRICTIONS

UNLESS USING THE DEDICATED HARDWARE TESTER, ONLY ONE VT105 CAN BE TESTED AT ONE TIME.

9.0 PROGRAM DESCRIPTION

9.1 Growing Horizontal Line (A)

The correct visual display will be a single horizontal line extending the entire width of the screen placed at base zero of the screen. Another horizontal line will successively appear giving the impression of a growing horizontal line, until the entire screen has been filled. Then the first line at the base of the screen will be removed, followed by each successive line until the entire block has disappeared.

9.2 Growing Vertical Line (B)

The correct visual display will be a single vertical line extending the entire height of the screen and placed at the far right side of the screen. Another vertical line will successively appear, giving the impression of a growing vertical line right to left, until the entire screen has been filled. Then the first line at the right will be removed, followed by each successive line until the entire block has disappeared.

9.3 Stepping Horizontal Line for Graph 0 (C)

The correct visual display will begin with a single horizontal line appearing near the center of the screen and extending the entire width of the screen. Then a second horizontal line halfway between the first line and the base of the screen will begin to grow from the left side of the screen. As this line grows, the first line disappears and you're left with a single horizontal line about one fourth the way up the screen. Then another line begins to grow from the left, halfway between the previous line and the base of the screen. As this one grows the previous line is removed. This procedure continues for a total of eight times.

9.4 Stepping Horizontal Line for Graph 1 (D)

Same as 9.3 except Graph 1 is enabled.

9.5 Different Data on Graph 0 and 1 (E)

GRAPH 0:

The correct visual display will begin with the appearance of a horizontal line extending the entire width of the screen placed at the base zero. As this line is removed from the left to right, a diagonal line, beginning at the left bottom corner, begins to grow until it reaches the top of the screen. At this point a second diagonal line begins to grow up from the base line about in the middle of the screen. This line continues to grow up until it reaches the top of the screen.

GRAPH 1:

Then a horizontal line reappears at base zero of the screen extending the entire width of the screen. Now a diagonal line beginning at the top of the left corner of the screen begins to decay downward as the base horizontal line disappears. It continues until it reaches the base line of the screen when a second diagonal line begins to decay downward from the top middle section of the screen and continues until it reaches the base line of the screen. The end result should be two large X's filling up the entire screen (XX).

9.6 Display a Stepping Histogram Line on Graph 0 (F)

The correct visual display will begin with the appearance of a horizontal line at base zero on the screen. Then a line halfway up the screen will begin to grow from the left side of the screen with all the area between the two lines shaded. This shaded area will continue to grow until it reaches the far right side of the screen. Then a line which bisects the shaded area begins to grow from the left side. As this line grows it removes the shaded area above it, continuing until it reaches the right side of the screen. The shaded area is then cut in half again and again until a single horizontal line remains.

9.7 Display a Stepping Histogram Line on Graph 1 (G)

Same as 9.6 except Graph 1 is enabled.

9.8 Histogram on Graph 0 and 1 (H)

The correct visual display will follow the same pattern as the visual display for Graph 0 and 1, except that as each diagonal line grows, a triangular shaded area grows under it. The final result should consist of four overlapping right triangles, two with the right angle on the right bottom of the screen (made by the diagonal lines which started from the bottom left) and two with the right angle on the left bottom of the screen (made by the diagonal lines which started from the top left).

9.9 Cursors on Graph 0 (I)

The correct visual display will begin with a single horizontal line extending the entire length of the screen placed at base zero. A diagonal line will then begin to grow from the bottom left corner as the base horizontal line is removed. It continues to grow until it reaches the top of the screen when a second diagonal line begins to grow from the bottom of the middle of the screen. This line continues to grow as the base horizontal line continues to be removed. When the diagonal line reaches the top of the screen a square of cursors grows at the base of the first diagonal line. It is followed by another square, eventually giving the appearance of a staircase. This procedure is repeated on the second diagonal line and when the last square is done, the entire procedure is reversed. Each square is successively removed starting at the top of the second diagonal line, continuing down it, then starting at the top of the first diagonal line and going down it.

9.10 Cursors on Graph 1 (J)

The correct visual display will be almost identical to that of the cursors on Graph 0. The only difference is that the two diagonal lines begin at the top left of the screen and go down towards the right.

9.11 Starting Coordinate on Graph 0 (K)

The correct visual display will begin with a single horizontal line extending the entire width of the screen placed at base zero. A diagonal line will then begin to decay from the top left corner as the horizontal line disappears. It continues to decay until it reaches the bottom of the screen when a second diagonal line begins to decay from the top of the middle of the screen. This line continues to decay as the horizontal line continues to disappear. When the second diagonal line reaches the bottom of the screen, a small section of the horizontal line should still be visible. At this point a dotted sine curve begins to appear from the right edge. As it grows upward the diagonal line is removed. As the sine curve reaches its peak, the second diagonal line begins to disappear. The line continues to disappear as the sine curve rounds the peak and starts downward. Then the sine curve grows upward again and the first diagonal line begins to disappear as the curve reaches its peak. The sine curve continues to grow until four complete cycles have been formed.

9.12 Starting Coordinate on Graph 1 (L)

Same as 9.11 except Graph 1 is enabled.

9.13 GRAPH ASPECT RATIO AND INTERACTIVE TEST ENABLE (M)

THE PURPOSE OF THE TEST IS TO VERIFY OPERATION OF THE INTERNAL INTERACTIVE TEST AND ASPECT RATIO LOGIC. THE VISUAL DISPLAY PATTERN IS GENERATED BY ENABLING THE INTERNAL INTERACTIVE TEST LOGIC. THE VISUAL DISPLAY CONSISTS OF TWO SECTIONS. THE FIRST IS WITH VT55 ASPECT RATIO. ONE HISTOGRAMED TRIANGLE ON THE LEFT SIDE AND A VERTICAL RECTANGLS ON THE RIGHT SIDE SHOULD APPEAR. WITH THE SECTION SECTION, THE VT105 ASPECT RATIO IS ENABLED. THE HEIGHT SHOULD REMAIN NEAR CONSTANT BUT THE WIDTH SHOULD CONTRACT.

9.14 CHARACTER ASPECT RATIO (N)

The correct visual display consists of twelve rows of the letter 'H' with a blank line separating each of the rows. Then twelve horizontal lines are displayed, starting at the bottom and overlaying the rows of H's touching the bottom of the H's. Then forty-one vertical lines are displayed, resulting in a checkerboard over the twelve rows of H's. The first vertical line is placed through the middle of the first row of H's. Each successive vertical line is 13 points to the right of the previous line.

9.15 BASELINE ON HISTOGRAM 0 (O)

THE CORRECT VISUAL DISPLAY WILL BEGIN WITH TWO ACCENDING SHADED HISTOGRAMED RIGHT TRIANGLES ON GRAPH 0. BASE LINE FOR GRAPH 0 IS THEN ENABLED. THE CONTENTS OF THE BASE REGISTER IS INCREMENTED. THE HISTOGRAMED LINE WILL TERMINATE AT THE BASE LINE VALUE. IF THE PLOTTED POINT IS LESS THAN THE BASE REGISTER VALUE, THE HISTOGRAM LINE WILL ASCEND TO THE BASE REGISTER VALUE. THE BASE REGISTER IS INCREMENTED TO MAXIMUM VALUE AND THEN DECREMENTED TO THE VALUE OF ZERO. THE OPERATOR SHOULD OBSERVE A SMOOTH MOVEMENT OF THE PLOTTED HISTOGRAM LINES.

9.16 BASE LINE ON HISTOGRAM 1 (P)

SAME AS 9.15 EXCEPT GRAPH 1 AND BASELINE 1 ARE ENABLED.

9.17 STRIP CHART ON GRAPH 0 (Q)

THE START OF THE CORRECT VISUAL DISPLAY WILL BE THE APPEARANCE OF TWO ACCENDING RIGHT TRIANGLES ON GRAPH 0. THE TRIANGLES ARE DISPLAYED WITH STRIP CHART 0 ENABLED BUT THE TRIANGLES SHOULD START ON THE LEFT EDGE OF THE SCREEN. WHEN THE SECOND TRIANGLE HAS BEEN DISPLAYED, THE PROGRAM WILL CHANGE THE PATTERN TO THAT OF A "SINE WAVE". THE VT105 SHOULD STRIPCHART THE "SINEWAVE" ACROSS THE SCREEN FROM RIGHT TO LEFT. THE OPERATOR SHOULD OBSERVE A SMOOTH MOVEMENT FROM RIGHT TO LEFT. THE INITIAL TWO TRIANGLES SHOULD STRIPCHART LEFT OFF THE SCREEN.

9.18 STRIP CHART ON GRAPH 1 (R)

SAME AS 9.17 EXCEPT GRAPH 1 AND STRIPCHART 1 ARE ENABLED.

9.19 DUAL STRIP CHART MODE (S)

THE CORRECT VISUAL DISPLAY PATTERN WILL BEGIN WITH DUAL STRIP CHART IS ENABLED. A TOTAL OF TEN HISTOGRAMED "SINE WAVE" PATTERNS ARE STRIPCHARTED FROM RIGHT TO LEFT. ONE "SINE WAVE" BEGINS ON A POSITIVE SWING AND THE OTHER ON A NEGATIVE SWING. WHERE THE TWO WAVEFORMS OVERLAP, THE INTENSITY WILL BE BRIGHTER. THE OPERATOR SHOULD OBSERVE A SMOOTH MOVEMENT AND 3 VARIATIONS OF INTENSITY. NO VISUAL LINES PAST THE LEFT EDGE OR RANDOM DOTS PAST THE RIGHT EDGE SHOULD APPEAR.

13	BASIC DEFINITIONS
19	TRAP CATCHER
(1)	STARTING ADDRESS(ES)
26	ACT11 HOOKS
28	APT PARAMETER BLOCK
29	COMMON TAGS
(2)	APT MAILBOX-ETABLE
(1)	ERROR POINTER TABLE
112	INITIALIZE THE COMMON TAGS
174	T1 A DISPLAY A GROWING HORIZONTAL LINES
213	T2 B DISPLAY A GROWING VERTICAL LINES
251	T3 C GRAPH 0 DISPLAY A STEPPING HORIZONTAL LINE
292	T4 D GRAPH 1 DISPLAY A STEPPING HORIZONTAL LINE
332	T5 E GRAPH 0 AND 1
349	T6 F GRAPH 0 DISPLAY A STEPPING HISTOGRAM LINE
382	T7 G GRAPH 1 DISPLAY A STEPPING HISTOGRAM LINE
414	T10 H HISTOGRAM ON GRAPH 0 AND 1
432	T11 I CURSORS ON GRAPH 0
454	T12 J CURSORS ON GRAPH 1
475	T13 K TEST STARTING COORDINATE ON GRAPH 0
507	T14 L TEST STARTING COORDINATE ON GRAPH 1
554	T15 M GRAPH ASPECT RATIO AND INTERACTIVE TEST ENABLE
588	T16 N CHARACTER ASPECT RATIO
661	T17 O BASE LINE ON HISTOGRAM 0
676	T20 P BASE LINE ON HISTOGRAM 1
692	T21 Q STRIP CHART ON GRAPH 0
705	T22 R STRIP CHART ON GRAPH 1
718	T23 S DUAL STRIPCHART MODE
763	END OF PASS ROUTINE
1280	ASCII MESSAGES
1328	TTY INPUT ROUTINE
1329	READ AN OCTAL NUMBER FROM THE TTY
1330	APT COMMUNICATIONS ROUTINE
1331	CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
1344	SCOPE HANDLER ROUTINE
1347	TYPE ROUTINE
1348	BINARY TO OCTAL (ASCII) AND TYPE
1350	TRAP DECODER
(3)	TRAP TABLE
1352	POWER DOWN AND UP ROUTINES

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12      .TITLE CZVTNA VT105 ACCEPTANCE TEST
(1)    .*COPYRIGHT (C) 1978
(1)    .*DIGITAL EQUIPMENT CORP.
(1)    .*MAYNARD, MASS. 01754
(1)    .*
(1)    .*PROGRAM BY R. SHOOP
(1)    .*
(1)    .*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
(1)    .*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
(1)    .*
13      .SBTTL BASIC DEFINITIONS
(1)
(1)    .*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
(1)    001100 STACK= 1100
(1)    .EQUIV EMT,ERROR      ;;BASIC DEFINITION OF ERROR CALL
(1)    .EQUIV IOT,SCOPE     ;;BASIC DEFINITION OF SCOPE CALL
(1)
(1)    .*MISCELLANEOUS DEFINITIONS
(1)    000011 HT= 11          ;;CODE FOR HORIZONTAL TAB
(1)    000012 LF= 12          ;;CODE FOR LINE FEED
(1)    000015 CR= 15          ;;CODE FOR CARRIAGE RETURN
(1)    000200 CRLF= 200       ;;CODE FOR CARRIAGE RETURN-LINE FEED
(1)    177776 PS= 177776     ;;PROCESSOR STATUS WORD
(1)    .EQUIV PS,PSW
(1)    177774 STKLMT= 177774  ;;STACK LIMIT REGISTER
(1)    177772 PIRQ= 177772   ;;PROGRAM INTERRUPT REQUEST REGISTER
(1)    177570 DSWR= 177570   ;;HARDWARE SWITCH REGISTER
(1)    177570 DDISP= 177570  ;;HARDWARE DISPLAY REGISTER
(1)
(1)    .*GENERAL PURPOSE REGISTER DEFINITIONS
(1)    000000 R0= %0          ;;GENERAL REGISTER
(1)    000001 R1= %1          ;;GENERAL REGISTER
(1)    000002 R2= %2          ;;GENERAL REGISTER
(1)    000003 R3= %3          ;;GENERAL REGISTER
(1)    000004 R4= %4          ;;GENERAL REGISTER
(1)    000005 R5= %5          ;;GENERAL REGISTER
(1)    000006 R6= %6          ;;GENERAL REGISTER
(1)    000007 R7= %7          ;;GENERAL REGISTER
(1)    000006 SP= %6          ;;STACK POINTER
(1)    000007 PC= %7          ;;PROGRAM COUNTER
(1)
(1)    .*PRIORITY LEVEL DEFINITIONS
(1)    000000 PR0= 0          ;;PRIORITY LEVEL 0
(1)    000040 PR1= 40         ;;PRIORITY LEVEL 1
(1)    000100 PR2= 100        ;;PRIORITY LEVEL 2
(1)    000140 PR3= 140        ;;PRIORITY LEVEL 3
(1)    000200 PR4= 200        ;;PRIORITY LEVEL 4
(1)    000240 PR5= 240        ;;PRIORITY LEVEL 5
(1)    000300 PR6= 300        ;;PRIORITY LEVEL 6
(1)    000340 PR7= 340        ;;PRIORITY LEVEL 7
(1)
(1)    .*'SWITCH REGISTER' SWITCH DEFINITIONS
(1)    100000 SW15= 100000
(1)    040000 SW14= 40000

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```
(1) 020000 SW13= 20000
(1) 010000 SW12= 10000
(1) 004000 SW11= 4000
(1) 002000 SW10= 2000
(1) 001000 SW09= 1000
(1) 000400 SW08= 400
(1) 000200 SW07= 200
(1) 000100 SW06= 100
(1) 000040 SW05= 40
(1) 000020 SW04= 20
(1) 000010 SW03= 10
(1) 000004 SW02= 4
(1) 000002 SW01= 2
(1) 000001 SW00= 1
(1) .EQUIV SW09,SW9
(1) .EQUIV SW08,SW8
(1) .EQUIV SW07,SW7
(1) .EQUIV SW06,SW6
(1) .EQUIV SW05,SW5
(1) .EQUIV SW04,SW4
(1) .EQUIV SW03,SW3
(1) .EQUIV SW02,SW2
(1) .EQUIV SW01,SW1
(1) .EQUIV SW00,SW0
(1)
(1) ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
(1) 100000 BIT15= 100000
(1) 040000 BIT14= 40000
(1) 020000 BIT13= 20000
(1) 010000 BIT12= 10000
(1) 004000 BIT11= 4000
(1) 002000 BIT10= 2000
(1) 001000 BIT09= 1000
(1) 000400 BIT08= 400
(1) 000200 BIT07= 200
(1) 000100 BIT06= 100
(1) 000040 BIT05= 40
(1) 000020 BIT04= 20
(1) 000010 BIT03= 10
(1) 000004 BIT02= 4
(1) 000002 BIT01= 2
(1) 000001 BIT00= 1
(1) .EQUIV BIT09,BIT9
(1) .EQUIV BIT08,BIT8
(1) .EQUIV BIT07,BIT7
(1) .EQUIV BIT06,BIT6
(1) .EQUIV BIT05,BIT5
(1) .EQUIV BIT04,BIT4
(1) .EQUIV BIT03,BIT3
(1) .EQUIV BIT02,BIT2
(1) .EQUIV BIT01,BIT1
(1) .EQUIV BIT00,BIT0
(1)
(1) ;*BASIC "CPU" TRAP VECTOR ADDRESSES
```

(1)	000004	ERRVEC= 4	::TIME OUT AND OTHER ERRORS
(1)	000010	RESVEC= 10	::RESERVED AND ILLEGAL INSTRUCTIONS
(1)	000014	TBITVEC=14	::'T' BIT
(1)	000014	TRTVEC= 14	::TRACE TRAP
(1)	000014	BPTVEC= 14	::BREAKPOINT TRAP (BPT)
(1)	000020	IOTVEC= 20	::INPUT/OUTPUT TRAP (IOT) **SCOPE**
(1)	000024	PWRVEC= 24	::POWER FAIL
(1)	000030	EMTVEC= 30	::EMULATOR TRAP (EMT) **ERROR**
(1)	000034	TRAPVEC=34	::'TRAP' TRAP
(1)	000060	TKVEC= 60	::TTY KEYBOARD VECTOR
(1)	000064	TPVEC= 64	::TTY PRINTER VECTOR
(1)	000240	PIRQVEC=240	::PROGRAM INTERRUPT REQUEST VECTOR
14			
15			
16	177560	ABASE=177560	
17	176500	ACDW1=176500	;TESTER STARTING ADDRESS

```

19          .SBTTL TRAP CATCHER
(1)
(1)          000000          .=0
(1)          ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
(1)          ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
(1)          ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
(1)          000174          .=174
(1) 000174 000000  DISPREG: .WORD 0          ;;SOFTWARE DISPLAY REGISTER
(1) 000176 000000  SWREG:   .WORD 0          ;;SOFTWARE SWITCH REGISTER
(1)          .SBTTL STARTING ADDRESS(ES)
(1) 000200 000137 001320  JMP @#BEGIN ;;JUMP TO STARTING ADDRESS OF PROGRAM
20 000204 000137 001354  JMP RBEGIN  ;;JUMP TO RESTART ADDRESS
21 000210 000137 001364  JMP BEGIN2  ;;JUMP TO ADJUSTMENT PATTERN
22
23          000176          .=176
24 000176 000200          200
25
26          .SBTTL ACT11 HOOKS
(1)
(2)          ;*****
(1)          ;HOOKS REQUIRED BY ACT11
(1)          000200          $SVPC=.          ;SAVE PC
(1)          000046          .=46
(1) 000046 005332          $ENDAD          ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
(1)          000052          .=52
(1) 000052 000000          .WORD 0          ;;2)SET LOC.52 TO ZERO
(1)          000200          .=$$VPC          ;; RESTORE PC
27          001000          .=1000
28          .SBTTL APT PARAMETER BLOCK
(1)
(2)          ;*****
(1)          ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
(2)          ;*****
(1)          001000          .$X=.          ;;SAVE CURRENT LOCATION
(1)          000024          .=24          ;;SET POWER FAIL TO POINT TO START OF PROGRAM
(1) 000024 000200          200          ;;FOR APT START UP
(1)          000044          .=44          ;;POINT TO APT INDIRECT ADDRESS PNTR.
(1) 000044 001000          $APTHDR ;;POINT TO APT HEADER BLOCK
(1)          001000          .=.$X          ;;RESET LOCATION COUNTER
(2)          ;*****
(1)          ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
(1)          ;INTERFACE SPEC.
(1)          001000          $APTHD:
(1) 001000 000000          $HIBTS: .WORD 0          ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
(1) 001002 001172          $MBADR: .WORD $MAIL      ;;ADDRESS OF APT MAILBOX (BITS 0-15)
(1) 001004 000300          $TSTM:  .WORD 300       ;;RUN TIM OF LONGEST TEST
(1) 001006 000300          $PASTM: .WORD 300       ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
(1) 001010 000300          $UNITM: .WORD 300       ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
(1) 001012 000031          .WORD $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
    
```


(2)	001202	000000	\$DEVCT: .WORD	ADEVCT	::DEVICE COUNT
(2)	001204	000000	\$UNIT: .WORD	AUNIT	::I/O UNIT NUMBER
(2)	001206	000000	\$MSGAD: .WORD	AMSGAD	::MESSAGE ADDRESS
(2)	001210	000000	\$MSGLG: .WORD	AMSGLG	::MESSAGE LENGTH
(2)	001212		\$ETABLE:		::APT ENVIRONMENT TABLE
(2)	001212	000	\$ENV: .BYTE	AENV	::ENVIRONMENT BYTE
(2)	001213	000	\$ENVM: .BYTE	AENVM	::ENVIRONMENT MODE BITS
(2)	001214	000000	\$SWREG: .WORD	ASWREG	::APT SWITCH REGISTER
(2)	001216	000000	\$USWR: .WORD	AUSWR	::USER SWITCHES
(2)	001220	000000	\$CPUOP: .WORD	ACPUOP	::CPU TYPE,OPTIONS
(2)			:*		BITS 15-11=CPU TYPE
(2)			:*		11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
(2)			:*		11/70=06,PDQ=07,Q=10
(2)			:*		BIT 10=REAL TIME CLOCK
(2)			:*		BIT 9=FLOATING POINT PROCESSOR
(2)			:*		BIT 8=MEMORY MANAGEMENT
(2)	001222	000	\$MAMS1: .BYTE	AMAMS1	::HIGH ADDRESS,M.S. BYTE
(2)	001223	000	\$MTYP1: .BYTE	AMTYP1	::MEM. TYPE,BLK#1
(2)			:*		MEM.TYPE BYTE -- (HIGH BYTE)
(2)			:*		900 NSEC CORE=001
(2)			:*		300 NSEC BIPOLAR=002
(2)			:*		500 NSEC MOS=003
(2)	001224	000000	\$MADR1: .WORD	AMADR1	::HIGH ADDRESS,BLK#1
(2)			:*		MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF 'TYPE' ABOVE
(2)	001226	000	\$MAMS2: .BYTE	AMAMS2	::HIGH ADDRESS,M.S. BYTE
(2)	001227	000	\$MTYP2: .BYTE	AMTYP2	::MEM. TYPE,BLK#2
(2)	001230	000000	\$MADR2: .WORD	AMADR2	::MEM.LAST ADDRESS,BLK#2
(2)	001232	000	\$MAMS3: .BYTE	AMAMS3	::HIGH ADDRESS,M.S.BYTE
(2)	001233	000	\$MTYP3: .BYTE	AMTYP3	::MEM. TYPE,BLK#3
(2)	001234	000000	\$MADR3: .WORD	AMADR3	::MEM.LAST ADDRESS,BLK#3
(2)	001236	000	\$MAMS4: .BYTE	AMAMS4	::HIGH ADDRESS,M.S.BYTE
(2)	001237	000	\$MTYP4: .BYTE	AMTYP4	::MEM. TYPE,BLK#4
(2)	001240	000000	\$MADR4: .WORD	AMADR4	::MEM.LAST ADDRESS,BLK#4
(2)	001242	000000	\$VECT1: .WORD	AVECT1	::INTERRUPT VECTOR#1,BUS PRIORITY#1
(2)	001244	000000	\$VECT2: .WORD	AVECT2	::INTERRUPT VECTOR#2BUS PRIORITY#2
(2)	001246	177560	\$BASE: .WORD	ABASE	::BASE ADDRESS OF EQUIPMENT UNDER TEST
(2)	001250	000000	\$DEVVM: .WORD	ADEVVM	::DEVICE MAP
(2)	001252	176500	\$CDW1: .WORD	ACDW1	::CONTROLLER DESCRIPTION WORD#1
(2)	001254		\$ETEND:		
(2)			.MEXIT		

66											
67	001254	177560			FIRST:	177560				:FIRST DEVICE ADDRESS OF SEQUENTIAL DL-11-A/B TYPE DEVIC	
68										:DEFAULT TO THE CONSOLE ADDRESS	
69	001256	000000			LAST:	0				:LAST DEVICE ADDRESS OF DL-11-A/B TYPE	
70	001260	177560			VTNOW:	177560				:CURRENT DEVICE BUSS ADDRESS	
71	001262	000000			TSTNUM:	0				:ERROR PATTERN	
72											
73	001264	000200			TIME0:	200				:CHARACTER FLAG TIMEOUT CONSTANT	
74	001266	000003			SUBTST:	3.				:SUBTEST DELAY CONSTANT	
80	001270	000000			WFTEST:	0					
81	001272	177560			VTIS:	177560				:DEVICE ADDRESSES	
82	001274	177562			VTIB:	177562				:IN DATA	
83	001276	177564			VTOS:	177564				:OUT STAT	
84	001300	177566			VTOB:	177566				:OUT DATA	
85	001302	000000			SAVE4:	0					
86	001304	000040			ASPTRB:	40				:40 = VT55 RATIO 41 = 105 RATIO	
87											
88	001306	022626			BUSSTR:	CMP	(SP)+,(SP)+			:POP STACK	
89	001310	104401	010641			TYPE,	EM3			:REPORT BUS TIMEOUT TO OPER.	
90	001314	000240				NOP					
91	001316	000240				NOP					
92											
93	001320	012737	002122	002120	BEGIN:	MOV	#TST1,WHERE			:STARTING ACCEPTANCE TEST ADDRESS	
94	001326	005037	001270			CLR	WFTEST				
95	001332	005037	001302			CLR	SAVE4				
96	001336	012737	001306	000004		MOV	#BUSSTR,@#ERRVEC				
97	001344	012737	000340	000006		MOV	#340,@#ERRVEC+2				
98	001352	000424				BR	GINA				
99	001354	012737	002122	002120	RBEGIN:	MOV	#TST1,WHERE				
100	001362	000415				BR	GIN				
101	001364	012737	000001	001270	BEGIN2:	MOV	#1,WFTEST				
102	001372	012700	010064			MOV	#VTISO,R0			:GET POINTER TO DLV11'S	
103	001376	013701	001252			MOV	\$CDW1,R1			:GET INITIAL VALUE	
104	001402	010120			1\$:	MOV	R1,(R0)+			:LOAD THE ADDRESSES	
105	001404	022700	010164			CMP	#VTOB7+2,R0			:CHECK IF DONE	
106	001410	001405				BEQ	GINA			:BR IF DONE	
107	001412	005721				TST	(R1)+			:BUMP THE ADDRESS VALUE	
108	001414	000772				BR	1\$:TRY AGAIN	
109	001416	012737	000001	001302	GIN:	MOV	#1,SAVE4				
110	001424	000005			GINA:	RESET					

```

112      .SBTTL INITIALIZE THE COMMON TAGS
(1)      ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
(1) 001426 012706 001100      MOV      #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
(1) 001432 005026              CLR      (R6)+           ;;CLEAR MEMORY LOCATION
(1) 001434 022706 001140      CMP      #SWR,R6      ;;DONE?
(1) 001440 001374              BNE     #-6             ;;LOOP BACK IF NO
(1) 001442 012706 001100      MOV      #STACK,SP     ;;SETUP THE STACK POINTER
(1)      ;;INITIALIZE A FEW VECTORS
(1) 001446 012737 013444 000020  MOV      #SCOPE,@IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
(1) 001454 012737 000340 000022  MOV      #340,@IOTVEC+2 ;;LEVEL 7
(1) 001462 012737 014304 000034  MOV      #STRAP,@TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
(1) 001470 012737 000340 000036  MOV      #340,@TRAPVEC+2;LEVEL 7
(1) 001476 012737 014366 000024  MOV      #SPWRDN,@PWRVEC ;;POWER FAILURE VECTOR
(1) 001504 012737 000340 000026  MOV      #340,@PWRVEC+2 ;;LEVEL 7
(1) 001512 013737 005300 005272  MOV      $ENDCT,$EOPCT  ;;SETUP END-OF-PROGRAM COUNTER
(1) 001520 012737 001520 001106  MOV      #,$LPADR      ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
(2)      ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
(2)      ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
(2) 001526 013746 000004          MOV      @ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
(2) 001532 012737 001566 000004  MOV      #64$,@ERRVEC  ;;SET UP ERROR VECTOR
(2) 001540 012737 177570 001140  MOV      #DSWR,SWR     ;;SETUP FOR A HARDWARE SWICH REGISTER
(2) 001546 012737 177570 001142  MOV      #DDISP,DISPLAY ;;AND A HARDWARE DISPLAY REGISTER
(2) 001554 022777 177777 177356  CMP      #-1,@SWR     ;;TRY TO REFERENCE HARDWARE SWR
(2) 001562 001012              BNE     66$           ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
(2)                                ;;AND THE HARDWARE SWR IS NOT = -1
(2) 001564 000403              BR      65$           ;;BRANCH IF NO TIMEOUT
(2) 001566 012716 001574          64$:  MOV      #65$, (SP)   ;;SET UP FOR TRAP RETURN
(2) 001572 000002              RTI
(2) 001574 012737 000176 001140  65$:  MOV      #SWREG,SWR   ;;POINT TO SOFTWARE SWR
(2) 001602 012737 000174 001142  MOV      #DISPREG,DISPLAY
(2) 001610 012637 000004          66$:  MOV      (SP)+,@ERRVEC ;;RESTORE ERROR VECTOR
(1)
(2) 001614 005037 001200          CLR      $PASS        ;;CLEAR PASS COUNT
(2) 001620 132737 000200 001213  BITB    #APTSIZE,$ENVM ;;TEST USER SIZE UNDER APT
(2) 001626 001403              BEQ     67$           ;;YES,USE NON-APT SWITCH
(2) 001630 012737 001214 001140  MOV      #SSWREG,SWR  ;;NO,USE APT SWITCH REGISTER
(2) 001636          67$:
113 001636 005037 007532          CLR      LOOP
114 001642 012737 013376 000020  MOV      #MSCOPE,@IOTVEC
115 001650 005737 001302          TITST: TST      SAVE4      ;TEST FLAG
116 001654 001067              BNE     4$            ;BR IF NON-ZERO
117 001656 013737 001246 001254  MOV      $BASE,FIRST  ;LOAD DEFAULT ADDRESS
118 001664 104401              TYPE
119 001666 010346              TITLE
120 001670 005037 001704          CLR      66$         ;SETUP STARTUP DELAY
121 001674 005337 001704          1$:  DEC      66$         ;DELAY
122 001700 001375              BNE     1$
123 001702 000401              BR      11$
124 001704 000000          66$:  0

```

```

126
127
128 001706 022737 000176 001140 :NOW TEST IF RUNNING ON NON-SWR CPU
129 001714 001403 11$: CMP #SWREG,SWR ;TEST IF NON-SWITCH REGISTER
130 001716 105777 177216 BEQ 2$ ;BR IF YES - AND ASK ADDRESS
131 001722 100044 TSTB @SWR
132 001724 005737 000042 2$: TST @#42 ;BR IF CLEARED
133 001730 001037 BNE 3$ ;TEST IF XXDP CHAIN MODE
134 001732 104401 TYPE ;BR IF YES
135 001734 010616 WHAT8 ;FIRST
136 001736 104401 TYPE
137 001740 010561 WHAT0 ;FIND OUT THE DEVICE ADDRESS
138 001742 017700 177200 MOV @STKB,R0 ;ENSURE CLEAR CHAR.
139 001746 104412 RDOCT
140 001750 012600 MOV (SP)+,R0 ;SAVE THE ADDRESS
141 001752 001426 BEQ 3$ ;BR IF 'CR'
142 001754 010037 001254 MOV R0,FIRST
143 001760 022737 160000 001254 CMP #160000,FIRST
144 001766 101347 BHI 11$ ;BR IF INVALID
145 001770 005777 177260 TST @FIRST ;TEST IF VALID
146 001774 104401 TYPE
147 001776 010630 WHAT9 ;FIND OUT THE LAST ADDRESS
148 002000 104401 TYPE
149 002002 010561 WHAT0
150 002004 104412 RDOCT ;GET OPR INPUT
151 002006 012600 MOV (SP)+,R0 ;
152 002010 001407 BEQ 3$ ;BR IF NONE
153 002012 005710 TST (R0) ;SEE IF IT EXISTS
154 002014 010037 001256 MOV R0,LAST ;IT MUST, SAVE IT
155 002020 022700 160000 CMP #160000,R0 ;TEST IF I/O VALUE
156 002024 101330 BHI 11$ ;BR IF NOT
157 002026 000402 BR 4$
158 002030 005037 001256 3$: CLR LAST
159 002034 012737 000006 000004 4$: MOV #6,@#4
160 002042 005037 000006 CLR @#6
161 002046 013737 001254 001260 RSTRTA: MOV FIRST,VTNOW ;LOAD INITIAL DEVICE ADDRESS
162
163 002054 012700 001272 RSTRT: MOV #VTIS,R0 ;LOAD POINTER
164 002060 013720 001260 MOV VTNOW,(R0)+ ;LOAD INPUT STAT
165 002064 013710 001260 MOV VTNOW,(R0)
166 002070 062720 000002 ADD #2,(R0)+ ;LOAD INPUT BUFFER
167 002074 013710 001260 MOV VTNOW,(R0)
168 002100 062720 000004 ADD #4,(R0)+ ;LOAD OUTPUT STAT
169 002104 013710 001260 MOV VTNOW,(R0)
170 002110 062720 000006 ADD #6,(R0)+ ;LOAD OUTPUT BUFFER
171 002114 000177 000000 JMP @WHERE ;JUMP TO STARTING ADDRESS
172 002120 002122 WHERE: TST1
  
```

```

174      ;*****
(3)      ;*TEST 1      A      DISPLAY A GROWING HORIZONTAL LINES
(3)      ;*****
(2) 002122 000004      TST1: SCOPE
175 002124 004537 010164      JSR      R5,AMSG      ;DISPLAY HEADER
176 002130 010700      DAHL
177
178 002132 012700 014540      MOV      #BUFFER,R0      ;LOAD THE STARTING ADDRESS
179 002136 112720 000033      MOVB     #ESC,(R0)+      ;LOAD GRAPHIC ENABLE
180 002142 112720 000061      MOVB     #GRON,(R0)+      ;
181 002146 112720 000101      MOVB     #LDE0,(R0)+      ;LOAD ENABLE 0
182 002152 112720 000041      MOVB     #BITS!BIT0,(R0)+ ;LOAD DISPLAY ENABLE
183 002156 112720 000111      MOVB     #LDE1,(R0)+      ;LOAD ENABLE 1
184 002162 112720 000041      MOVB     #BITS!BIT0,(R0)+ ;LOAD DISPLAY HORIZ. LINE
185 002166 113720 001304      MOVB     ASPTRB,(R0)+      ;LOAD ASPECT RATIO
186 002172 112720 000104      MOVB     #LHV0,(R0)+      ;LOAD LOAD HORIZONTAL LINE
187 002176 012737 002000 006374      MOV      #ADDLIN,BASE      ;LOAD THE STARTING DATA VALUE
188 002204 004737 006400      1$: JSR      PC,SHUFF      ;SHUFFEL THE DATA INTO VT-55 FORMAT
189 002210 010120      MOV      R1,(R0)+      ;SAVE THE LSB MSB BYTE
190 002212 005237 006374      INC      BASE      ;UPDATE THE DATA
191 002216 022737 002354 006374      CMP      #ADDLIN!MAXHOZ,BASE ;COMPARE TO LAST DATA LINE
192 002224 001367      BNE     1$      ;LOOP UNTIL DONE
193 002226 105020      CLRB    (R0)+      ;TERM
194 002230 004737 006632      JSR      PC,XPRNT      ;EXECUTE
195 002234 004737 007756      JSR      PC,DELAY
196      ;NOW REMOVE THE LINE
197 002240 012700 014540      MOV      #BUFFER,R0      ;LOAD BUFFER POINTER
198 002244 112720 000100      MOVB     #LNO,(R0)+      ;LOAD NOP
199 002250 112720 000104      MOVB     #LHV0,(R0)+      ;LOAD HORIZONTAL LINE MODE AGAIN
200
201 002254 012737 000000 006374      MOV      #0,BASE      ;LOAD STARTING DATA VALUE TO REMOVE THE LINE
202 002262 004737 006400      2$: JSR      PC,SHUFF      ;SHUFFEL THE DATA INTO VT-55 FORMAT
203 002266 010120      MOV      R1,(R0)+      ;SAVE THE LSB MSB BYTE
204 002270 005237 006374      INC      BASE      ;UPDATE THE DATA
205 002274 022737 000354 006374      CMP      #MAXHOZ,BASE      ;COMPATE TO LAST DATA LINE
206 002302 001367      BNE     2$      ;BR TOLL DONE
207
208 002304 105020      CLRB    (R0)+      ;LOAD TERMINATOR
209 002306 004737 006632      JSR      PC,XPRNT      ;DISPLAY
210 002312 004737 007756      JSR      PC,DELAY
211

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```

213      ::*****
(3)      ::*TEST 2      B      DISPLAY A GROWING VERTICAL LINES
(3)      ::*****
(2) 002316 000004          TST2:  SCOPE
214 002320 004537 010164      JSR      R5,AMSG          ;DISPLAY HEADER
215 002324 010724          DAVL
216
217 002326 012700 014540      MOV      #BUFFER,R0          ;LOAD THE STARTING ADDRESS
218 002332 112720 000033      MOVB    #ESC,(R0)+          ;LOAD 'ESC' CODE
219 002336 112720 000061      MOVB    #GRON,(R0)+         ;LOAD '01' ENTER CODE
220 002342 112720 000101      MOVB    #LDE0,(R0)+        ;LOAD ENABLE 0
221 002346 112720 000041      MOVB    #BIT5!BIT0,(R0)+   ;LOAD DISPLAY ENABLE
222 002352 112720 000111      MOVB    #LDE1,(R0)+        ;LOAD ENABLE 1
223 002356 112720 000042      MOVB    #BIT5!BIT1,(R0)+   ;LOAD DISPLAY VERTICAL LINE
224 002362 113720 001304      MOVB    ASPTRB,(R0)+       ;LOAD NOP
225 002366 112720 000114      MOVB    #LHV1,(R0)+        ;LOAD VERTICAL LINE
226 002372 012737 002777 006374  MOV      #ADDLIN!MAXVRT-1,BASE ;LOAD THE STARTING DATA VALUE
227 002400 004737 006400      1$:  JSR      PC,SHUFF        ;SHUFFEL THE DATA INTO VT-55 FORMAT
228 002404 010120          MOV      R1,(R0)+          ;SAVE THE LSB MSB BYTE
229 002406 005337 006374      DEC     BASE              ;UPDATE THE DATA
230 002412 022737 002000 006374  CMP      #ADDLIN,BASE      ;COMPARE TO LAST DATA LINE
231 002420 001367          BNE     1$                ;LOOP UNTIL DONE
232 002422 105020          CLRB   (R0)+              ;LOAD TERM
233 002424 004737 006632      JSR     PC,XPRNT          ;EXECUTE
234 002430 004737 007756      JSR     PC,DELAY
235      ;NOW REMOVE THE LINE
236 002434 012700 014540      MOV      #BUFFER,R0
237 002440 112720 000100      MOVB    #LNO,(R0)+          ;LOAD NOP
238 002444 112720 000114      MOVB    #LHV1,(R0)+        ;LOAD VERTIACL LINE MODE AGAIN
239
240 002450 012737 001000 006374  MOV      #MAXVRT,BASE      ;LOAD STARTING DATA VALUE TO REMOVE THE LINE
241 002456 004737 006400      2$:  JSR      PC,SHUFF        ;SHUFFEL THE DATA INTO VT-55 FORMAT
242 002462 010120          MOV      R1,(R0)+          ;SAVE THE LSB MSB BYTE
243 002464 005337 006374      DEC     BASE              ;UPDATE THE DATA
244 002470 001372          BNE     2$                ;BR TOLL DONE
245
246 002472 105020          CLRB   (R0)+              ;LOAD TERMINATOR
247 002474 004737 006632      JSR     PC,XPRNT          ;DISPLAY
248 002500 004737 007756      JSR     PC,DELAY
249

```

```
251 (3) *****  
(3) *TEST 3 C GRAPH 0 DISPLAY A STEPPING HORIZONTAL LINE  
(2) 002504 000004 TST3: SCOPE  
252 002506 004537 010164 JSR R5,AMSG ;DISPLAY HEADER  
253 002512 010747 SHLO  
255  
256 002514 012737 000200 002674 MOV #BIT7,100$ ;LOAD STARTING BASE LINE  
257 002522 012700 014540 2$: MOV #BUFFER,R0 ;LOAD OUTPUT BUFFER POINTER  
258 002526 112720 000033 MOVB #ESC,(R0)+ ;ENTER VT-55 FORMAT  
259 002532 112720 000061 MOVB #GRON,(R0)+ ;LOAD ENTER '01' CODE  
260 002536 112720 000101 MOVB #LDE0,(R0)+ ;LOAD ENABLE 0  
261 002542 112720 000040 MOVB #BIT5,(R0)+ ;DISABLE DISPLAY  
262 002546 112720 000111 MOVB #LDE1,(R0)+ ;LOAD ENABLE 1  
263 002552 112720 000060 MOVB #BIT5!BIT4,(R0)+ ;CLEAR GRAPH, LINES AND CURSORS  
264  
265 002556 112720 000101 MOVB #LDE0,(R0)+ ;LOAD ENABLE 0  
266 002562 112720 000043 MOVB #BIT5!BIT1!BIT0,(R0)+ ;LOAD DISPLAY ENABLE AND GRAPH 0 ON  
267 002566 112720 000100 MOVB #LNO,(R0)+ ;NOP  
268 002572 112720 000110 MOVB #LSC,(R0)+ ;LOAD STARTING COORD.  
269 002576 012737 000000 006374 MOV #0,BASE ;GET BASE LINE  
270 002604 004737 006400 JSR PC,SHUFF ;CONVERT  
271 002610 010120 MOV R1,(R0)+ ;SAVE COORD.  
272 002612 112720 000100 MOVB #LNO,(R0)+ ;LOAD NOP  
273 002616 112720 000102 MOVB #LDG0,(R0)+ ;LOAD 'LOAD GRAPH'  
274 002622 013737 002674 006374 MOV 100$,BASE ;LOAD THE STARTING DATA VALUE  
275 002630 004737 006400 JSR PC,SHUFF ;SHUFFEL THE DATA INTO VT-55 FORMAT  
276 002634 012737 001000 002676 MOV #MAXVRT,101$ ;LOAD COUNTER  
277 002642 010120 1$: MOV R1,(R0)+ ;SAVE THE LSB MSB BYTE  
278 002644 005337 002676 DEC 101$ ;DONE FULL GRAPH  
279 002650 001374 BNE 1$  
280  
281  
282 002652 105020 CLRB (R0)+ ;LOAD TERMINATOR  
283 002654 004737 006632 JSR PC,XPRNT ;DISPLAY  
284 002660 006037 002674 ROR 100$ ;CHANGE DATA VALUE  
285 002664 001316 BNE 2$ ;NO  
286 002666 004737 007756 JSR PC,DELAY  
287 002672 000402 BR TST4 ;:NEXT TEST  
288  
289 002674 000000 100$: 0  
290 002676 000000 101$: 0
```

```

292          ::*****
(3)          ::*TEST 4          D          GRAPH 1 DISPLAY A STEPPING HORIZONTAL LINE
(3)          ::*****
(2) 002700 000004          TST4: SCOPE
293 002702 004537 010164      JSR      R5,AMSG          ;DISPLAY HEADER
294 002706 011017          SHL1
296
297 002710 012737 000200 003070      MOV      #BIT7,100$          ;LOAD STARTING BASE LINE
298 002716 012700 014540      2$: MOV      #BUFFER,R0          ;LOAD OUTPUT BUFFER POINTER
299 002722 112720 000033      MOV      #ESC,(R0)+          ;ENTER VT55 MODE
300 002726 112720 000061      MOV      #GRON,(R0)+          ;LOAD ENTER '01' CODE
301 002732 112720 000101      MOV      #LDE0,(R0)+          ;LOAD ENABLE 0
302 002736 112720 000040      MOV      #BIT5,(R0)+          ;DISABLE DISPLAY
303 002742 112720 000111      MOV      #LDE1,(R0)+          ;LOAD ENABLE 1
304 002746 112720 000060      MOV      #BIT5!BIT4,(R0)+      ;CLEAR GRAPH,LINES NAD CURSORS
305 002752 112720 000101      MOV      #LDE0,(R0)+          ;LOAD ENABLE 0
306 002756 112720 000045      MOV      #BIT5!BIT2!BIT0,(R0)+ ;LOAD DISPLAY ENABLE AND GRAPH 1 ON
307 002762 112720 000100      MOV      #LNO,(R0)+          ;NOP
308 002766 112720 000110      MOV      #LSC,(R0)+          ;LOAD STARTING COORD.
309 002772 012737 000000 006374      MOV      #0,BASE          ;GET BASE LINE
310 003000 004737 006400          JSR      PC,SHUFF          ;CONVERT
311 003004 010120          MOV      R1,(R0)+          ;SAVE COORD.
312 003006 112720 000100      MOV      #LNO,(R0)+          ;LOAD NOP
313 003012 112720 000112      MOV      #LDG1,(R0)+          ;LOAD 'LOAD GRAPH'
314 003016 013737 003070 006374      MOV      100$,BASE          ;LOAD THE STARTING DATA VALUE
315 003024 004737 006400          JSR      PC,SHUFF          ;SHUFFEL THE DATA INTO VT-55 FORMAT
316 003030 012737 001000 003072      MOV      #MAXVRT,101$          ;LOAD COUNTER
317 003036 010120      1$: MOV      R1,(R0)+          ;SAVE THE LSB MSB BYTE
318 003040 005337 003072      DEC      101$          ;DONE FULL GRAPH
319 003044 001374          BNE      1$
320
321
322 003046 105020          CLR      (R0)+          ;LOAD TERMINATOR
323 003050 004737 006632      JSR      PC,XPRNT          ;DISPLAY
324 003054 006037 003070      ROR      100$
325 003060 001316          BNE      2$          ;NO
326 003062 004737 007756      JSR      PC,DELAY
327 003066 000402          BR       TST5          ;;NEXT TEST
328
329 003070 000000      100$: 0
330 003072 000000      101$: 0
  
```

```
332 ::*****  
(3) :*TEST 5 E GRAPH 0 AND 1  
(3) :*****  
(2) 003074 000004 TST5: SCOPE  
333 003076 004537 010164 JSR R5,AMSG ;DISPLAY HEADER  
334 003102 011067 GROA1  
335  
337 JSR R5,UPDWN ;LOAD DATA PATTERN  
338 003104 004537 005610 .BYTE BIT1,LDGO ;GRAPH 0 INC. PAT.  
339 003110 002 102 .WORD 0  
340 003112 000000 JSR PC,XPRNT  
341 003114 004737 006632  
342  
343 JSR R5,UPDWN ;LOAD DATA PATTERN  
344 003124 004537 005610 .BYTE BIT2!BIT1,LDG1 ;GRAPH 0 DEC. PAT.  
345 003126 100354 .WORD BIT15!MAXHOZ ;  
346  
347 JSR PC,XPRNT ;EXECUTE  
348 003134 004737 007756 JSR PC,DELAY  
349  
(3) :*****  
(3) :*TEST 6 F GRAPH 0 DISPLAY A STEPPING HISTOGRAM LINE  
(3) :*****  
(2) 003140 000004 TST6: SCOPE  
350 003142 004537 010164 JSR R5,AMSG ;DISPLAY HEADER  
351 003146 011125 SHGL0  
353  
354 003150 012737 000200 003310 MOV #BIT7,100$ ;LOAD STARTING BASE LINE  
355 003156 012700 014540 2$: MOV #BUFFER,R0  
356 003162 112720 000033 MOV #ESC,(R0)+ ;LOAD 'ESC' CODE  
357 003166 112720 000061 MOV #GRON,(R0)+ ;LOAD '01' ENTER CODE  
358 003172 112720 000101 MOV #LDE0,(R0)+ ;LOAD ENABLE 0  
359 003176 112720 000053 MOV #BIT5!BIT3!BIT1!BIT0,(R0)+ ;LOAD DISP. ENABLE , GRAPH 0, HISTO 1 ON  
360 003202 112720 000100 MOV #LNO,(R0)+ ;LOAD NOP  
361 003206 112720 000110 MOV #LSC,(R0)+ ;LOAD STARTING COORD.  
362 003212 012737 000000 006374 MOV #0,BASE ;GET BASE LINE  
363 003220 004737 006400 JSR PC,SHUFF ;CONVERT  
364 003224 010120 MOV R1,(R0)+ ;SAVE COORD.  
365 003226 112720 000100 MOV #LNO,(R0)+ ;LOAD NOP  
366 003232 112720 000102 MOV #LDG0,(R0)+ ;LOAD 'LOAD GRAPH'  
367 003236 013737 003310 006374 MOV 100$,BASE ;LOAD THE STARTING DATA VALUE  
368 003244 004737 006400 JSR PC,SHUFF ;SHUFFEL THE DATA INTO VT-55 FORMAT  
369 003250 012737 001000 003312 1$: MOV #MAXVRT,101$ ;LOAD COUNTER  
370 003256 010120 MOV R1,(R0)+ ;SAVE THE LSB MSB BYTE  
371 003260 005337 003312 DEC 101$ ;DONE FULL GRAPH  
372 003264 001374 BNE 1$  
373 003266 105020 CLRB (R0)+ ;LOAD TERMINATOR  
374 003270 004737 006632 JSR PC,XPRNT ;DISPLAY  
375 003274 006037 003310 ROR 100$ ;CHANGE DATA VALUE  
376 003300 001326 BNE 2$ ;NO  
377 003302 004737 007756 JSR PC,DELAY  
378 003306 000402 BR TST7 ;:NEXT TEST  
379 003310 000000 100$: 0  
380 003312 000000 101$: 0
```

```
382 (3) *****  
(3) *TEST 7 G GRAPH 1 DISPLAY A STEPPING HISTOGRAM LINE  
(2) 003314 000004  
383 003316 004537 010164 TST7: SCOPE ;  
384 003322 011170 JSR R5,AMSG ;DISPLAY HEADER  
386 SHGL1  
387 003324 012737 000200 003464 MOV #BIT7,100$ ;LOAD STARTING BASE LINE  
388 003332 012700 014540 2$: MOV #BUFFER,R0 ;LOAD THE STARTING ADDRESS  
389 003336 112720 000033 MOVB #ESC,(R0)+ ;LOAD 'ESC' CODE  
390 003342 112720 000061 MOVB #GRON,(R0)+ ;LOAD '01' ENTER CODE  
391 003346 112720 000101 MOVB #LDE0,(R0)+ ;LOAD ENABLE 0  
392 003352 112720 000065 MOVB #BIT5!BIT4!BIT2!BIT0,(R0)+ ;LOAD DISPLAY ENABLE AND GRAPH 1 ON  
393 003356 112720 000100 MOVB #LNO,(R0)+ ;LOAD NOP  
394 003362 112720 000110 MOVB #LSC,(R0)+ ;LOAD STARTING COORD.  
395 003366 012737 000000 006374 MOV #0,BASE ;GET BASE LINE  
396 003374 004737 006400 JSR PC,SHUFF ;CONVERT  
397 003400 010120 MOV R1,(R0)+ ;SAVE COORD.  
398 003402 112720 000100 MOVB #LNO,(R0)+ ;LOAD NOP  
399 003406 112720 000112 MOVB #LDG1,(R0)+ ;LOAD 'LOAD GRAPH'  
400 003412 013737 003464 006374 MOV 100$,BASE ;LOAD THE STARTING DATA VALUE  
401 003420 004737 006400 JSR PC,SHUFF ;SHUFFEL THE DATA INTO VT-55 FORMAT  
402 003424 012737 001000 003466 1$: MOV #MAXVRT,101$ ;LOAD COUNTER  
403 003432 010120 MOV R1,(R0)+ ;SAVE THE LSB MSB BYTE  
404 003434 005337 003466 DEC 101$ ;DONE FULL GRAPH  
405 003440 001374 BNE 1$  
406 003442 105020 CLRB (R0)+ ;LOAD TERMINATOR  
407 003444 004737 006632 JSR PC,XPRNT ;DISPLAY  
408 003450 006037 003464 ROR 100$  
409 003454 001326 BNE 2$ ;NO  
410 003456 004737 007756 JSR PC,DELAY  
411 003462 000402 BR TST10 ;:NEXT TEST  
412 003464 000000 100$: 0  
413 003466 000000 101$: 0  
414 (3) *****  
(3) *TEST 10 H HISTOGRAM ON GRAPH 0 AND 1  
(2) 003470 000004  
415 003472 004537 010164 TST10: SCOPE ;  
416 003476 011233 JSR R5,AMSG ;DISPLAY HEADER  
418 HG0A1  
419 003500 004537 005610 JSR R5,UPDWN ;LOAD DATA PATTERN  
420 003504 012 102 .BYTE BIT3!BIT1,LDG0 ;GRAPH 0 INC. PAT.  
421 003506 000000 .WORD 0  
422 003510 004737 006632 JSR PC,XPRNT  
423  
424 003514 004537 005610 JSR R5,UPDWN ;LOAD DATA PATTERN  
425 003520 036 112 .BYTE BIT4!BIT3!BIT2!BIT1,LDG1 ;GRAPH 1  
426 003522 100354 .WORD BIT15!MAXHOZ  
427  
428 003524 004737 006632 JSR PC,XPRNT ;EXECUTE  
429 003530 004737 007756 JSR PC,DELAY  
430
```

432
(3)
(3)
(2) 003534 000004
433 003536 004537 010164
434 003542 011266
436
437 003544 004537 005610
438 003550 002 102
439 003552 000000
440 003554 004737 006632
441
442 003560 004537 006176
443 003564 002 103
444 003566 002000
445
446 003570 004737 006632
447
448 003574 004537 006176
449 003600 002 103
450 003602 100000
451 003604 004737 006632
452 003610 004737 007756
453
454
(3)
(3)
(2) 003614 000004
455 003616 004537 010164
456 003622 011311
458
459 003624 004537 005610
460 003630 004 112
461 003632 100354
462 003634 004737 006632
463
464 003640 004537 006176
465 003644 004 113
466 003646 002000
467
468 003650 004737 006632
469 003654 004537 006176
470 003660 004 113
471 003662 100000
472 003664 004737 006632
473 003670 004737 007756

```
::*****  
:*TEST 11 I CURSORS ON GRAPH 0  
:*****  
TST11: SCOPE  
JSR R5,AMSG ;DISPLAY HEADER  
CURGR0  
JSR R5,UPDWN ;LOAD DATA PATTERN  
.BYTE BIT1,LDC0 ;GRAPH 0  
.WORD 0 ;DATA TO BE LOADED  
JSR PC,XPRNT ;EXECUTE IT  
JSR R5,CURSOR ;ENABLE CURSORS  
.BYTE BIT1,LDC0  
.WORD ADDLIN ;SC = 0 GRAPH 0  
JSR PC,XPRNT ;EXECUTE  
JSR R5,CURSOR ;REMOVE CURSORS  
.BYTE BIT1,LDC0 ;ON GRAPH 0  
.WORD BIT15  
JSR PC,XPRNT ;EXECUTE  
JSR PC,DELAY
```

```
::*****  
:*TEST 12 J CURSORS ON GRAPH 1  
:*****  
TST12: SCOPE  
JSR R5,AMSG ;DISPLAY HEADER  
CURGR1  
JSR R5,UPDWN ;LOAD DATA PATTERN  
.BYTE BIT2,LDC1 ;GRAPH 1 DECREMENTING PAT.  
.WORD BIT15!MAXHOZ ;MAX #  
JSR PC,XPRNT ;EXECUTE  
JSR R5,CURSOR ;ENABLE CURSORS  
.BYTE BIT2,LDC1  
.WORD ADDLIN  
JSR PC,XPRNT ;EXECUTE  
JSR R5,CURSOR ;REMOVE CURSOR ON GRAPH 1  
.BYTE BIT2,LDC1  
.WORD BIT15  
JSR PC,XPRNT ;EXECUTE  
JSR PC,DELAY
```

```
475 (3) *****  
(3) *TEST 13 K TEST STARTING COORDINATE ON GRAPH 0  
(2) 003674 000004 TST13: SCOPE  
476 003676 004537 010164 JSR R5,AMSG ;DISPLAY HEADER  
477 003702 011334 SCORDO  
479 JSR R5,UPDWN ;LOAD GRAPH 0 DATA  
480 003704 004537 005610 .BYTE BIT1,LDGO  
481 003710 002 102 .WORD BIT15!MAXHOZ  
482 003712 100354 JSR PC,XPRNT ;EXECUTE  
483 003714 004737 006632  
484 MOV #4,R3 ;LOAD SINE COUNTER  
485 003720 012703 000004 MOV #MAXVRT-1,R1 ;LOAD STARTING CORD.  
486 003724 012701 000777 MOV #SINEND-40,R0 ;LOAD SA FOR FIRST PASS  
487 003730 012700 005537 BR 1$  
488 003734 000402 3$: MOV #SINEND,R0 ;LOAD SINE POINTER  
489 003736 012700 005577 1$: MOVB -(R0),10$ ;LOAD SINE DATA WORD  
490 003742 114037 003762 BEQ 2$ ;BR IF NO MORE DATA  
491 003746 001413 MOV R1,11$ ;LOAD STARTING COORDINATE  
492 003750 010137 003764  
493 JSR R5,STCORD ;LOAD DATA INTO BUFFER  
494 003754 004537 006014 .BYTE BIT1,LDGO ;FOR GRAPH 0  
495 003760 002 102 10$: .WORD 0 ;DATA TO BE LOADED  
496 003762 000000 11$: .WORD 0 ;STARTING COORD.  
497 003764 000000  
498 JSR PC,XPRNT ;EXECUTE  
499 003766 004737 006632 DEC R1 ;DONE ALL COORD. ?  
500 003772 005301 BR 1$  
501 003774 000762 2$: DEC R3 ;FINISHED ALL LINES ?  
502 003776 005303 BNE 3$ ;BR IF NOT  
503 004000 001356 JSR PC,DELAY ;  
504 004002 004737 007756  
505
```

```
507 (3) (3) (2) 004006 000004  
508 004010 004537 010164  
509 004014 011400  
511  
512 004016 004537 005610  
513 004022 004 112  
514 004024 100354  
515 004026 004737 006632  
516  
517 004032 012703 000004  
518 004036 012701 000777  
519 004042 012700 005537  
520 004046 000402  
521 004050 012700 005577  
522 004054 114037 004074  
523 004060 001413  
524 004062 010137 004076  
525  
526 004066 004537 006014  
527 004072 004 112  
528 004074 000000  
529 004076 000000  
530  
531 004100 004737 006632  
532 004104 005301  
533 004106 000762  
534 004110 005303  
535 004112 001356  
536 004114 004737 007756  
537
```

```
*****  
*TEST 14 L TEST STARTING COORDINATE ON GRAPH 1  
*****  
TST14: SCOPE  
JSR R5,AMSG ;DISPLAY HEADER  
SCORD1  
JSR R5,UPDWN ;LOAD GRAPH 0 DATA  
.BYTE BIT2,LDG1  
.WORD BIT15!MAXHOZ  
JSR PC,XPRNT ;EXECUTE  
MOV #4,R3 ;LOAD SINE COUNT  
MOV #MAXVRT-1,R1 ;LOAD STARTING CORD.  
MOV #SINEND-40,R0 ;LOAD SA POINTER  
BR 1$  
3$: MOV #SINEND,R0 ;LOAD SINE POINTER  
1$: MOVB -(R0),10$ ;LOAD SINE DATA WORD  
BEQ 2$ ;BR IF NO MORE DATA  
MOV R1,11$ ;LOAD STARTING COORDINATE  
JSR R5,STCORD ;LOAD DATA INTO BUFFER  
.BYTE BIT2,LDG1 ;FOR GRAPH 1  
10$: .WORD 0 ;DATA TO BE LOADED  
11$: .WORD 0 ;STARTING COORD.  
JSR PC,XPRNT ;EXECUTE  
DEC R1 ;DONE ALL COORD. ?  
BR 1$  
2$: DEC R3 ;DONE ALL LINES ?  
BNE 3$ ;BR IF NOT  
JSR PC,DELAY ;
```

553
554
(3)
(3)
(2) 004120 000004
555 004122 005737 001200
556 004126 001455
557 004130 004537 010164
558 004134 011627
559
561 004136 012700 014540
562 004142 112720 000033
563 004146 112720 000061
564 004152 112720 000111
565 004156 112720 000040
566 004162 112720 000042
567 004166 112720 000101
568 004172 112720 000051
569 004176 105020
570 004200 004737 006632
571 004204 004737 007756
572
573
574
575 004210 012700 014540
576 004214 112720 000033
577 004220 112720 000061
578 004224 112720 000111
579 004230 112720 000040
580 004234 112720 000041
581 004240 112720 000101
582 004244 112720 000061
583 004250 105020
584 004252 004737 006632
585 004256 004737 007756

```
::*****  
:*TEST 15 M GRAPH ASPECT RATIO AND INTERACTIVE TEST ENABLE  
:*****  
TST15: SCOPE  
TST $PASS ;TEST IF FIRST PASS  
BEQ TST16 ;:BYPASS IF FIRST PASS  
JSR R5,AMSG ;DISPLAY HEADER  
GAITE  
:ENABLE TEST MODE AND RECTANGLE RATIO  
MOV #BUFFER,R0 ;LOAD OUTPUT POINTER  
MOVB #ESC,(R0)+ ;LOAD ENTER GRAPH MODE  
MOVB #GRON,(R0)+  
MOVB #LDE1,(R0)+ ;LOAD 55 RATIO AND TEST ENABLE  
MOVB #40,(R0)+  
MOVB #42,(R0)+  
MOVB #LDE0,(R0)+ ;AND NOW ENABLE DISPLAY  
MOVB #51,(R0)+ ;ON GRAPH 0 HISTOGRAM  
CLRB (R0)+ ;LOAD TERM  
JSR PC,XPRNT ;DISPLAY  
JSR PC,DELAY  
  
:NOW CHANGE TO SQUARE RATIO AND GRAPH 1  
  
MOV #BUFFER,R0 ;LOAD OUTPUT POINTER  
MOVB #ESC,(R0)+ ;LOAD ENTER GRAPH MODE  
MOVB #GRON,(R0)+  
MOVB #LDE1,(R0)+ ;ENABLE VT105 RATIO  
MOVB #40,(R0)+  
MOVB #41,(R0)+  
MOVB #LDE0,(R0)+ ;AND NOW ENABLE DISPLAY  
MOVB #61,(R0)+ ;ON GRPAH 1 HISTOGRAM  
CLRB (R0)+ ;LOAD TERM  
JSR PC,XPRNT ;DISPLAY  
JSR PC,DELAY
```

587
588
(3)
(3)
(2) 004262 000004
589
590
591 004264 005737 001200
592 004270 001545
593 004272 004537 010164
594 004276 011706
595 004300 012702 000014
596 004304 012700 014540
597 004310 112720 000015
598 004314 112720 000012
599 004320 112720 000015
600 004324 112720 000012
601 004330 012701 000050
602 004334 012720 044110
603 004340 005301
604 004342 001374
605 004344 105020
606 004346 004737 006632
607 004352 005302
608 004354 001374
609
610
611
612 004356 012700 014540
613 004362 112720 000033
614 004366 112720 000061
615 004372 112720 000101
616 004376 112720 000041
617 004402 112720 000111
618 004406 112720 000043
619 004412 112720 000041
620 004416 112720 000104
621 004422 012737 002002 006374
622 004430 004737 006400
623 004434 010120
624 004436 062737 000024 006374
625 004444 022737 002340 006374
626 004452 100366
627 004454 105020
628 004456 004737 006632

```

:*****
:*TEST 16      N      CHARACTER ASPECT RATIO
:*****

```

```

TST16: SCOPE
:FILL THE SCREEN WITH THE H CHARACTER

```

```

TST      $PASS      ;TEST IF FIRST PASS
BEQ      TST17      ;;BYPASS IF FIRST PASS
JSR      R5,AMSG    ;DISPLAY HEADER
CARAT
MOV      #12.,R2    ;LOAD COUNT
MOV      #BUFFER,R0 ;LOAD BUFFER POINTER
MOVB     #15,(R0)+  ;LOAD CR
MOVB     #12,(R0)+  ;LOAD LF
MOVB     #15,(R0)+  ;LOAD CR
MOVB     #12,(R0)+  ;LOAD LF
MOV      #40.,R1   ;LOAD SCREEN WIDTH
1$:      MOV      #44110,(R0)+ ;LOAD ASCII H
DEC      R1        ;FINISHED ?
BNE      1$        ;BR IF NOT
CLRB     (R0)+     ;LOAD TERM.
2$:      JSR      PC,XPRNT      ;XFER TO SCREEN
DEC      R2        ;FINISHED ALL LINES
BNE      2$        ;BR IF NOT

```

```

;NOW INSTALL THE HORIZONTAL LINES AT A SQUARE RATIO

```

```

MOV      #BUFFER,R0 ;LOAD BUFFER POINTER
MOVB     #ESC,(R0)+ ;ENABLE CHART MODE
MOVB     #GRON,(R0)+
MOVB     #LDE0,(R0)+ ;LOAD ENABLE 0
MOVB     #BITS!BIT0,(R0)+ ;LOAD DISPLAY ENABLE
MOVB     #LDE1,(R0)+ ;LOAD ENABLE 1
MOVB     #BITS!BIT1!BIT0,(R0)+ ;ENABLE HORIZ.+ VERT LINES
MOVB     #BITS!BIT0,(R0)+ ;ENSURE 105 RATIO
MOVB     #LHV0,(R0)+ ;LOAD HORIZ INST
3$:      MOV      #ADDLIN+2,BASE ;LOAD BASE LINE VALUE
JSR      PC,SHUFF   ;SHUFFEL THE DATA
MOV      R1,(R0)+  ;SAVE THE DATA
ADD      #24,BASE   ;UPDATE BASE LINE VALUE
CMP      #ADDLIN+340,BASE ;TEST FOR GREATER THAN VALID
BPL      3$        ;BR IF OK
CLRB     (R0)+     ;LOAD TERM
JSR      PC,XPRNT  ;XMIT TO THE SCREEN

```

```
630
631
632           ;NOW LOAD THE VERTICAL LINES
633
634 004462 012700 014540      MOV      #BUFFER,R0           ;LOAD OUTPUT BUFFER POINTER
635 004466 112720 000033      MOVB    #ESC,(R0)+         ;LOAD ESC
636 004472 112720 000061      MOVB    #GRON,(R0)+        ;ENTER CHART MODE
637 004476 112720 000100      MOVB    #LNO,(R0)+        ;LOAD NOP
638 004502 112720 000114      MOVB    #LHV1,(R0)+       ;LOAD VERT LINE INST.
639 004506 012737 002000 006374  MOV      #ADDLIN,BASE      ;LOAD STARTING LINE #
640 004514 004737 006400      4$:   JSR      PC,SHUFF      ;SHUFFEL THE DATA
641 004520 010120              MOV      R1,(R0)+         ;SAVE DATA
642 004522 062737 000015 006374  ADD      #15,BASE         ;UPDATE DATA
643 004530 022737 003000 006374  CMP      #ADDLIN!1000,BASE ;TEST FOR LAST DATA LINE
644 004536 100366              BPL      4$              ;BR IF NOT DONE
645 004540 105020              CLRB    (R0)+            ;LOAD TERM.
646 004542 004737 006632      JSR      PC,XPRNT        ;SEND TO SCREEN
647
648 004546 004737 007756      JSR      PC,DELAY        ;DELAY
649
650           ;NOW CHANGE TO VT55 RATIO
651
652 004552 012700 014540      MOV      #BUFFER,R0           ;LOAD POINTER
653 004556 112720 000111      MOVB    #LDE1,(R0)+        ;LOAD ENABLE 1
654 004562 112720 000043      MOVB    #BIT5!BIT1!BIT0,(R0)+ ;LOAD WORD 1
655 004566 112720 000040      MOVB    #BIT5,(R0)+        ;LOAD 55 RATIO
656 004572 105020              CLRB    (R0)+            ;LOAD TERM
657 004574 004737 006632      JSR      PC,XPRNT        ;SEND TO SCREEN
658 004600 004737 007756      JSR      PC,DELAY        ;DELAY
```

660
 661
 (3)
 (3)
 (2) 004604 000004
 662 004606 004537 010164
 663 004612 011444
 665
 666 004614 004537 005610
 667 004620 010 102
 668 004622 000000
 669
 670 004624 004537 006476
 671 004630 041 042
 672
 673 004632 004737 006632
 674 004636 004737 007756
 675
 676
 (3)
 (3)
 (2) 004642 000004
 677 004644 004537 010164
 678 004650 011475
 680
 681 004652 004537 005610
 682 004656 020 112
 683 004660 100354
 684
 685 004662 004537 006476
 686 004666 041 045
 687
 688 004670 004737 006632
 689 004674 004737 007756

```

*****
*TEST 17      0      BASE LINE ON HISTOGRAM 0
*****
TST17: SCOPE
        JSR      R5,AMSG          ;DISPLAY HEADER
        BSLGR0
        JSR      R5,UPDWN        ;LOAD ACCENDING VECTOR ON
        .BYTE   BIT3,LDGO       ;GRAPH 0
        .WORD   0                ;STARTING AT 0
        JSR      R5,LDBASE       ;LOAD MOVING BASE LINE
        .BYTE   41,42
        JSR      PC,XPRNT        ;DISPLAY IT
        JSR      PC,DELAY        ;DELAY
  
```

```

*****
*TEST 20      P      BASE LINE ON HISTOGRAM 1
*****
TST20: SCOPE
        JSR      R5,AMSG          ;DISPLAY HEADER
        BSLGR1
        JSR      R5,UPDWN        ;LOAD DECENDING VECTOR ON
        .BYTE   BIT4,LDG1       ;GRAPH 1
        .WORD   BIT15!MAXHOZ    ;STARTING AT MAX
        JSR      R5,LDBASE       ;LOAD MOVING BASE LINE
        .BYTE   41,45
        JSR      PC,XPRNT        ;DISPLAY IT
        JSR      PC,DELAY        ;DELAY
  
```

691
 692
 (3)
 (3)
 (2) 004700 000004
 693 004702 004537 010164
 694 004706 011526
 696
 697 004710 004537 005600
 698 004714 012 102
 699 004716 000000
 700
 701 004720 004737 006570
 702 004724 004737 006632
 703 004730 004737 007756
 704
 705
 (3)
 (3)
 (2) 004734 000004
 706 004736 004537 010164
 707 004742 011554
 709
 710 004744 004537 005600
 711 004750 024 112
 712 004752 100354
 713
 714 004754 004737 006570
 715 004760 004737 006632
 716 004764 004737 007756

```

:*****
:*TEST 21      Q      STRIP CHART ON GRAPH 0
:*****
TST21: SCOPE
      JSR      R5,AMSG          ;DISPLAY HEADER
      STCGRO
      JSR      R5,UPDWNS       ;LOAD ACCENDING GRAPH
      .BYTE   BIT3!BIT1,LDG0   ;ON GRAPH 0
      .WORD   0                ;STARTING AT MIN.
;NOW CONTINUE LOADING DATA INTO GRAPH 0
      JSR      PC,STRIPG       ;LOAD MORE DATA <SINE WAVE>
      JSR      PC,XPRNT        ;DISPLAY IT
      JSR      PC,DELAY
:*****
:*TEST 22      R      STRIP CHART ON GRAPH 1
:*****
TST22: SCOPE
      JSR      R5,AMSG          ;DISPLAY HEADER
      STCGR1
      JSR      R5,UPDWNS       ;LOAD DECENDING GRAPH
      .BYTE   BIT4!BIT2,LDG1   ;ON GRAPH 1
      .WORD   BIT15!MAXHOZ     ;STARTING AT MAX.
;NOW CONTINUE LOADING DATA INTO GRAPH 1
      JSR      PC,STRIPG       ;LOAD MORE DATA <SINE WAVE>
      JSR      PC,XPRNT        ;DISPLAY IT
      JSR      PC,DELAY
  
```

```

718      ::*****
(3)      :*TEST 23      S      DUAL STRIPCHART MODE
(3)      :*****
(2) 004770 000004          TST23: SCOPE
719 004772 004537 010164      JSR      R5,AMSG          ;DISPLAY HEADER
720 004776 011602          DUSTC
721
722      ;NOW LOAD DATA IN STRIP CHART MODE
723
724 005000 012700 014540      MOV      #BUFFER,R0          ;LOAD POINTER
725 005004 004537 010302      JSR      R5,MTOB          ;LOAD MESSAGE INTO BUFFER
726 005010 006152          SETBAS
727 005012 105740          TSTB      -(R0)          ;BACK UP OVER TERM.
728 005014 112720 000100      MOVB     #LNO,(R0)+
729 005020 112720 000101      MOVB     #LDE0,(R0)+      ;LOAD ENABLE 0
730 005024 112720 000047      MOVB     #47,(R0)+        ;DISPLAY ENABLE
731 005030 112720 000066      MOVB     #66,(R0)+        ;DUAL STRIPCHART ENABLE
732
733 005034 012703 005367      MOV      #SINBEG+1,R3      ;LOAD GRAPH 0 POINTER
734 005040 012704 005472      MOV      #SINBEG+104,R4   ;LOAD GRAPH 1 POINTER
735 005044 012737 000012      MOV      #10,SAVE4        ;LOAD # OF WAVES TO BE SEEN
001302 736 005052 112337 006374      1$: MOVB     (R3)+,BASE      ;GET BYTE OF DATA
737 005056 001425          BEQ      4$                ;BR IF DONE
738 005060 004737 006400      JSR      PC,SHUFF          ;CONVERT DATA INTO FORMAT
739 005064 112720 000100      MOVB     #LNO,(R0)+        ;LOAD NOP TO ENSURE WORD EDGE
740 005070 112720 000102      MOVB     #LDG0,(R0)+      ;LOAD 'LOAD GRAPH 0 DATA'
741 005074 010120          MOV      R1,(R0)+        ;LOAD SHUFFLED DATA
742 005076 112437 006374      2$: MOVB     (R4)+,BASE      ;GET BYTE OF GRAPH 1 DATA
743 005102 001410          BEQ      3$                ;BR IF NO MORE
744 005104 004737 006400      JSR      PC,SHUFF          ;CONVERT DATA INTO FORMAT
745 005110 112720 000100      MOVB     #LNO,(R0)+        ;LOAD NOP TO ENSURE WORD EDGE
746 005114 112720 000112      MOVB     #LDG1,(R0)+      ;LOAD 'LOAD GRAPH 1 DATA'
747 005120 010120          MOV      R1,(R0)+        ;LOAD SHUFFLED DATA
748 005122 000753          BR      1$
749 005124 012704 005367      3$: MOV      #SINBEG+1,R4   ;RELOAD GRAPH 1 POINTER
750 005130 000762          BR      2$
751 005132 012703 005367      4$: MOV      #SINBEG+1,R3   ;RELOAD GRAPH 0 POINTER
752 005136 005337 001302      DEC      SAVE4            ;FINISHED ?
753 005142 001343          BNE     1$
754 005144 112720 000033      MOVB     #ESC,(R0)+        ;ENSURE TEXT MODE
755 005150 112720 000062      MOVB     #GROF,(R0)+      ;SO END OF PASS IS OK
756 005154 105020          CLRB     (R0)+            ;TERM
757 005156 004737 006632      JSR      PC,XPRNT         ;DISPLAY
758 005162 004737 007756      JSR      PC,DELAY
759      ;NOW CLEAR THE GRAPH OFF THE SCREEN
760 005166 004537 010164      JSR      R5,AMSG          ;USE THE HEADER ROUTINE TO
761 005172 011766          ZAPITB                    ;CLEAR THE SCREEN

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763      .SBTTL  END OF PASS ROUTINE
(1)
(2)      ::*****
(1)      ::*INCREMENT THE PASS NUMBER ($PASS)
(1)      ::*TYPE 'END PASS #XXXXX' (WHERE XXXXX IS A DECIMAL NUMBER)
(1)      ::*IF THERES A MONITOR GO TO IT
(1)      ::*IF THERE ISN'T JUMP TO RSTRTA
(1)
(1)      $EOP:
(3)      005174      000004      SCOPE
(3)      005176      005737      001256      TST      LAST      :TEST IF MORE
(3)      005202      001411      BEQ      1$      :BR IF NONE
(3)      005204      023737      001256      001260      CMP      LAST,VTNOW :IS THIS THE LAST ONE
(3)      005212      001405      BEQ      1$      :BR IF YES
(3)      005214      062737      000010      001260      ADD      #10,VTNOW
(3)      005222      000137      002054      JMP      RSTRT      :TEST NEXT ONE
(3)      005226      112737      000040      001304      1$:      MOVB     #40,ASPTRB :LOAD VT55 RATIO
(3)      005234      032737      000001      001200      BIT      #BIT0,$PASS :TEST IF EVEN
(3)      005242      001002      BNE      2$      :BR IF NOT
(3)      005244      105237      001304      INCB     ASPTRB      :MAKE 105 RATIO
(3)      005250      000240      2$:      NOP
(1)      005252      005037      001102      CLR      $STNM      ::ZERO THE TEST NUMBER
(1)      005256      005237      001200      INC      $PASS      ::INCREMENT THE PASS NUMBER
(1)      005262      042737      100000      001200      BIC      #100000,$PASS ::DON'T ALLOW A NEG. NUMBER
(1)      005270      005327      DEC      (PC)+      ::LOOP?
(1)      005272      000001      $EOPCT: .WORD 1
(1)      005274      003022      BGT      $DOAGN      ::YES
(1)      005276      012737      MOV      (PC)+,@(PC)+ ::RESTORE COUNTER
(1)      005300      000001      $ENDCT: .WORD 1
(1)      005302      005272      $EOPCT
(1)      005304      104401      005351      TYPE     ,SENDMG      ::TYPE 'END PASS #'
(2)      005310      013746      001200      MOV      $PASS,-(SP)  ::SAVE $PASS FOR TYPEOUT
(2)      005314      104405      TYPDS    :GO TYPE--DECIMAL ASCII WITH SIGN
(1)      005316      104401      005346      TYPE     ,SENULL      ::TYPE A NULL CHARACTER
(1)      005322      013700      000042      $GET42: MOV      @#42,R0  ::GET MONITOR ADDRESS
(1)      005326      001405      BEQ      $DOAGN      ::BRANCH IF NO MONITOR
(1)      005330      000005      RESET    :CLEAR THE WORLD
(1)      005332      004710      $ENDAD: JSR      PC,(R0) ::GO TO MONITOR
(1)      005334      000240      NOP      :SAVE ROOM
(1)      005336      000240      NOP      :FOR
(1)      005340      000240      NOP      :ACT11
(1)      005342      $DOAGN:
(1)      005342      000137      JMP      @(PC)+      ::RETURN
(1)      005344      002046      $RTNAD: .WORD  RSTRTA
(1)      005346      377      377      000      $ENULL: .BYTE  -1,-1,0  ::NULL CHARACTER STRING
(1)      005351      015      042412  042116  $ENDMG: .ASCIZ <15><12>/END PASS #/
(1)      005356      050040  051501  020123
(1)      005364      000043
  
```

765	005366	000	003	004	SINBEG: .BYTE	000,003,004,004,005
	005371	004	005			
766	005373	006	007	010	.BYTE	006,007,010,012,014,015,017,021,024,027,032,035,040
	005376	012	014	015		
	005401	017	021	024		
	005404	027	032	035		
	005407	040				
767	005410	043	047	053	.BYTE	043,047,053,056,062,066,073,077,103,110,115,121,126,133
	005413	056	062	066		
	005416	073	077	103		
	005421	110	115	121		
	005424	126	133			
768	005426	137	144	151	.BYTE	137,144,151,156,162,167,174,201,206,213,217,223,230,235
	005431	156	162	167		
	005434	174	201	206		
	005437	213	217	223		
	005442	230	235			
769	005444	241	245	251	.BYTE	241,245,251,255,261,265,271,274,277,303,305,310,313
	005447	255	261	265		
	005452	271	274	277		
	005455	303	305	310		
	005460	313				
770	005461	316	317	321	.BYTE	316,317,321,323,324,326,327,330,331,331,331,331,331
	005464	323	324	326		
	005467	327	330	331		
	005472	331	331	331		
	005475	331				
771	005476	330	327	326	.BYTE	330,327,326,325,323,322,320,317,314,312,307
	005501	325	323	322		
	005504	320	317	314		
	005507	312	307			
772	005511	304	301	275	.BYTE	304,301,275,272,267,263,257,253,247,243,237,232,225
	005514	272	267	263		
	005517	257	253	247		
	005522	243	237	232		
	005525	225				
773	005526	221	214	207	.BYTE	221,214,207,203,176,171,164,157,153,145,140
	005531	203	176	171		
	005534	164	157	153		
	005537	145	140			
774	005541	134	127	121	.BYTE	134,127,121,115,111,104,077,073,066,063,057,053,047
	005544	115	111	104		
	005547	077	073	066		
	005552	063	057	053		
	005555	047				
775	005556	043	040	034	.BYTE	043,040,034,031,027,023,021,017,015,013,011,010,007
	005561	031	027	023		
	005564	021	017	015		
	005567	013	011	010		
	005572	007				
776	005573	006	005	004	.BYTE	006,005,004,003
	005576	003				
777	005577	000			SINEND: .BYTE	0
778					.EVEN	

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779          ;UP-DOWN SUBROUTINE
780
781 005600 012737 000050 006012 UPDWNZ: MOV    #50,UPDWNZ      ;LOAD
782 005606 000403          BR      UPDWNX
783 005610 012737 000040 006012 UPDWN:  MOV    #40,UPDWNZ      ;LOAD
784 005616 012537 006006          UPDWNX: MOV    (R5)+,11$      ;GET GRAPH BIT AND INC/DEC WORD
785 005622 012537 006010          MOV    (R5)+,12$      ;GET STARTING CORD.
786 005626 012700 014540          MOV    #BUFFER,R0     ;LOAD THE POINTER
787 005632 112720 000033          MOVB   #ESC,(R0)+     ;LOAD 'ESCAPE'
788 005636 112720 000061          MOVB   #GRON,(R0)+   ;ENABLE GRAPHIC MODE
789 005642 112720 000101          MOVB   #LDE0,(R0)+  ;LOAD ENABLE 0
790 005646 112710 000041          MOVB   #BITS!BIT0,(R0) ;ENABLE DISPLAY
791 005652 153720 006006          BISB   11$,(R0)+    ;LOAD GRAPH ENABLE BIT
792 005656 012737 000001 006004 MOV    #1,10$
793 005664 113720 006012          MOVB   UPDWNZ,(R0)+  ;LOAD NOP
794 005670 112720 000110          MOVB   #LSC,(R0)+   ;LOAD STARTING CORD.
795 005674 005037 006374          CLR    BASE         ;LOAD START. CORD.
796 005700 004737 006400          JSR    PC,SHUFF
797 005704 010120          MOV    R1,(R0)+     ;LOAD INTO BUFFER
798 005706 112720 000100          MOVB   #LNO,(R0)+   ;LOAD NOP
799 005712 113720 006007          MOVB   11$+1,(R0)+  ;LOAD LOAD GRAPH X
800 005716 013737 006010 006374 4$: MOV    12$,BASE      ;LOAD DATA
801 005724 004737 006400          1$: JSR    PC,SHUFF   ;SHUFFEL DATA
802 005730 010120          MOV    R1,(R0)+     ;LOAD DATA
803 005732 005737 006010          TST    12$          ;TEST FOR UP OR DOWN DATA
804 005736 100007          BPL    2$           ;BR IF INC.
805 005740 005337 006374          DEC    BASE         ;DEC. DATA
806 005744 042737 177400 006374 BIC    #177400,BASE
807 005752 001407          BEQ    5$
808 005754 000763          BR     1$
809 005756 005237 006374          2$: INC    BASE      ;CHANGE DATA
810 005762 022737 000354 006374 3$: CMP    #MAXHOZ,BASE ;TEST FOR LAST
811 005770 001355          BNE    1$          ;BR IF NOT
812 005772 005337 006004          5$: DEC    10$
813 005776 100347          BPL    4$          ;BR IF NOT
814 006000 105010          CLRB  (R0)         ;LOAD TERMINATOR
815 006002 000205          RTS    R5         ;EXIT
816 006004 000000          10$: 0
817 006006 000000          11$: 0
818 006010 000000          12$: 0
819 006012 000040          UPDWNZ: 40
  
```

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821                                     ;STARTING CORDINATE SUBROUTINE
822
823 006014 012537 006146      STCORD: MOV      (R5)+,11$      ;GET GRAPH BIT AND INC/DEC WORD
824 006020 012537 006150      MOV      (R5)+,12$      ;GET STARTING CORD.
825 006024 012537 006144      MOV      (R5)+,10$      ;GET ARG. WORD
826 006030 010046      MOV      R0,-(SP)      ;SAVE R0
827 006032 010146      MOV      R1,-(SP)      ;SAVE R1
828 006034 012700 014540      MOV      #BUFFER,R0    ;LOAD THE POINTER
829 006040 112720 000033      MOV      #ESC,(R0)+    ;LOAD 'ESCAPE'
830 006044 112720 000061      MOV      #GRON,(R0)+   ;ENABLE GRAPHIC MODE
831 006050 112720 000101      MOV      #LDE0,(R0)+   ;LOAD ENABLE 0
832 006054 112710 000041      MOV      #BITS!BIT0,(R0) ;ENABLE DISPLAY
833 006060 153720 006146      BIS      11$,(R0)+     ;LOAD GRAPH ENABLE BIT
834 006064 112720 000100      MOV      #LNO,(R0)+    ;LOAD NOP
835 006070 112720 000110      MOV      #LSC,(R0)+    ;LOAD STARTING CORD.
836 006074 013737 006144      MOV      10$,BASE      ;LOAD START. CORD.
837 006102 004737 006400      JSR      PC,SHUFF      ;
838 006106 010120      MOV      R1,(R0)+      ;LOAD INTO BUFFER
839 006110 112720 000100      MOV      #LNO,(R0)+    ;LOAD NOP
840 006114 113720 006147      MOV      11$+1,(R0)+   ;LOAD LOAD GRAPH X
841 006120 013737 006150      MOV      12$,BASE      ;LOAD DATA
842 006126 004737 006400      JSR      PC,SHUFF      ;SHUFFEL DATA
843 006132 010120      MOV      R1,(R0)+      ;LOAD DATA
844 006134 105010      CLRB     (R0)          ;LOAD TERMINATOR
845 006136 012601      MOV      (SP)+,R1
846 006140 012600      MOV      (SP)+,R0
847 006142 000205      RTS      R5           ;EXIT
848 006144 000000      10$:    0
849 006146 000000      11$:    0
850 006150 000000      12$:    0
851
852 006152      033      061      SETBAS: .BYTE  ESC,GRON      ;ENABLE GRAPH MODE
853 006154      101      040      .BYTE  LDE0,40,42    ;ENABLE BASE 0 TO BE LOADED
854 006157      100      060      .BYTE  LNO,60,43    ;LOAD BASE 0
855 006162      101      040      .BYTE  LDE0,40,43    ;ENABLE BASE 1 TO BE LOADED
856 006165      100      060      .BYTE  LNO,60,43    ;LOAD BASE 1
857 006170      110      040      .BYTE  LSC,40,40    ;LOAD STARTING CORD. TO 0
858 006173      100
859 006174      000
860      006176      .EVEN

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862
863      ;CURSOR SUBROUTINE
864      ;THE FIRST ARG. LOW BYTE IS AN 'LDC0 OR LDC1'
865      ;HIGH BYTE IS BIT 1 OR BIT 2 TO ENABLE CURSOR
866      ;THE SECOND ARG. = BIT 15 WILL REMOVE CURSORS
867      ;= BIT 10 WILL ADD CURSORS
868
869 006176 012537 006370      CURSOR: MOV      (R5)+,11$      ;GET ARG. WORD
870 006202 012537 006372      MOV      (R5)+,12$      ;GET ARG. WORD
871 006206 012700 014540      MOV      #BUFFER,R0    ;LOAD THE POINTER
872 006212 112720 000033      MOVB     #ESC,(R0)+    ;LOAD 'ESCAPE'
873 006216 112720 000061      MOVB     #GRON,(R0)+   ;ENABLE GRAPHIC MODE
874 006222 112720 000101      MOVB     #LDE0,(R0)+   ;LOAD ENABLE 0
875 006226 112710 000041      MOVB     #BIT5!BIT0,(R0) ;ENABLE DISPLAY
876 006232 153720 006370      BISB     11$,(R0)+    ;LOAD GRAPH ENABLE BIT
877 006236 112720 000111      MOVB     #LDE1,(R0)+   ;LOAD ENABLE
878 006242 013701 006370      MOV      11$,R1
879 006246 006301              ASL      R1              ;MAKE PROPER CURSOR ENABLE DATA BYTE
880 006250 112710 000040      MOVB     #BIT5,(R0)
881 006254 150120              BISB     R1,(R0)+
882 006256 112720 000100      MOVB     #LNO,(R0)+    ;LOAD NOP
883 006262 112720 000110      MOVB     #LSC,(R0)+    ;LOAD STARTING CORD.
884 006266 005037 006374      CLR      BASE          ;LOAD START. CORD.
885 006272 004737 006400      JSR      PC,SHUFF
886 006276 010120              MOV      R1,(R0)+      ;LOAD INTO BUFFER
887 006300 112720 000100      MOVB     #LNO,(R0)+    ;LOAD NOP
888 006304 113720 006371      MOVB     11$+1,(R0)+   ;LOAD 'LOAD CURSOR ON GRAPH X'
889 006310 013737 006372 006374  MOV      12$,BASE      ;LOAD CURSOR POSITION DATA
890 006316 004737 006400      JSR      PC,SHUFF      ;SHUFFEL DATA
891 006322 010120              MOV      R1,(R0)+      ;LOAD DATA
892 006324 005737 006372      TST      12$           ;TEST FOR UP OR DOWN DATA
893 006330 100007              BPL      2$            ;BR IF INC.
894 006332 005337 006374      DEC      BASE
895 006336 042737 177000 006374  BIC      #177000,BASE
896 006344 001407              BEQ      4$
897 006346 000763              BR       1$
898 006350 005237 006374 2$: INC      BASE          ;CHANGE DATA
899 006354 022737 003000 006374 3$: CMP      #ADDLIN!MAXVRT,BASE ;TEST FOR LAST
900 006362 001355              BNE      1$            ;BR IF NOT
901 006364 105010 4$: CLRB     (R0)      ;LOAD TERMINATOR
902 006366 000205              RTS      R5            ;EXIT
903 006370 000000      11$: 0
904 006372 000000      12$: 0
905 006374 000000      BASE: 0
906 006376 000000      BASE1: 0
907

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909          ;SUBROUTINE TO SHUFFEL DATA INTO GRAPHIC DATA BYTE FORMAT
910
911 006400 013702 006374 SHUFF: MOV BASE,R2          ;LOAD VALUE TO BE SHUFFELED
912 006404 010237 006376      MOV R2,BASE1
913 006410 042737 177740 006376      BIC #177740,BASE1
914 006416 010201          MOV R2,R1
915 006420 006001          ROR R1
916 006422 006001          ROR R1
917 006424 006001          ROR R1
918 006426 006001          ROR R1
919 006430 006001          ROR R1
920 006432 110137 006377      MOVB R1,BASE1+1          ;RELOAD R1
921 006436 042737 170340 006376      BIC #170340,BASE1      ;MASK
922 006444 052737 020040 006376      BIS #20040,BASE1      ;CONVERT TO ASCII
923 006452 032737 002000 006374      BIT #BIT10,BASE
924 006460 001403          BEQ 1$          ;BR IF NOT SET
925 006462 052737 010000 006376      BIS #BIT12,BASE1      ;SET BIT
926 006470 013701 006376      1$: MOV BASE1,R1
927 006474 000207          RTS PC          ;EXIT
928          ;SUBROUTINE TO LOAD VARIABLE BASE LINE
929 006476 112720 000033 LDBASE: MOVB #ESC,(R0)+      ;LOAD ESC
930 006502 112720 000061      MOVB #GRON,(R0)+      ;LOAD GRAPH MODE
931 006506 112720 000101      MOVB #LDE0,(R0)+      ;LOAD ENABLE 0
932 006512 112520          MOVB (R5)+,(R0)+      ;LOAD ENABLE 0 DATA BITS
933 006514 112520          MOVB (R5)+,(R0)+      ;LOAD ENABLE 0 2ND WORD DATA BITS
934 006516 005037 006374      CLR BASE          ;CLEAR BASE VALUE
935 006522 112720 000100      MOVB #LNO,(R0)+      ;ENSURE WORD ADDR.
936          ;NOW RAISE THE BASE LINE
937 006526 004737 006400      1$: JSR PC,SHUFF          ;CONVERT BASE VALUE TO DATA
938 006532 010120          MOV R1,(R0)+      ;SAVE BASE LINE VALUE
939 006534 005237 006374      INC BASE          ;UPDATE TO NEXT BASE LINE VALUE
940 006540 022737 000354 006374      CMP #MAXHOZ,BASE      ;TEST IF DONE
941 006546 001367          BNE 1$          ;BR IF NOT
942          ;NOW LOWER THE BASE LINE
943 006550 004737 006400      2$: JSR PC,SHUFF          ;CONVERT BASE VALUE INTO DATA
944 006554 010120          MOV R1,(R0)+      ;SAVE BASE LINE VALUE
945 006556 005337 006374      DEC BASE          ;UPDATE TO PREVIOUS BASE LINE VALUE
946 006562 001372          BNE 2$          ;BR IF NOT DONE
947 006564 005010          CLR (R0)          ;LOAD TERM
948 006566 000205          RTS R5          ;EXIT
949          ;SUBROUTINE TO LOAD SINE WAVE TO THE END OF CURRENT BUFFER
950 006570 005037 006374 STRIPG: CLR BASE          ;PRIME THE BASE VALUE
951 006574 012704 000003      MOV #3,R4          ;LOAD # OF SINE WAVES SEEN
952 006600 012703 005367      1$: MOV #SINBEG+1,R3      ;LOAD SINE WAVE POINTER
953 006604 112337 006374      2$: MOVB (R3)+,BASE      ;GET A SINE WAVE DATA BYTE
954 006610 001404          BEQ 3$          ;BR IF END OF SINE WAVE DATA
955 006612 004737 006400      JSR PC,SHUFF          ;CONVERT BASE INTO DATA
956 006616 010120          MOV R1,(R0)+      ;LOAD THE DATA INTO THE BUFFER
957 006620 000771          BR 2$          ;BR AND DO MORE DATA
958 006622 005304          3$: DEC R4          ;FINISHED ALL SINE WAVES
959 006624 100365          BPL 1$          ;BR IF NOT
960 006626 005010          CLR (R0)          ;LOAD TERM
961 006630 000207          RTS PC          ;EXIT

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963          ;DISPLAY SUBROUTINE
964
965 006632 010046 XPRNT: MOV R0,-(SP)
966 006634 010146      MOV R1,-(SP)
967 006636 010246      MOV R2,-(SP)
968 006640 005037 007534      CLR ANESC          ;HOUSEKEEP
969 006644 005037 007540      CLR TERM
970 006650 005037 007536      CLR NOEXIT
971 006654 012700 014540      MOV #BUFFER,R0     ;SETUP BUFFER POINTER
972 006660 105777 172412 1$:  TSTB @VTOS        ;TEST READY
973 006664 100375          BPL 1$
974 006666 005737 001270      TST WFTST         ;TEST IF TESTER MODE
975 006672 001435          BEQ 2$            ;BR IF NOT
976 006674 105777 001170 60$: TSTB @VTOS0       ;LINE 0 READY
977 006700 100375          BPL 60$
978 006702 105777 001172 61$: TSTB @VTOS1       ;LINE 1 READY
979 006706 100375          BPL 61$
980 006710 105777 001174 62$: TSTB @VTOS2       ;LINE 2 READY
981 006714 100375          BPL 62$
982 006716 105777 001176 63$: TSTB @VTOS3       ;LINE 3 READY
983 006722 100375          BPL 63$
984 006724 105777 001200 64$: TSTB @VTOS4       ;LINE 4 READY
985 006730 100375          BPL 64$
986 006732 105777 001202 65$: TSTB @VTOS5       ;LINE 5 READY
987 006736 100375          BPL 65$
988 006740 105777 001204 66$: TSTB @VTOS6       ;LINE 6 READY
989 006744 100375          BPL 66$
990 006746 105777 001206 67$: TSTB @VTOS7       ;LINE 7 READY
991 006752 100375          BPL 67$
992 006754 000240          NOP
993 006756 000240          NOP
994 006760 000240          NOP
995 006762 000240          NOP
996 006764 000240          NOP
997 006766 112001 2$:  MOVB (R0)+,R1      ;GET A CHAR.
998 006770 001500          BEQ 14$          ;BR IF TERM
999 006772 122701 000033      CMPB #33,R1      ;TEST FOR ESC
1000 006776 001003          BNE 4$          ;BR IF NOT
1001 007000 005237 007534 3$:  INC ANESC         ;SET SOFT FLAG
1002 007004 000402          BR 5$
1003 007006 005037 007534 4$:  CLR ANESC         ;CLEAR SOFT FLAG
1004 007012 110177 172262 5$:  MOVB R1,@VTOB    ;LOAD CHAR
1005 007016 005737 001270      TST WFTST         ;TEST IF TESTER MODE
1006 007022 001450          BEQ 68$          ;BR IF NOT
1007 007024 110177 001042      MOVB R1,@VTOB0   ;LOAD LINE 0
1008 007030 110177 001046      MOVB R1,@VTOB1   ;LOAD LINE 1
1009 007034 110177 001052      MOVB R1,@VTOB2   ;LOAD LINE 2
1010 007040 110177 001056      MOVB R1,@VTOB3   ;LOAD LINE 3
1011 007044 110177 001062      MOVB R1,@VTOB4   ;LOAD LINE 4
1012 007050 110177 001066      MOVB R1,@VTOB5   ;LOAD LINE 5
1013 007054 110177 001072      MOVB R1,@VTOB6   ;LOAD LINE 6
1014 007060 110177 001076      MOVB R1,@VTOB7   ;LOAD LINE 7
1015 007064 105777 000774      TSTB @VTISO     ;TEST INPUT LINE 0
1016 007070 100442          BMI 70$
    
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1017 007072 105777 000776      TSTB @VTIS1      ;TEST INPUT LINE 1
1018 007076 100442      BMI 71$
1019 007100 105777 001000      TSTB @VTIS2      ;TEST INPUT LINE 2
1020 007104 100442      BMI 72$
1021 007106 105777 001002      TSTB @VTIS3      ;TEST INPUT LINE 3
1022 007112 100442      BMI 73$
1023 007114 105777 001004      TSTB @VTIS4      ;TEST INPUT LINE 4
1024 007120 100442      BMI 74$
1025 007122 105777 001006      TSTB @VTIS5      ;TEST INPUT LINE 5
1026 007126 100442      BMI 75$
1027 007130 105777 001010      TSTB @VTIS6      ;TEST INPUT LINE 6
1028 007134 100442      BMI 76$
1029 007136 105777 001012      TSTB @VTIS7      ;TEST INPUT LINE 7
1030 007142 100442      BMI 77$
1031 007144 105777 172122      68$: TSTB @VTIS      ;TEST INPUT FLAG
1032 007150 100243      BPL 1$           ;BR IF CLEARED
1033 007152 005737 007534      TST ANESC       ;TEST IF 'ESC' WAS JUST SENT
1034 007156 001240      BNE 1$
1035 007160 005037 001124      CLR $GDDAT     ;CLEAR EXPECTED DATA
1036 007164 013702 001272      MOV VTIS,R2    ;GET CONSOLE ADDRESS
1037 007170 000452      BR 10$
1038 007172 000137 007476      14$: JMP 16$
1039 007176 013702 010064      70$: MOV VTIS0,R2 ;GET LINE 0 STATUS
1040 007202 000445      BR 10$
1041 007204 013702 010074      71$: MOV VTIS1,R2 ;GET LINE 1 STATUS
1042 007210 000442      BR 10$
1043 007212 013702 010104      72$: MOV VTIS2,R2 ;GET LINE 2 STATUS
1044 007216 000437      BR 10$
1045 007220 013702 010114      73$: MOV VTIS3,R2 ;GET LINE 3 STATUS
1046 007224 000434      BR 10$
1047 007226 013702 010124      74$: MOV VTIS4,R2 ;GET LINE 4 STATUS
1048 007232 000431      BR 10$
1049 007234 013702 010134      75$: MOV VTIS5,R2 ;GET LINE 5 STATUS
1050 007240 000426      BR 10$
1051 007242 013702 010144      76$: MOV VTIS6,R2 ;GET LINE 6 STATUS
1052 007246 000423      BR 10$
1053 007250 013702 010154      77$: MOV VTIS7,R2 ;GET LINE 7 STATUS
1054 007254 000420      BR 10$
1055
1056      ;WAIT FOR A KEYBOARD FLAG - EXIT IF NONE
1057
1058 007256 013737 001264 010276 6$: MOV TIME0,TIME1
1059 007264 005037 010300      CLR TIME2      ;LOAD DELAY
1060 007270 105712      7$: TSTB (R2)   ;TEST IF INPUT FLAG
1061 007272 100411      BMI 10$        ;BR IF SET
1062 007274 005337 010300      DEC TIME2      ;DELAY
1063 007300 001373      BNE 7$
1064 007302 104407      CKSWR         ;TEST FOR 'CTRG G' ON CONSOLE TTY
1065 007304 005337 010276      DEC TIME1      ;DELAY
1066 007310 001367      BNE 7$
1067 007312 000137 006660      13$: JMP 1$    ;TRY AGAIN
1068
1069      ;INPUT FLAG SET - FIND OUT WHAT CHARACTER IT WAS
1070

```

1071	007316	010201			10\$:	MOV	R2,R1	:COPY R2
1072	007320	005721				TST	(R1)+	:BUMP VALUE
1073	007322	011137	001126			MOV	(R1), \$BDDAT	:READ CHAR
1074	007326	042737	177600	001126		BIC	#177600, \$BDDAT	:MASK
1075	007334	022737	000021	001126		CMP	#XON, \$BDDAT	:TEST FOR X ON
1076	007342	001006				BNE	11\$	
1077	007344	005037	007536			CLR	NOEXIT	
1078	007350	005737	007540			TST	TERM	:TEST IF TERMINATOR WAS SET
1079	007354	001756				BEQ	13\$:BR IF NOT
1080	007356	000460				BR	17\$:BR IF ONLY ONE
1081	007360	022737	000023	001126	11\$:	CMP	#XOFF, \$BDDAT	:TEST FOR X OFF
1082	007366	001006				BNE	12\$:BR IF NOT
1083	007370	105237	007536			INCB	NOEXIT	:SET 'NO EXIT UNTIL X-ON' RCVD
1084	007374	012737	000021	001124		MOV	#XON, \$GDDAT	:LOAD EXPECTED VALUE
1085	007402	000725				BR	6\$:WAIT FOR X-ON
1086	007404	005037	001124		12\$:	CLR	\$GDDAT	:LOAD EXPECTED
1087	007410	105777	171524			TSTB	@SWR	:TEST SWR
1088	007414	100336				BPL	13\$:BR IF CLEARED
1089	007416	020237	001272			CMP	R2, VTIS	:TEST IF NON-TESTER
1090	007422	001333				BNE	13\$:BR IF TESTER
1091	007424	022737	000057	001126		CMP	#', \$BDDAT	:COMPARE
1092	007432	001413				BEQ	15\$:BR IF EQUAL
1093	007434	022737	000134	001126		CMP	#'\, \$BDDAT	:COMPARE
1094	007442	001323				BNE	13\$:BR IF NOT
1095	007444	012737	000001	007532		MOV	#1, LOOP	:SET SOFT FLAG
1096	007452	012737	010426	007552		MOV	#MQ0, FINDTA	:SETUP MESSAGE
1097	007460	000430				BR	FINDOT	
1098	007462	005037	007532		15\$:	CLR	LOOP	
1099	007466	012737	010503	007552		MOV	#MQ1, FINDTA	:SETUP MESSAGE
1100	007474	000422				BR	FINDOT	
1101	007476	012737	000001	007540	16\$:	MOV	#1, TERM	:SET 'TERMINATOR HAS BEEN FOUND' FLAG
1102	007504	012737	000021	001124		MOV	#XON, \$GDDAT	:LOAD EXPECTED
1103	007512	105737	007536			TSTB	NOEXIT	:TEST IF ALLOWED TO LEAVE ROUTINE ?
1104	007516	001257				BNE	6\$:BR IF NOT ALLOWED
1105	007520	012602			17\$:	MOV	(SP)+, R2	
1106	007522	012601				MOV	(SP)+, R1	
1107	007524	012600				MOV	(SP)+, R0	
1108	007526	000207				RTS	PC	:EXIT
1109	007530	000000			30\$:	0		
1110	007532	000000			LOOP:	0		
1111	007534	000000			ANESC:	0		
1112	007536	000000			NOEXIT:	0		
1113	007540	000000			TERM:	0		

```

1115 ; DETERMINE WHAT THE OPR. WANTS TO DO NOW
1116 007542 012706 001100 FINDOT: MOV #STACK,SP
1117 007546 004537 010164 JSR R5,AMSG
1118 007552 010503 FINDTA: MQ1
1119 007554 004737 010226 JSR PC,GETCHR
1120 007560 000770 BR FINDOT
1121
1122 007562 105777 171510 1$: TSTB @VTOS
1123 007566 100375 BPL 1$
1124 007570 110077 171504 MOVB R0,@VTOB
1125 007574 042700 177640 BIC #177640,R0 ;MASK
1126 007600 122700 000007 CMPB #7,R0 ;TEST FOR CTRL G
1127 007604 001432 BEQ 2$
1128 007606 122700 000003 CMPB #3,R0 ;TEST FOR CTRL C
1129 007612 001431 BEQ 3$
1130 007614 122700 000101 CMPB #'A,R0 ;TEST FOR NUMBER
1131 007620 101350 BHI FINDOT
1132 007622 122700 000124 CMPB #'T,R0 ;TEST FOR OTHERS
1133 007626 103745 BLO FINDOT
1134 007630 042700 177740 BIC #177740,R0 ;MAKE 0-37
1135 007634 005300 DEC R0
1136 007636 110037 001102 MOVB R0,$STSTNM ;LOAD THAT TEST #
1137 007642 006300 ASL R0
1138 007644 005760 007702 TST DSPCH(R0) ;TEST IF VALID
1139 007650 001734 BEQ FINDOT ;BR IF NOT
1140 007652 016037 007702 001106 MOV DSPCH(R0),$LPADR ;LOAD RETURN ADDRESS
1141 007660 016037 007702 001110 MOV DSPCH(R0),$LPERR ;LOAD ERROR LOOP ADDRESS
1142 007666 000170 007702 JMP @DSPCH(R0) ;GO TO THAT TEST
1143 007672 104406 2$: GTSWR ;READ SWITCHES
1144 007674 000722 BR FINDOT
1145 007676 000000 3$: HALT ;LSI-11 ODT ENTRY
1146 007700 000720 BR FINDOT
1147
1148 007702 002124 DSPCH: TST1+2
1149 007704 002320 TST2+2
1150 007706 002506 TST3+2
1151 007710 002702 TST4+2
1152 007712 003076 TST5+2
1153 007714 003142 TST6+2
1154 007716 003316 TST7+2
1155 007720 003472 TST10+2
1156 007722 003536 TST11+2
1157 007724 003616 TST12+2
1158 007726 003676 TST13+2
1159 007730 004010 TST14+2
1160 007732 004122 TST15+2
1161 007734 004264 TST16+2
1162 007736 004606 TST17+2
1163 007740 004644 TST20+2
1164 007742 004702 TST21+2
1165 007744 004736 TST22+2
1166 007746 004772 TST23+2
1167 007750 000000 0
1168 007752 000000 0
  
```

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1169 007754 000000          0
1170
1171
1172          ;PROGRAM DELAY ROUTINE
1173
1174 007756 013737 001266 010060 DELAY: MOV      SUBTST,10$      ;LOAD COUNT
1175 007764 005037 010062          CLR      11$
1176 007770 005737 001270          TST     WFTST          ;TEST IF W.F. MODE
1177 007774 001410          BEQ     2$             ;BR IF NOT
1178 007776 006237 010060          ASR     10$          ;CHANGE DELAY TIMER
1179 010002 006237 010060          ASR     10$
1180 010006 001003          BNE     2$             ;BR IF SOME BITS ARE SET
1181 010010 012737 000001 010060 MOV     #1,10$        ;ENSURE SOME DELAY
1182 010016 032777 010000 171114 2$: BIT     #BIT12,@SWR    ;TEST SR
1183 010024 001014          BNE     3$             ;BR IF SET
1184 010026 005737 001200          TST     $PASS        ;FIRST PASS ?
1185 010032 001411          BEQ     3$             ;BR IF YES
1186 010034 105777 171232          TSTB   @VTIS        ;CHECK FOR INPUT FLAG
1187 010040 100406          BMI     3$             ;BR IF FLAG
1188 010042 005337 010062          DEC     11$          ;DELAY
1189 010046 001363          BNE     2$             ;BR IF NOT DONE
1190 010050 005337 010060          DEC     10$
1191 010054 100360          BPL     2$             ;DELAY
1192 010056 000207          3$:   RTS     PC      ;EXIT
1193
1194 010060 000002          10$:   2
1195 010062 000000          11$:   0
  
```

			:TESTER	DEVICE BUS ADDRESSES	:LINE 0 ADDRESSES
1197					
1198	010064	000000	VTIS0:	0	
1199	010066	000000	VTIB0:	0	
1200	010070	000000	VTOS0:	0	
1201	010072	000000	VT0B0:	0	
1202					
1203	010074	000000	VTIS1:	0	
1204	010076	000000	VTIB1:	0	
1205	010100	000000	VTOS1:	0	
1206	010102	000000	VT0B1:	0	
1207					
1208	010104	000000	VTIS2:	0	
1209	010106	000000	VTIB2:	0	
1210	010110	000000	VTOS2:	0	
1211	010112	000000	VT0B2:	0	
1212					
1213	010114	000000	VTIS3:	0	
1214	010116	000000	VTIB3:	0	
1215	010120	000000	VTOS3:	0	
1216	010122	000000	VT0B3:	0	
1217					
1218	010124	000000	VTIS4:	0	
1219	010126	000000	VTIB4:	0	
1220	010130	000000	VTOS4:	0	
1221	010132	000000	VT0B4:	0	
1222					
1223	010134	000000	VTIS5:	0	
1224	010136	000000	VTIB5:	0	
1225	010140	000000	VTOS5:	0	
1226	010142	000000	VT0B5:	0	
1227					
1228	010144	000000	VTIS6:	0	
1229	010146	000000	VTIB6:	0	
1230	010150	000000	VTOS6:	0	
1231	010152	000000	VT0B6:	0	
1232					
1233	010154	000000	VTIS7:	0	
1234	010156	000000	VTIB7:	0	
1235	010160	000000	VTOS7:	0	
1236	010162	000000	VT0B7:	0	

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1238
1239           ;HEADER SUBROUTINE FOR TERMINAL UNDER TEST
1240
1241 010164 012537 010216          AM$G:  MOV      (R5)+,10$      ;GET POINTER
1242 010170 012700 014540          MOV      #BUFFER,R0      ;LOAD OUTPUT POINTER
1243 010174 113737 001304 011752  MOVB     ASPTRB,ZAPITA    ;GET ASPECT RATIO
1244 010202 004537 010302          JSR      R5,MTOB         ;MOVE TO OUTPUT BUFFER
1245 010206 011743                  ZAPIT                    ;CLEAR SCREEN AND SET ASPECT RATIO
1246 010210 105740                  TSTB     -(R0)           ;BACK OVER TERMINATOR
1247 010212 004537 010302          JSR      R5,MTOB         ;MOVE TO BUFFER
1248 010216 000000          10$:  0
1249 010220 004737 006632          JSR      PC,XPRNT       ;DISPLAY IT
1250 010224 000205          RTS      R5             ;EXIT
1251
1252           ;SUBROUTINE TO GET A CHARACTER FROM THE TERMINAL
1253
1254
1255 010226 013737 001264 010276  GETCHR: MOV      TIME0,TIME1    ;LOAD TIME COUNTER
1256 010234 005037 010300          CLR      TIME2
1257
1258 010240 105777 171026          1$:   TSTB     @VTIS        ;TEST INPUT STATUS
1259 010244 100005                  BPL      2$             ;BR IF CLEARED
1260 010246 017700 171022          MOV      @VTIB,R0      ;READ A CHAR
1261 010252 062716 000002          ADD     #2,(SP)        ;UPDATE RETURN
1262 010256 000207                  RTS      PC             ;EXIT
1263
1264 010260 005337 010300          2$:   DEC      TIME2      ;DELAY
1265 010264 001365                  BNE     1$
1266 010266 005337 010276          DEC     TIME1          ;FINISHED ?
1267 010272 100362                  BPL     1$             ;LOOP TILL TIME EXPIRED
1268 010274 000207                  RTS     PC             ;EXIT
1269
1270 010276 000000          TIME1: 0
1271 010300 000000          TIME2: 0
1272
1273           ;MOVE TO THE OUTPUT BUFFER
1274
1275 010302 012501          MTOB:  MOV      (R5)+,R1    ;LOAD DEST.
1276 010304 112120          1$:   MOVB     (R1)+,(R0)+  ;LOAD BYTE
1277 010306 001376                  BNE     1$             ;BR UNTIL DONE
1278 010310 000205                  RTS     R5             ;EXIT
1279
1280           .SBTTL  ASCII MESSAGES
  
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1282 :ASCII MESSAGES
1283 010312 031033 005015 050042 PWRMSG: .ASCIZ <33><62><15><12>/'POWER FAIL OCCURRED'/<15><12>
      010320 053517 051105 043040
      010326 044501 020114 041517
      010334 052503 051122 042105
      010342 006442 000012
1284 010346 033 062 TITLE: .BYTE 33,62 ;ENSURE EXIT FROM GRAPH MODE
1285 010350 033 074 .BYTE 33,'< ;ENTER ANSCII
1286 010352 033 133 077 .BYTE 33,133,77,63,154 ;ENSURE 80 COLUMN
      010355 063 154
1287 010357 033 133 077 .BYTE 33,133,77,62,154 ;ENSURE ANSCII
      010362 062 154
1288 010364 006415 041412 053132 .ASCIZ <15><15><12>/CZVTNA VT105 ACCEPTANCE TEST/<15><12>
      010372 047124 004501 052126
      010400 030061 020065 041501
      010406 042503 052120 047101
      010414 042503 052040 051505
      010422 006524 000012
1289 010426 047514 050117 047440 MQ0: .ASCIZ /LOOP ON TEST PATTERN LETTER (A THRU S) ? = /
      010434 020116 042524 052123
      010442 050040 052101 042524
      010450 047122 046040 052105
      010456 042524 020122 040450
      010464 052040 051110 020125
      010472 024523 037440 036440
      010500 020040 000
1290 010503 123 040524 052122 MQ1: .ASCIZ /START AT TEST PATTERN LETTER (A THRU S) ? = /
      010510 040440 020124 042524
      010516 052123 050040 052101
      010524 042524 047122 046040
      010532 052105 042524 020122
      010540 040450 052040 051110
      010546 020125 024523 037440
      010554 036440 020040 000
1291 010561 104 053105 041511 WHAT0: .ASCIZ /DEVICE STARTING ADDRESS ? = /
      010566 020105 052123 051101
      010574 044524 043516 040440
      010602 042104 042522 051523
      010610 037440 036440 000040
1292 010616 015 012 012 WHAT8: .BYTE 15,12,12
1293 010621 106 051111 052123 .ASCIZ /FIRST /
      010626 000040
1294 010630 015 012 012 WHAT9: .BYTE 15,12,12
1295 010633 114 051501 020124 .ASCIZ /LAST /
      010640 000
1296 010641 111 053116 046101 EM3: .ASCIZ /INVALID BUS ADDRESS, TRY AGAIN/
      010646 042111 041040 051525
      010654 040440 042104 042522
      010662 051523 020054 051124
      010670 020131 043501 044501
      010676 000116
1297 010700 051107 053517 047111 DAHL: .ASCIZ /GROWING HORIZ. LINE/
      010706 020107 047510 044522
      010714 027132 046040 047111
  
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1298	010722	000105				
	010724	051107	053517	047111	DAVL:	.ASCIZ /GROWING VERT. LINE/
	010732	020107	042526	052122		
	010740	020056	044514	042516		
	010746	000				
1299	010747	104	051511	046120	SHLO:	.ASCIZ /DISPLAY STEPPING HORIZ. LINE ON GRAPH 0/
	010754	054501	051440	042524		
	010762	050120	047111	020107		
	010770	047510	044522	027132		
	010776	046040	047111	020105		
	011004	047117	043440	040522		
	011012	044120	030040	000		
1300	011017	104	051511	046120	SHL1:	.ASCIZ /DISPLAY STEPPING HORIZ. LINE ON GRAPH 1/
	011024	054501	051440	042524		
	011032	050120	047111	020107		
	011040	047510	044522	027132		
	011046	046040	047111	020105		
	011054	047117	043440	040522		
	011062	044120	030040	000		
1301	011067	104	051511	046120	GROA1:	.ASCIZ /DISPLAY DATA ON GRAPH 0 AND 1/
	011074	054501	042040	052101		
	011102	020101	047117	043440		
	011110	040522	044120	030040		
	011116	040440	042116	030440		
	011124	000				
1302	011125	123	042524	050120	SHGL0:	.ASCIZ /STEPPING HISTOGRAM LINE ON GRAPH 0/
	011132	047111	020107	044510		
	011140	052123	043517	040522		
	011146	020115	044514	042516		
	011154	047440	020116	051107		
	011162	050101	020110	000060		
1303	011170	052123	050105	044520	SHGL1:	.ASCIZ /STEPPING HISTOGRAM LINE ON GRAPH 1/
	011176	043516	044040	051511		
	011204	047524	051107	046501		
	011212	046040	047111	020105		
	011220	047117	043440	040522		
	011226	044120	030440	000		
1304	011233	110	051511	047524	HGOA1:	.ASCIZ /HISTOGRAM ON GRAPH 0 AND 1/
	011240	051107	046501	047440		
	011246	020116	051107	050101		
	011254	020110	020060	047101		
	011262	020104	000061			
1305	011266	052503	051522	051117	CURGR0:	.ASCIZ /CURSORS ON GRAPH 0/
	011274	020123	047117	043440		
	011302	040522	044120	030040		
	011310	000				
1306	011311	103	051125	047523	CURGR1:	.ASCIZ /CURSORS ON GRAPH 1/
	011316	051522	047440	020116		
	011324	051107	050101	020110		
	011332	000061				
1307	011334	052123	051101	044524	SCORD0:	.ASCIZ /STARTING COORDINATE TEST ON GRAPH 0/
	011342	043516	041440	047517		
	011350	042122	047111	052101		
	011356	020105	042524	052123		

1308	011364	047440	020116	051107	
	011372	050101	020110	000060	
	011400	052123	051101	044524	SCORD1: .ASCIZ /STARTING COORDINATE TEST ON GRAPH 1/
	011406	043516	041440	047517	
	011414	042122	047111	052101	
	011422	020105	042524	052123	
	011430	047440	020116	051107	
	011436	050101	020110	000061	
1309	011444	040502	042523	046040	BSLGR0: .ASCIZ /BASE LINE ON HISTOGRAM 0/
	011452	047111	020105	047117	
	011460	044040	051511	047524	
	011466	051107	046501	030040	
	011474	000			
1310	011475	102	051501	020105	BSLGR1: .ASCIZ /BASE LINE ON HISTOGRAM 1/
	011502	044514	042516	047440	
	011510	020116	044510	052123	
	011516	043517	040522	020115	
	011524	000061			
1311	011526	052123	044522	041520	STCGR0: .ASCIZ /STRIPCHART ON GRAPH 0/
	011534	040510	052122	047440	
	011542	020116	051107	050101	
	011550	020110	000060		
1312	011554	052123	044522	041520	STCGR1: .ASCIZ /STRIPCHART ON GRAPH 1/
	011562	040510	052122	047440	
	011570	020116	051107	050101	
	011576	020110	000061		
1313	011602	052504	046101	051440	DUSTC: .ASCIZ /DUAL STRIPCHART MODE/
	011610	051124	050111	044103	
	011616	051101	020124	047515	
	011624	042504	000		
1314	011627	107	040522	044120	GAITE: .ASCIZ /GRAPH ASPECT RATIO AND INTERACTIVE ENABLE TEST/
	011634	040440	050123	041505	
	011642	020124	040522	044524	
	011650	020117	047101	020104	
	011656	047111	042524	040522	
	011664	052103	053111	020105	
	011672	047105	041101	042514	
	011700	052040	051505	000124	
1315	011706	051501	042520	052103	CARAT: .ASCIZ /ASPECT RATIO WITH CHARACTERS/
	011714	051040	052101	047511	
	011722	053440	052111	020110	
	011730	044103	051101	041501	
	011736	042524	051522	000	
1316	011743	033	061		ZAPIT: .BYTE ESC,GRON ;ENTER GRAPHIC
1317	011745	101	040	040	.BYTE LDE0,40,40 ;DISABLE THE SCREEN
1318	011750	111	060		.BYTE LDE1,60 ;CLEAR GRAPH DATA
1319	011752	040			.BYTE 40 ;LOAD ASPECT RATIO
1320	011753	033	062		.BYTE ESC,GR0F ;ENTER TEXT MODE
1321	011755	033	133	077	.BYTE ESC,'C','?',',2,154 ;ENSURE ASCII MODE
	011760	062	154		
1322	011762	033	110		.BYTE ESC,'H ;HOME THE SCREEN
1323	011764	033	112		.BYTE ESC,'J ;ERASE THE SCREEN
1324	011766	000			.BYTE 0 ;TERM.
1325	011770				.EVEN

1326

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1328      .SBTTL  TTY INPUT ROUTINE
(1)
(2)      ::*****
(1)      .ENABL  LSB
(1)
(2)      ::*****
(1)      ::SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
(1)      ::ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
(1)      ::SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
(1)      ::WHEN OPERATING IN TTY FLAG MODE.
(1) 011770 022737 000176 001140 $CKSWR: CMP    #SWREG,SWR    ;; IS THE SOFT-SWR SELECTED?
(1) 011776 001074          BNE    15$          ;; BRANCH IF NO
(1) 012000 105777 167140      TSTB   @$TKS         ;; CHAR THERE?
(1) 012004 100071          BPL    15$          ;; IF NO, DON'T WAIT AROUND
(1) 012006 117746 167134      MOVB   @$TKB,-(SP)    ;; SAVE THE CHAR
(1) 012012 042716 177600      BIC    #^C177,(SP)  ;; STRIP-OFF THE ASCII
(1) 012016 022726 000007      CMP    #7,(SP)+     ;; IS IT A CONTROL G?
(1) 012022 001062          BNE    15$          ;; NO, RETURN TO USER
(1) 012024 123727 001134 000001  CMPB   $AUTOB,#1    ;; ARE WE RUNNING IN AUTO-MODE?
(1) 012032 001456          BEQ    15$          ;; BRANCH IF YES
(1)
(1) 012034 104401 012515      $GTSWR: TYPE   , $CNTLG    ;; ECHO THE CONTROL-G (^G)
(1) 012040 104401 012522      TYPE   , $MSWR      ;; TYPE CURRENT CONTENTS
(2) 012044 013746 000176      MOV    SWREG,-(SP)  ;; SAVE SWREG FOR TYPEOUT
(2) 012050 104402          TYPOC           ;; GO TYPE--OCTAL ASCII(ALL DIGITS)
(1) 012052 104401 012533      TYPE   , $MNEW      ;; PROMPT FOR NEW SWR
(1) 012056 005046          19$: CLR    -(SP)      ;; CLEAR COUNTER
(1) 012060 005046          CLR    -(SP)      ;; THE NEW SWR
(1) 012062 105777 167056      7$:  TSTB   @$TKS         ;; CHAR THERE?
(1) 012066 100375          BPL    7$          ;; IF NOT TRY AGAIN
(1)
(1) 012070 117746 167052      MOVB   @$TKB,-(SP)  ;; PICK UP CHAR
(1) 012074 042716 177600      BIC    #^C177,(SP)  ;; MAKE IT 7-BIT ASCII
(1)
(1)
(1)
(1) 012100 021627 000025      9$:  CMP    (SP),#25   ;; IS IT A CONTROL-U?
(1) 012104 001005          BNE    10$         ;; BRANCH IF NOT
(1) 012106 104401 012510      TYPE   , $CNTLU     ;; YES, ECHO CONTROL-U (^U)
(1) 012112 062706 000006      20$: ADD    #6,SP       ;; IGNORE PREVIOUS INPUT
(1) 012116 000757          BR    19$         ;; LET'S TRY IT AGAIN
(1)
(1)
(1) 012120 021627 000015      10$: CMP    (SP),#15     ;; IS IT A <CR>?
(1) 012124 001022          BNE    16$         ;; BRANCH IF NO
(1) 012126 005766 000004      TST    4(SP)        ;; YES, IS IT THE FIRST CHAR?
(1) 012132 001403          BEQ    11$         ;; BRANCH IF YES
(1) 012134 016677 000002 166776  MOV    2(SP),@SWR    ;; SAVE NEW SWR
(1) 012142 062706 000006      11$: ADD    #6,SP       ;; CLEAR UP STACK
(1) 012146 104401 001167      14$: TYPE   , $CRLF    ;; ECHO <CR> AND <LF>
(1) 012152 123727 001135 000001  CMPB   $INTAG,#1    ;; RE-ENABLE TTY KBD INTERRUPTS?
(1) 012160 001003          BNE    15$         ;; BRANCH IF NOT
(1) 012162 012777 000100 166754  MOV    #100,@$TKS   ;; RE-ENABLE TTY KBD INTERRUPTS
(1) 012170 000002          15$: RTI          ;; RETURN
    
```

```

(1) 012172 004737 014006      16$: JSR    PC,$TYPEC      ;;ECHO CHAR
(1) 012176 021627 000060      CMP    (SP),#60        ;;CHAR < 0?
(1) 012202 002420              BLT    18$             ;;BRANCH IF YES
(1) 012204 021627 000067      CMP    (SP),#67        ;;CHAR > 7?
(1) 012210 003015              BGT    18$             ;;BRANCH IF YES
(1) 012212 042726 000060      BIC    #60,(SP)+       ;;STRIP-OFF ASCII
(1) 012216 005766 000002      TST    2(SP)           ;;IS THIS THE FIRST CHAR
(1) 012222 001403              BEQ    17$             ;;BRANCH IF YES
(1) 012224 006316              ASL    (SP)            ;;NO, SHIFT PRESENT
(1) 012226 006316              ASL    (SP)            ;;  CHAR OVER TO MAKE
(1) 012230 006316              ASL    (SP)            ;;  ROOM FOR NEW ONE.
(1) 012232 005266 000002      17$: INC    2(SP)         ;;KEEP COUNT OF CHAR
(1) 012236 056616 177776      BIS    -2(SP),(SP)     ;;SET IN NEW CHAR
(1) 012242 000707              BR     7$              ;;GET THE NEXT ONE
(1) 012244 104401 001166      18$: TYPE  $QUES        ;;TYPE ?<CR><LF>
(1) 012250 000720              BR     20$             ;;SIMULATE CONTROL-U
(1)                               .DSABL  LSB
    
```

```

(1)                               ;:*****
(1)                               ;:THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
(1)                               ;:CALL:
(1)                               ;:*
(1)                               ;*   RDCHR                ;;INPUT A SINGLE CHARACTER FROM THE TTY
(1)                               ;*   RETURN HERE          ;;CHARACTER IS ON THE STACK
(1)                               ;*                               ;;WITH PARITY BIT STRIPPED OFF
(1)                               ;:
    
```

```

(1) 012252 011646              $RDCHR: MOV    (SP),-(SP)     ;;PUSH DOWN THE PC
(1) 012254 016666 000004 000002 MOV    4(SP),2(SP)     ;;SAVE THE PS
(1) 012262 105777 166656      1$: TSTB   @$TKS         ;;WAIT FOR
(1) 012266 100375              BPL    1$              ;;A CHARACTER
(1) 012270 117766 166652 000004 MOVB   @$TKB,4(SP)     ;;READ THE TTY
(1) 012276 042766 177600 000004 BIC    #^C<177>,4(SP) ;;GET RID OF JUNK IF ANY
(1) 012304 026627 000004 000023 CMP    4(SP),#23       ;;IS IT A CONTROL-S?
(1) 012312 001013              BNE    3$              ;;BRANCH IF NO
(1) 012314 105777 166624      2$: TSTB   @$TKS         ;;WAIT FOR A CHARACTER
(1) 012320 100375              BPL    2$              ;;LOOP UNTIL ITS THERE
(1) 012322 117746 166620      MOVB   @$TKB,-(SP)    ;;GET CHARACTER
(1) 012326 042716 177600      BIC    #^C177,(SP)    ;;MAKE IT 7-BIT ASCII
(1) 012332 022627 000021      CMP    (SP)+,#21      ;;IS IT A CONTROL-Q?
(1) 012336 001366              BNE    2$              ;;IF NOT DISCARD IT
(1) 012340 000750              BR     1$              ;;YES, RESUME
(1) 012342 026627 000004 000140 3$: CMP    4(SP),#140     ;;IS IT UPPER CASE?
(1) 012350 002407              BLT    4$              ;;BRANCH IF YES
(1) 012352 026627 000004 000175 CMP    4(SP),#175     ;;IS IT A SPECIAL CHAR?
(1) 012360 003003              BGT    4$              ;;BRANCH IF YES
(1) 012362 042766 000040 000004 BIC    #40,4(SP)      ;;MAKE IT UPPER CASE
(1) 012370 000002      4$: RTI                ;;GO BACK TO USER
    
```

```

(2)                               ;:*****
(1)                               ;:THIS ROUTINE WILL INPUT A STRING FROM THE TTY
(1)                               ;:CALL:
(1)                               ;:*
(1)                               ;*   RDLIN                 ;;INPUT A STRING FROM THE TTY
(1)                               ;*   RETURN HERE          ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
(1)                               ;*                               ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
    
```

```

(1) 012372 010346          $RDLIN: MOV    R3,-(SP)          ;;SAVE R3
(1) 012374 012703 012500  1$:    MOV    #$TTYIN,R3        ;;GET ADDRESS
(1) 012400 022703 012510  2$:    CMP    #$TTYIN+8.,R3      ;;BUFFER FULL?
(1) 012404 101405          BLOS   4$                    ;;BR IF YES
(1) 012406 104410          RDCHR          ;;GO READ ONE CHARACTER FROM THE TTY
(1) 012410 112613          MOVB   (SP)+,(R3)          ;;GET CHARACTER
(1) 012412 122713 000177  10$:   CMPB   #177,(R3)          ;;IS IT A RUBOUT
(1) 012416 001003          BNE    3$                    ;;SKIP IF NOT
(1) 012420 104401 001166  4$:    TYPE  ,SQUES              ;;TYPE A '?'
(1) 012424 000763          BR     1$                    ;;CLEAR THE BUFFER AND LOOP
(1) 012426 111337 012476  3$:    MOVB   (R3),9$            ;;ECHO THE CHARACTER
(1) 012432 104401 012476          TYPE  ,9$
(1) 012436 122723 000015          CMPB   #15,(R3)+          ;;CHECK FOR RETURN
(1) 012442 001356          BNE    2$                    ;;LOOP IF NOT RETURN
(1) 012444 105063 177777          CLRB   -1(R3)              ;;CLEAR RETURN (THE 15)
(1) 012450 104401 001170          TYPE  ,LF                  ;;TYPE A LINE FEED
(1) 012454 012603          MOV    (SP)+,R3            ;;RESTORE R3
(1) 012456 011646          MOV    (SP),-(SP)          ;;ADJUST THE STACK AND PUT ADDRESS OF THE
(1) 012460 016666 000004 000002  MOV    4(SP),2(SP)          ;; FIRST ASCII CHARACTER ON IT
(1) 012466 012766 012500 000004  MOV    #$TTYIN,4(SP)
(1) 012474 000002          RTI                        ;;RETURN
(1) 012476 000          9$:    .BYTE  0                ;;STORAGE FOR ASCII CHAR. TO TYPE
(1) 012477 000          .BYTE  0                ;;TERMINATOR
(1) 012500 000010          $TTYIN: .BLKB 8.           ;;RESERVE 8 BYTES FOR TTY INPUT
(1) 012510 052536 005015 000          $CNTLU: .ASCIZ /^U/<15><12>  ;;CONTROL 'U'
(1) 012515 136 006507 000012          $CNTLG: .ASCIZ /^G/<15><12>  ;;CONTROL 'G'
(1) 012522 005015 053523 020122          $MSWR:  .ASCIZ <15><12>/SWR = /
(1) 012530 020075 000
(1) 012533 040 047040 053505          $MNEW:  .ASCIZ / NEW = /
(1) 012540 036440 000040
1329 .SBTTL READ AN OCTAL NUMBER FROM THE TTY
(1)
(2) ;;*****
(1) ;;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
(1) ;;*CHANGE IT TO BINARY.
(1) ;;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
(1) ;;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A '?' WILL BE TYPED
(1) ;;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
(1) ;;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
(1) ;;*CALL:
(1) ;;* RDOCT                ;;READ AN OCTAL NUMBER
(1) ;;* RETURN HERE          ;;LOW ORDER BITS ARE ON TOP OF THE STACK
(1) ;;*                      ;;HIGH ORDER BITS ARE IN $HIOCT
(1)
(1) 012544 011646          $RDOCT: MOV    (SP),-(SP)          ;;PROVIDE SPACE FOR THE
(1) 012546 016666 000004 000002  MOV    4(SP),2(SP)          ;;INPUT NUMBER
(3) 012554 010046          MOV    R0,-(SP)            ;;PUSH R0 ON STACK
(3) 012556 010146          MOV    R1,-(SP)            ;;PUSH R1 ON STACK
(3) 012560 010246          MOV    R2,-(SP)            ;;PUSH R2 ON STACK
(1) 012562 104411          1$:    RDLIN          ;;READ AN ASCII LINE
(1) 012564 012600          MOV    (SP)+,R0            ;;GET ADDRESS OF 1ST CHARACTER
(1) 012566 010037 012672          MOV    R0,5$              ;;AND SAVE IT
(1) 012572 005001          CLR    R1                  ;;CLEAR DATA WORD
    
```

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(1) 012574 005002          CLR      R2
(1) 012576 112046          2$: MOVB   (R0)+, -(SP)    ;; PICKUP THIS CHARACTER
(1) 012600 001420          BEQ     3$                ;; IF ZERO GET OUT
(1) 012602 122716 000060  CMPB   #'0,(SP)          ;; MAKE SURE THIS CHARACTER
(1) 012606 003026          BGT     4$                ;; IS AN OCTAL DIGIT
(1) 012610 122716 000067  CMPB   #'7,(SP)
(1) 012614 002423          BLT     4$
(1) 012616 006301          ASL     R1                ;; *2
(1) 012620 006102          ROL     R2
(1) 012622 006301          ASL     R1                ;; *4
(1) 012624 006102          ROL     R2
(1) 012626 006301          ASL     R1                ;; *8
(1) 012630 006102          ROL     R2
(1) 012632 042716 177770  BIC     #^C7,(SP)        ;; STRIP THE ASCII JUNK
(1) 012636 062601          ADD     (SP)+, R1        ;; ADD IN THIS DIGIT
(1) 012640 000756          BR      2$                ;; LOOP
(1) 012642 005726          3$: TST   (SP)+          ;; CLEAN TERMINATOR FROM STACK
(1) 012644 010166 000012  MOV    R1, 12(SP)        ;; SAVE THE RESULT
(1) 012650 010237 012702  MOV    R2, $HIOCT
(3) 012654 012602          MOV    (SP)+, R2        ;; POP STACK INTO R2
(3) 012656 012601          MOV    (SP)+, R1        ;; POP STACK INTO R1
(3) 012660 012600          MOV    (SP)+, R0        ;; POP STACK INTO R0
(1) 012662 000002          RTI
(1) 012664 005726          4$: TST   (SP)+          ;; CLEAN PARTIAL FROM STACK
(1) 012666 105010          CLRB   (R0)              ;; SET A TERMINATOR
(1) 012670 104401          TYPE
(1) 012672 000000          5$: .WORD 0                ;; TYPE UP THRU THE BAD CHAR.
(1) 012674 104401 001166  TYPE   , $QUES          ;; '?' 'CR' & 'LF'
(1) 012700 000730          BR     1$                ;; TRY AGAIN
(1) 012702 000000          $HIOCT: .WORD 0          ;; HIGH ORDER BITS GO HERE
1330 .SBTTL APT COMMUNICATIONS ROUTINE
(1)
(2)
(1) 012704 112737 000001 013150 $ATY1: MOVB   #1, $FFLG    ;; TO REPORT FATAL ERROR
(1) 012712 112737 000001 013146 $ATY3: MOVB   #1, $MFLG    ;; TO TYPE A MESSAGE
(1) 012720 000403          BR     $ATYC
(1) 012722 112737 000001 013150 $ATY4: MOVB   #1, $FFLG    ;; TO ONLY REPORT FATAL ERROR
(2) 012730          $ATYC:
(3) 012730 010046          MOV    R0, -(SP)        ;; PUSH R0 ON STACK
(3) 012732 010146          MOV    R1, -(SP)        ;; PUSH R1 ON STACK
(1) 012734 105737 013146  TSTB   $MFLG            ;; SHOULD TYPE A MESSAGE?
(1) 012740 001450          BEQ    5$                ;; IF NOT: BR
(1) 012742 122737 000001 001212  CMPB   #APTENV, $ENV     ;; OPERATING UNDER APT?
(1) 012750 001031          BNE    3$                ;; IF NOT: BR
(1) 012752 132737 000100 001213  BITB   #APTSPOOL, $ENVM  ;; SHOULD SPOOL MESSAGES?
(1) 012760 001425          BEQ    3$                ;; IF NOT: BR
(1) 012762 017600 000004          MOV    @4(SP), R0        ;; GET MESSAGE ADDR.
(1) 012766 062766 000002 000004  ADD    #2, 4(SP)         ;; BUMP RETURN ADDR.
(1) 012774 005737 001172          1$: TST   $MSGTYPE        ;; SEE IF DONE W/ LAST XMISSION?
(1) 013000 001375          BNE    1$                ;; IF NOT: WAIT
(1) 013002 010037 001206          MOV    R0, $MSGAD        ;; PUT ADDR IN MAILBOX
(1) 013006 105720          2$: TSTB   (R0)+          ;; FIND END OF MESSAGE
(1) 013010 001376          BNE    2$
(1) 013012 163700 001206          SUB    $MSGAD, R0        ;; SUB START OF MESSAGE
  
```

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(1) 013016 006200 ASR R0 ;:GET MESSAGE LNGTH IN WORDS
(1) 013020 010037 001210 MOV RO,$MSGGLT ;:PUT LENGTH IN MAILBOX
(1) 013024 012737 000004 001172 MOV #4,$MSGTYPE ;:TELL APT TO TAKE MSG.
(1) 013032 000413 BR 5$
(1) 013034 017637 000004 013060 3$: MOV @4(SP),4$ ;:PUT MSG ADDR IN JSR LINKAGE
(1) 013042 062766 000002 000004 ADD #2,4(SP) ;:BUMP RETURN ADDRESS
(3) 013050 013746 177776 MOV 177776,-(SP) ;:PUSH 177776 ON STACK
(1) 013054 004737 013574 JSR PC,$TYPE ;:CALL TYPE MACRO
(1) 013060 000000 4$: .WORD 0
(1) 013062 5$:
(1) 013062 105737 013150 10$: TSTB $FFLG ;:SHOULD REPORT FATAL ERROR?
(1) 013066 001416 BEQ 12$ ;:IF NOT: BR
(1) 013070 005737 001212 TST $ENV ;:RUNNING UNDER APT?
(1) 013074 001413 BEQ 12$ ;:IF NOT: BR
(1) 013076 005737 001172 11$: TST $MSGTYPE ;:FINISHED LAST MESSAGE?
(1) 013102 001375 BNE 11$ ;:IF NOT: WAIT
(1) 013104 017637 000004 001174 MOV @4(SP),$FATAL ;:GET ERROR #
(1) 013112 062766 000002 000004 ADD #2,4(SP) ;:BUMP RETURN ADDR.
(1) 013120 005237 001172 INC $MSGTYPE ;:TELL APT TO TAKE ERROR
(1) 013124 105037 013150 12$: CLRB $FFLG ;:CLEAR FATAL FLAG
(1) 013130 105037 013147 CLRB $LFLG ;:CLEAR LOG FLAG
(1) 013134 105037 013146 CLRB $MFLG ;:CLEAR MESSAGE FLAG
(3) 013140 012601 MOV (SP)+,R1 ;:POP STACK INTO R1
(3) 013142 012600 MOV (SP)+,R0 ;:POP STACK INTO R0
(1) 013144 000207 RTS PC ;:RETURN
(1) 013146 000 $MFLG: .BYTE 0 ;:MESSG. FLAG
(1) 013147 000 $LFLG: .BYTE 0 ;:LOG FLAG
(1) 013150 000 $FFLG: .BYTE 0 ;:FATAL FLAG
(1) 013152 .EVEN
(1) 000200 APTSIZE=200
(1) 000001 APTENV=001
(1) 000100 APTSPool=100
(1) 000040 APTCSUP=040
```

```
1331 .SBTTL CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
(1)
(2) ;:*****
(1) ;:*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
(1) ;:*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
(1) ;:*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
(1) ;:*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
(1) ;:*REPLACED WITH SPACES.
(1) ;:*CALL:
(1) ;:* MOV NUM,-(SP) ;:PUT THE BINARY NUMBER ON THE STACK
(1) ;:* TYPDS ;:GO TO THE ROUTINE
(2) $TYPDS:
(3) 013152 010046 MOV R0,-(SP) ;:PUSH R0 ON STACK
(3) 013154 010146 MOV R1,-(SP) ;:PUSH R1 ON STACK
(3) 013156 010246 MOV R2,-(SP) ;:PUSH R2 ON STACK
(3) 013160 010346 MOV R3,-(SP) ;:PUSH R3 ON STACK
(3) 013162 010546 MOV R5,-(SP) ;:PUSH R5 ON STACK
(1) 013164 012746 020200 MOV #20200,-(SP) ;:SET BLANK SWITCH AND SIGN
(1) 013170 016605 000020 MOV 20(SP),R5 ;:GET THE INPUT NUMBER
(1) 013174 100004 BPL 1$ ;:BR IF INPUT IS POS.
```

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(1) 013176 005405          NEG      R5          ;;MAKE THE BINARY NUMBER POS.
(1) 013200 112766 000055 000001  MOVB    #'-,1(SP)   ;;MAKE THE ASCII NUMBER NEG.
(1) 013206 005000          CLR      R0          ;;ZERO THE CONSTANTS INDEX
(1) 013210 012703 013366 1$:    MOV     #$DBLK,R3   ;;SETUP THE OUTPUT POINTER
(1) 013214 112723 000040          MOVB    #' ,(R3)+   ;;SET THE FIRST CHARACTER TO A BLANK
(1) 013220 005002          CLR      R2          ;;CLEAR THE BCD NUMBER
(1) 013222 016001 013356 2$:    MOV     $DTBL(R0),R1 ;;GET THE CONSTANT
(1) 013226 160105          SUB     R1,R5       ;;FORM THIS BCD DIGIT
(1) 013230 002402          BLT     4$         ;;BR IF DONE
(1) 013232 005202          INC     R2          ;;INCREASE THE BCD DIGIT BY 1
(1) 013234 000774          BR      3$
(1) 013236 060105          4$:    ADD     R1,R5       ;;ADD BACK THE CONSTANT
(1) 013240 005702          TST     R2          ;;CHECK IF BCD DIGIT=0
(1) 013242 001002          BNE     5$         ;;FALL THROUGH IF 0
(1) 013244 105716          TSTB   (SP)        ;;STILL DOING LEADING 0'S?
(1) 013246 100407          BMI     7$         ;;BR IF YES
(1) 013250 106316          5$:    ASLB   (SP)        ;;MSD?
(1) 013252 103003          BCC     6$         ;;BR IF NO
(1) 013254 116663 000001 177777  MOVB    1(SP),-1(R3) ;;YES--SET THE SIGN
(1) 013262 052702 000060 6$:    BIS     #'0,R2     ;;MAKE THE BCD DIGIT ASCII
(1) 013266 052702 000040 7$:    BIS     #' ,R2     ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
(1) 013272 110223          MOVB    R2,(R3)+   ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
(1) 013274 005720          TST     (R0)+     ;;JUST INCREMENTING
(1) 013276 020027 000010          CMP     R0,#10    ;;CHECK THE TABLE INDEX
(1) 013302 002746          BLT     2$         ;;GO DO THE NEXT DIGIT
(1) 013304 003002          BGT     8$         ;;GO TO EXIT
(1) 013306 010502          MOV     R5,R2     ;;GET THE LSD
(1) 013310 000764          BR      6$         ;;GO CHANGE TO ASCII
(1) 013312 105726          8$:    TSTB   (SP)+     ;;WAS THE LSD THE FIRST NON-ZERO?
(1) 013314 100003          BPL     9$         ;;BR IF NO
(1) 013316 116663 177777 177776  MOVB    -1(SP),-2(R3) ;;YES--SET THE SIGN FOR TYPING
(1) 013324 105013          9$:    CLRB   (R3)      ;;SET THE TERMINATOR
(3) 013326 012605          MOV     (SP)+,R5   ;;POP STACK INTO R5
(3) 013330 012603          MOV     (SP)+,R3   ;;POP STACK INTO R3
(3) 013332 012602          MOV     (SP)+,R2   ;;POP STACK INTO R2
(3) 013334 012601          MOV     (SP)+,R1   ;;POP STACK INTO R1
(3) 013336 012600          MOV     (SP)+,R0   ;;POP STACK INTO R0
(1) 013340 104401 013366          TYPE   $DBLK      ;;NOW TYPE THE NUMBER
(1) 013344 016666 000002 000004  MOV     2(SP),4(SP) ;;ADJUST THE STACK
(1) 013352 012616          MOV     (SP)+,(SP)
(1) 013354 000002          RTI
(1) 013356 023420          $DTBL: 10000.     ;;RETURN TO USER
(1) 013360 001750          1000.
(1) 013362 000144          100.
(1) 013364 000012          10.
(1) 013366 000004          $DBLK: .BLKW 4
  
```


(1) 013746 002770 BLT 6\$::BR IF NO--GO POP THE NULL OFF OF STACK
(1) 013750 004737 014006 JSR PC,\$TYPEC ::GO TYPE A NULL
(1) 013754 105337 014052 DECB \$CHARCNT ::DO NOT COUNT AS A COUNT
(1) 013760 000770 BR 7\$::LOOP

(1) (1) :HORIZONTAL TAB PROCESSOR

(1) 013762 112716 000040 8\$: MOVB #' ,(SP) ::REPLACE TAB WITH SPACE
(1) 013766 004737 014006 9\$: JSR PC,\$TYPEC ::TYPE A SPACE
(1) 013772 132737 000007 014052 BITB #7,\$CHARCNT ::BRANCH IF NOT AT
(1) 014000 001372 BNE 9\$::TAB STOP
(1) 014002 005726 TST (SP)+ ::POP SPACE OFF STACK
(1) 014004 000724 BR 2\$::GET NEXT CHARACTER
(1) 014006 105777 165136 \$TYPEC: TSTB @\$TPS ::WAIT UNTIL PRINTER IS READY
(1) 014012 100375 BPL \$TYPEC
(1) 014014 116677 000002 165130 MOVB 2(SP),@\$TPB ::LOAD CHAR TO BE TYPED INTO DATA REG.
(1) 014022 122766 000015 000002 CMPB #CR,2(SP) ::IS CHARACTER A CARRIAGE RETURN?
(1) 014030 001003 BNE 1\$::BRANCH IF NO
(1) 014032 105037 014052 CLRB \$CHARCNT ::YES--CLEAR CHARACTER COUNT
(1) 014036 000406 BR \$TYPEX ::EXIT
(1) 014040 122766 000012 000002 1\$: CMPB #LF,2(SP) ::IS CHARACTER A LINE FEED?
(1) 014046 001402 BEQ \$TYPEX ::BRANCH IF YES
(1) 014050 105227 INCB (PC)+ ::COUNT THE CHARACTER
(1) 014052 000000 \$CHARCNT: .WORD 0 ::CHARACTER COUNT STORAGE
(1) 014054 000207 \$TYPEX: RTS PC

1348 (1) .SBTTL BINARY TO OCTAL (ASCII) AND TYPE

(1) (2) ::*****
(1) *THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
(1) *OCTAL (ASCII) NUMBER AND TYPE IT.
(1) *\$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
(1) *CALL:
(1) * MOV NUM,-(SP) ::NUMBER TO BE TYPED
(1) * TYPOS ::CALL FOR TYPEOUT
(1) * .BYTE N ::N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
(1) * .BYTE M ::M=1 OR 0
(1) * ::1=TYPE LEADING ZEROS
(1) * ::0=SUPPRESS LEADING ZEROS
(1) *\$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
(1) *\$TYPOS OR \$TYPOC
(1) *CALL:
(1) * MOV NUM,-(SP) ::NUMBER TO BE TYPED
(1) * TYPON ::CALL FOR TYPEOUT
(1) *\$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
(1) *CALL:
(1) * MOV NUM,-(SP) ::NUMBER TO BE TYPED
(1) * TYPOC ::CALL FOR TYPEOUT
(1) 014056 017646 000000 \$TYPOS: MOV @(SP),-(SP) ::PICKUP THE MODE
(1) 014062 116637 000001 014301 MOVB 1(SP),\$OFILL ::LOAD ZERO FILL SWITCH
(1) 014070 112637 014303 MOVB (SP)+,\$OMODE+1 ::NUMBER OF DIGITS TO TYPE

(1)	014074	062716	000002		ADD	#2,(SP)	::ADJUST RETURN ADDRESS
(1)	014100	000406			BR	\$TYPON	
(1)	014102	112737	000001	014301	\$TYPOC: MOVB	#1,\$OFILL	::SET THE ZERO FILL SWITCH
(1)	014110	112737	000006	014303	MOVB	#6,\$OMODE+1	::SET FOR SIX(6) DIGITS
(1)	014116	112737	000005	014300	\$TYPON: MOVB	#5,\$OCNT	::SET THE ITERATION COUNT
(1)	014124	010346			MOV	R3,-(SP)	::SAVE R3
(1)	014126	010446			MOV	R4,-(SP)	::SAVE R4
(1)	014130	010546			MOV	R5,-(SP)	::SAVE R5
(1)	014132	113704	014303		MOVB	\$OMODE+1,R4	::GET THE NUMBER OF DIGITS TO TYPE
(1)	014136	005404			NEG	R4	
(1)	014140	062704	000006		ADD	#6,R4	::SUBTRACT IT FOR MAX. ALLOWED
(1)	014144	110437	014302		MOVB	R4,\$OMODE	::SAVE IT FOR USE
(1)	014150	113704	014301		MOVB	\$OFILL,R4	::GET THE ZERO FILL SWITCH
(1)	014154	016605	000012		MOV	12(SP),R5	::PICKUP THE INPUT NUMBER
(1)	014160	005003			CLR	R3	::CLEAR THE OUTPUT WORD
(1)	014162	006105		1\$:	ROL	R5	::ROTATE MSB INTO 'C'
(1)	014164	000404			BR	3\$::GO DO MSB
(1)	014166	006105		2\$:	ROL	R5	::FORM THIS DIGIT
(1)	014170	006105			ROL	R5	
(1)	014172	006105			ROL	R5	
(1)	014174	010503			MOV	R5,R3	
(1)	014176	006103		3\$:	ROL	R3	::GET LSB OF THIS DIGIT
(1)	014200	105337	014302		DECB	\$OMODE	::TYPE THIS DIGIT?
(1)	014204	100016			BPL	7\$::BR IF NO
(1)	014206	042703	177770		BIC	#177770,R3	::GET RID OF JUNK
(1)	014212	001002			BNE	4\$::TEST FOR 0
(1)	014214	005704			TST	R4	::SUPPRESS THIS 0?
(1)	014216	001403			BEQ	5\$::BR IF YES
(1)	014220	005204		4\$:	INC	R4	::DON'T SUPPRESS ANYMORE 0'S
(1)	014222	052703	000060		BIS	#'0,R3	::MAKE THIS DIGIT ASCII
(1)	014226	052703	000040		BIS	#',R3	::MAKE ASCII IF NOT ALREADY
(1)	014232	110337	014276		MOVB	R3,8\$::SAVE FOR TYPING
(1)	014236	104401	014276		TYPE	,8\$::GO TYPE THIS DIGIT
(1)	014242	105337	014300		DECB	\$OCNT	::COUNT BY 1
(1)	014246	003347			BGT	2\$::BR IF MORE TO DO
(1)	014250	002402			BLT	6\$::BR IF DONE
(1)	014252	005204			INC	R4	::INSURE LAST DIGIT ISN'T A BLANK
(1)	014254	000744			BR	2\$::GO DO THE LAST DIGIT
(1)	014256	012605		6\$:	MOV	(SP)+,R5	::RESTORE R5
(1)	014260	012604			MOV	(SP)+,R4	::RESTORE R4
(1)	014262	012603			MOV	(SP)+,R3	::RESTORE R3
(1)	014264	016666	000002 000004		MOV	2(SP),4(SP)	::SET THE STACK FOR RETURNING
(1)	014272	012616			MOV	(SP)+,(SP)	
(1)	014274	000002			RTI		::RETURN
(1)	014276	000		8\$:	.BYTE	0	::STORAGE FOR ASCII DIGIT
(1)	014277	000			.BYTE	0	::TERMINATOR FOR TYPE ROUTINE
(1)	014300	000		\$OCNT:	.BYTE	0	::OCTAL DIGIT COUNTER
(1)	014301	000		\$OFILL:	.BYTE	0	::ZERO FILL SWITCH
(1)	014302	000000		\$OMODE:	.WORD	0	::NUMBER OF DIGITS TO TYPE


```

1352          .SBTTL POWER DOWN AND UP ROUTINES
(1)
(2)          ::*****
(1)          :POWER DOWN ROUTINE
(1) 014366 012737 014532 000024 $PWRDN: MOV    #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
(1) 014374 012737 000340 000026      MOV    #340,@#PWRVEC+2 ;;PRIO:7
(3) 014402 010046      MOV    R0,-(SP)      ;;PUSH R0 ON STACK
(3) 014404 010146      MOV    R1,-(SP)      ;;PUSH R1 ON STACK
(3) 014406 010246      MOV    R2,-(SP)      ;;PUSH R2 ON STACK
(3) 014410 010346      MOV    R3,-(SP)      ;;PUSH R3 ON STACK
(3) 014412 010446      MOV    R4,-(SP)      ;;PUSH R4 ON STACK
(3) 014414 010546      MOV    R5,-(SP)      ;;PUSH R5 ON STACK
(3) 014416 017746      MOV    @SWR,-(SP)     ;;PUSH @SWR ON STACK
(1) 014422 010637 014536      MOV    SP,$SAVR6     ;;SAVE SP
(1) 014426 012737 014440 000024      MOV    #$PWRUP,@#PWRVEC ;;SET UP VECTOR
(1) 014434 000000      HALT
(1) 014436 000776      BR      -2          ;;HANG UP
(1)
(2)          ::*****
(1)          :POWER UP ROUTINE
(1) 014440 012737 014532 000024 $PWRUP: MOV    #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
(1) 014446 013706 014536      MOV    $SAVR6,SP     ;;GET SP
(1) 014452 005037 014536      CLR    $SAVR6       ;;WAIT LOOP FOR THE TTY
(1) 014456 005237 014536      1$:  INC    $SAVR6     ;;WAIT FOR THE INC
(1) 014462 001375      BNE    1$           ;;OF WORD
(3) 014464 012677 164450      MOV    (SP)+,@SWR    ;;POP STACK INTO @SWR
(3) 014470 012605      MOV    (SP)+,R5     ;;POP STACK INTO R5
(3) 014472 012604      MOV    (SP)+,R4     ;;POP STACK INTO R4
(3) 014474 012603      MOV    (SP)+,R3     ;;POP STACK INTO R3
(3) 014476 012602      MOV    (SP)+,R2     ;;POP STACK INTO R2
(3) 014500 012601      MOV    (SP)+,R1     ;;POP STACK INTO R1
(3) 014502 012600      MOV    (SP)+,R0     ;;POP STACK INTO R0
(1) 014504 012737 014366 000024      MOV    #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
(1) 014512 012737 000340 000026      MOV    #340,@#PWRVEC+2 ;;PRIO:7
(1) 014520 104401      TYPE                                ;;REPORT THE POWER FAILURE
(1) 014522 010312      $PWRMG: .WORD PWRMSG ;;POWER FAIL MESSAGE POINTER
(1) 014524 012716      MOV    (PC)+,(SP)   ;;RESTART AT RBEGIN
(1) 014526 001354      $PWRAD: .WORD RBEGIN ;;RESTART ADDRESS
(1) 014530 000002      RTI
(1) 014532 000000      $ILLUP: HALT
(1) 014534 000776      BR      -2          ;;THE POWER UP SEQUENCE WAS STARTED
(1) 014536 000000      $SAVR6: 0          ;;BEFORE THE POWER DOWN WAS COMPLETE
                          ;;PUT THE SP HERE
1353
1354
1355          ;START OF BUFFER SPACE
1356
1357 014540 000000      BUFFER: 0
1358          .END
  
```


CZVTNA VT105 ACCEPTANCE TEST CZVTNA.P11 CROSS REFERENCE TABLE		MACY11 27(654)		19-SEP-78 11:19		D 6 PAGE 35-3									SEQ 0068		
DDISP = 177570		13#	29	112													
DELAY 007756		195	210	234	248	286	326	348	377	410	429	452	473	504			
		536	571	585	648	658	674	689	703	716	758	1174#					
DISPLA 001142		29#	112*	1344*													
DISPRE 000174		19#	112														
DSPCH 007702		1138	1140	1141	1142	1148#											
DSWR = 177570		13#	29	112													
DUSTC 011602		720	1313#														
EMTVEC= 000030		13#															
EM3 010641		89	1296#														
ERRVEC= 000004		13#	96*	97*	112*	1344*											
ESC = 000033		43#	179	218	258	299	356	389	562	576	613	635	754	787			
		829	852	872	929	1316	1320	1321	1322	1323							
FINDOT 007542		1097	1100	1116#	1120	1131	1133	1139	1144	1146							
FINDTA 007552		1096*	1099*	1118#													
FIRST 001254		67#	117*	142*	143	145	161										
GAITE 011627		558	1314#														
GETCHR 010226		1119	1255#														
GIN 001416		100	109#														
GINA 001424		98	106	110#													
GNS = ***** U		19	1350														
GROF = 000062		44#	755	1320													
GRON = 000061		45#	180	219	259	300	357	390	563	577	614	636	788	830			
		852	873	930	1316												
GROA1 011067		334	1301#														
GTSWR = 104406		1143	1350#														
HGOA1 011233		416	1304#														
HT = 000011		13#	1347														
IOTVEC= 000020		13#	112*	114*													
LAST 001256		69#	154*	158*	763												
LDBASE 006476		670	685	929#													
LDCO = 000103		55#	443	449													
LDC1 = 000113		56#	465	470													
LDEO = 000101		49#	181	220	260	265	301	305	358	391	567	581	615	729			
		789	831	853	855	874	931	1317									
LDE1 = 000111		50#	183	222	262	303	564	578	617	653	877	1318					
LDGO = 000102		52#	273	339	366	420	438	481	495	667	698	740					
LDG1 = 000112		53#	313	344	399	425	460	513	527	682	711	746					
LF = 000012		13#	1347														
LHVO = 000104		58#	186	199	620												
LHV1 = 000114		59#	225	238	638												
LNO = 000100		47#	198	237	267	272	307	312	360	365	393	398	637	728			
		739	745	798	834	839	854	856	858	882	887	935					
LOOP 007532		113*	1095*	1098*	1110#	1342											
LSC = 000110		61#	268	308	361	394	794	835	857	883							
MAXHOZ= 000354		37#	191	205	345	426	461	482	514	683	712	810	940				
MAXVRT= 001000		39#	226	240	276	316	369	402	486	518	899						
MQO 010426		1096	1289#														
MQ1 010503		1099	1118	1290#													
MSCOPE 013376		114	1334#														
MTOB 010302		725	1244	1247	1275#												
NOEXIT 007536		970*	1077*	1083*	1103	1112#											
PC = %000007		13#	188*	194*	195*	202*	209*	210*	227*	233*	234*	241*	247*	248*			
		270*	275*	283*	286*	310*	315*	323*	326*	341*	347*	348*	363*	368*			

374*	377*	396*	401*	407*	410*	422*	428*	429*	440*	446*	451*	452*
462*	468*	472*	473*	483*	499*	504*	515*	531*	536*	570*	571*	584*
585*	606*	622*	628*	640*	646*	648*	657*	658*	673*	674*	688*	689*
701*	702*	703*	714*	715*	716*	738*	744*	757*	758*	763*	796*	801*
837*	842*	885*	890*	927*	937*	943*	955*	961*	1108*	1119*	1192*	1249*
1262*	1268*	1328*	1330*	1347*	1352							

PIRQ = 177772
 PIRQVE = 000240
 PRO = 000000
 PR1 = 000040
 PR2 = 000100
 PR3 = 000140
 PR4 = 000200
 PR5 = 000240
 PR6 = 000300
 PR7 = 000340
 PS = 177776
 PSW = 177776
 PWRMSG 010312
 PWRVEC = 000024
 RBEGIN 001354
 RDCHR = 104410
 RDLIN = 104411
 RDOCT = 104412
 RESVEC = 000010
 RSTRT 002054
 RSTRTA 002046
 RO = %000000

1283#	1352		
13#	112*	1352*	
20	99#	1352	
1328	1350#		
1329	1350#		
139	150	1350#	

163#	763												
161#	763												
13#	102*	104*	105	138*	140*	142	151*	153	154	155	163*	164*	
165*	166*	167*	168*	169*	170*	178*	179*	180*	181*	182*	183*	184*	
185*	186*	189*	193*	197*	198*	199*	203*	208*	217*	218*	219*	220*	
221*	222*	223*	224*	225*	228*	232*	236*	237*	238*	242*	246*	257*	
258*	259*	260*	261*	262*	263*	265*	266*	267*	268*	271*	272*	273*	
277*	282*	298*	299*	300*	301*	302*	303*	304*	305*	306*	307*	308*	
311*	312*	313*	317*	322*	355*	356*	357*	358*	359*	360*	361*	364*	
365*	366*	370*	373*	388*	389*	390*	391*	392*	393*	394*	397*	398*	
399*	403*	406*	487*	489*	490	519*	521*	522	561*	562*	563*	564*	
565*	566*	567*	568*	569*	575*	576*	577*	578*	579*	580*	581*	582*	
583*	596*	597*	598*	599*	600*	602*	605*	612*	613*	614*	615*	616*	
617*	618*	619*	620*	623*	627*	634*	635*	636*	637*	638*	641*	645*	
652*	653*	654*	655*	656*	724*	727	728*	729*	730*	731*	739*	740*	
741*	745*	746*	747*	754*	755*	756*	763*	786*	787*	788*	789*	790*	
791*	793*	794*	797*	798*	799*	802*	814*	826	828*	829*	830*	831*	
832*	833*	834*	835*	838*	839*	840*	843*	844*	846*	871*	872*	873*	
874*	875*	876*	877*	880*	881*	882*	883*	886*	887*	888*	891*	901*	
929*	930*	931*	932*	933*	935*	938*	944*	947*	956*	960*	965	971*	
997	1107*	1124	1125*	1126	1128	1130	1132	1134*	1135*	1136	1137*	1138	
1140	1141	1142	1242*	1246	1260*	1276*	1329*	1330*	1331*	1347*	1350*	1352*	
13#	103*	104	107	189	203	228	242	271	277	311	317	364	
370	397	403	486*	492	500*	518*	524	532*	601*	603*	623	641	
741	747	797	802	827	838	843	845*	878*	879*	881	886	891	
914*	915*	916*	917*	918*	919*	920	926*	938	944	956	966	997*	
999	1004	1007	1008	1009	1010	1011	1012	1013	1014	1071*	1072	1073	
1106*	1275*	1276	1329*	1330*	1331*	1352*							
13#	595*	607*	911*	912	914	967	1036*	1039*	1041*	1043*	1045*	1047*	

R1 = %000001

R2 = %000002

\$CDW1	001252	29#	103				
\$CHARC	014052	1347#*					
\$CKSWR	011770	1328#	1350				
\$CMTAG	001100	29#	112				
\$CM1 =	000002	29#					
\$CM2 =	000004	29#					
\$CM3 =	000002	29#					
\$CNTLG	012515	1328#					
\$CNTLU	012510	1328#					
\$CPUOP	001220	29#					
\$CRLF	001167	29#	1328	1329	1347		
\$DBLK	013366	1331#					
\$DEVCT	001202	29#					
\$DEVN	001250	29#					
\$DOAGN	005342	763#					
\$DTBL	013356	1331#					
\$ENDAD	005332	26	763#				
\$ENDCT	005300	112	763#				
\$ENDMG	005351	763#					
\$ENULL	005346	763#					
\$ENV	001212	29#	1330	1347			
\$ENVM	001213	29#	112	1330	1347		
\$EOP	005174	763#					
\$EOPCT	005272	112*	763#				
\$ERFLG	001103	29#	1344*				
\$ERMAX	001115	29#	1344				
\$ERRPC	001116	29#					
\$ERRTB	001254	29#					
\$ERTTL	001112	29#					
\$ETABL	001212	29#					
\$ETEND	001254	28	29#				
\$FATAL	001174	29#	1330*				
\$FFLG	013150	1330#*					
\$FILLC	001156	29#	1347				
\$FILLS	001155	29#	1347				
\$GDADR	001120	29#					
\$GDDAT	001124	29#	1035*	1084*	1086*	1102*	
\$GET42	005322	763#					
\$GTSWR	012040	1328#	1350				
\$HD =	000000	12					
\$HIBTS	001000	28#					
\$HIOCT	012702	1329#*					
\$ICNT	001104	29#					
\$ILLUP	014532	1352#					
\$INTAG	001135	29#	1328				
\$ITEMB	001114	29#					
\$LF	001170	29#	1328	1329	1347		
\$LFLG	013147	1330#*					
\$LPADR	001106	29#	112*	1140*	1344*		
\$LPERR	001110	29#	1141*				
\$MADR1	001224	29#					
\$MADR2	001230	29#					
\$MADR3	001234	29#					
\$MADR4	001240	29#					

\$MAIL	001172	28	29#	112	1344	1347												
\$MAMS1	001222	29#																
\$MAMS2	001226	29#																
\$MAMS3	001232	29#																
\$MAMS4	001236	29#																
\$MBADR	001002	28#																
\$MFLG	013146	1330#*																
\$MNEW	012533	1328#																
\$MSGAD	001206	29#	1330*															
\$MSGLG	001210	29#	1330*															
\$MSGTY	001172	29#	1330*															
\$MSWR	012522	1328#																
\$MTYP1	001223	29#																
\$MTYP2	001227	29#																
\$MTYP3	001233	29#																
\$MTYP4	001237	29#																
\$NULL	001154	29#	1347															
\$NWTST=	000001	174#	213#	251#	292#	332#	349#	382#	414#	432#	454#	475#	507#	554#				
		588#	661#	676#	692#	705#	718#											
\$OCNT	014300	1348#*																
\$OMODE	014302	1348#*																
\$OVER	013560	1343	1344#															
\$PASS	001200	29#	112*	555	591	763*	1184											
\$PASTM	001006	28#																
\$PWRAD	014526	1352#																
\$PWRDN	014366	112	1352#															
\$PWRMG	014522	1352#																
\$PWRUP	014440	1352#																
\$QUES	001166	29#	1328	1329	1347													
\$RDCHR	012252	1328#	1350															
\$RDDEC=	***** U	1350																
\$RDLIN	012372	1328#	1350															
\$RDOCT	012544	1329#	1350															
\$RDSZ =	000010	1328#																
\$REGAD	001160	29#																
\$REGO	001162	29#																
\$REG1	001164	29#																
\$RTNAD	005344	763#																
\$R2A =	***** U	1350																
\$SAVRE=	***** U	1350																
\$SAVR6	014536	1352#*																
\$SCOPE	013444	112	1341	1344#														
\$SETUP=	000135	31#	112	763	1328	1344												
\$STUP =	177777	31#																
\$SVLAD	013536	1344#																
\$SVPC =	000200	26#																
\$SWR =	040400	5#	12	29	112	174	213	251	292	332	349	382	414	432				
		454	475	507	554	588	661	676	692	705	718	763	1344	1352				
\$SWREG	001214	29#	112															
\$SWRMK=	000000	1344																
\$TESTN	001176	29#	1344*															
\$TKB	001146	29#	138	1328														
\$TKS	001144	29#	1328*															
\$TN =	000024	6#	12	174#	213#	251#	287	292#	327	332#	349#	378	382#	411				

.\$ERRO	7#		
.\$ERRT	9#		
.\$SPARM	8#		
.\$SPOWE	8#	1352	
.\$RDOC	9#	1329	
.\$READ	8#	1328	
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.\$STRAP	8#	1350	
.\$STYPD	9#	1331	
.\$STYPE	7#	8#	1347
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ADD	166	168	170	624	642	763	1261	1328	1329	1330	1331	1347	1348		
ASL	879	1137	1328	1329	1350										
ASLB	1331														
ASR	1178	1179	1330												
BCC	1331														
BEQ	106	112	129	141	152	491	523	556	592	737	743	763	807	896	924
	954	975	998	1006	1079	1092	1127	1129	1139	1177	1185	1328	1329	1330	1335
	1338	1344	1347	1348											
BGT	763	1328	1329	1331	1348										
BHI	144	156	1131												
BIC	763	806	895	913	921	1074	1125	1134	1328	1329	1348				
BIS	922	925	1328	1331	1348										
BISB	791	833	876	881											
BIT	763	923	1182	1334	1337	1344									
BITB	112	1330	1347												
BLO	1133														
BLOS	1328														
BLT	1328	1329	1331	1347	1348										
BMI	1016	1018	1020	1022	1024	1026	1028	1030	1061	1187	1331				
BNE	112	116	122	133	192	206	231	244	279	285	319	325	372	376	405
	409	503	535	604	608	753	763	811	900	941	946	1000	1034	1063	1066
	1076	1082	1090	1094	1104	1180	1183	1189	1265	1277	1328	1330	1331	1343	1344
	1347	1348	1352												
BPL	131	626	644	804	813	893	959	973	977	979	981	983	985	987	989
	991	1032	1088	1123	1191	1259	1267	1328	1331	1341	1347	1348			
BR	98	100	108	112	123	157	287	327	378	411	488	501	520	533	748
	750	782	808	897	957	1002	1037	1040	1042	1044	1046	1048	1050	1052	1054
	1080	1085	1097	1100	1120	1144	1146	1328	1329	1330	1331	1344	1347	1348	1352
CLR	94	95	112	113	120	158	160	763	795	884	934	947	950	960	968
	969	970	1003	1035	1059	1077	1086	1098	1175	1256	1328	1329	1331	1348	1352
CLRB	193	208	232	246	282	322	373	406	569	583	605	627	645	656	756
	814	844	901	1328	1329	1330	1331	1344	1347						
CMP	88	105	112	128	143	155	191	205	230	625	643	763	810	899	940
	1075	1081	1089	1091	1093	1328	1331	1344							
CMPB	999	1126	1128	1130	1132	1328	1329	1330	1344	1347					
DEC	121	229	243	278	318	371	404	500	502	532	534	603	607	752	763
	805	812	894	945	958	1062	1065	1135	1188	1190	1264	1266			
DECB	1347	1348													
EMT	13														
HALT	19	1145	1347	1352											
INC	190	204	763	809	898	939	1001	1328	1330	1331	1348	1352			
INCB	763	1083	1339	1344	1347										
IOT	13														
JMP	19	20	21	171	763	1038	1067	1142							
JSR	175	188	194	195	202	209	210	214	227	233	234	241	247	248	252
	270	275	283	286	293	310	315	323	326	333	338	341	343	347	348
	350	363	368	374	377	383	396	401	407	410	415	419	422	424	428
	429	433	437	440	442	446	448	451	452	455	459	462	464	468	469
	472	473	476	480	483	494	499	504	508	512	515	526	531	536	557
	570	571	584	585	593	606	622	628	640	646	648	657	658	662	666
	670	673	674	677	681	685	688	689	693	697	701	702	703	706	710
	714	715	716	719	725	738	744	757	758	760	763	796	801	837	842
	885	890	937	943	955	1117	1119	1244	1247	1249	1328	1330	1347		
MOV	93	96	97	99	101	102	103	104	109	112	114	117	138	140	142

.IF	12	13	19	26	28	29	31	112	174	213	251	287	292	327	332
	349	378	382	411	414	432	454	475	507	554	556	588	592	661	676
.IFF	692	705	718	763	1092	1328	1329	1330	1331	1344	1347	1348	1350	1352	382
	13	26	28	29	112	174	213	251	287	292	327	332	349	378	718
	411	414	432	454	475	507	554	556	588	592	661	676	692	705	
.IFT	763	1092	1328	1329	1330	1331	1344	1347	1348	1350	1352				
.IFTF	1328	1329	1344												
.IIF	12	19	29	112	763	1328	1329	1344	1347	1350					
.IRP	31	174	213	251	292	332	349	382	414	432	454	475	507	554	588
	661	676	692	705	718	763	1329	1330	1331	1344	1352				
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	414	432	454	475	507	554	588	661	676	692	705	718	763	1328	1344
	1350														
.MACRO	29	62	112	538	1350										
.MCALL	7	8	9	10	13	29	112								
.MEXIT	29														
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	1350														
.PAGE	29														
.REPT	19	29													
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	454	475	507	554	588	661	676	692	705	718	763	1280	1328	1329	1330
	1331	1344	1347	1348	1350	1352									
.TITLE	12														
.WORD	19	26	28	29	340	345	421	426	439	444	450	461	466	471	482
	496	497	514	528	529	668	683	699	712	763	1329	1330	1347	1348	1350
	1352														

ERRORS DETECTED: 0

*CZVTNA,CZVTNA/CRF=CZVTNA
RUN-TIME: 23 9 1 SECONDS
CORE USED: 25K