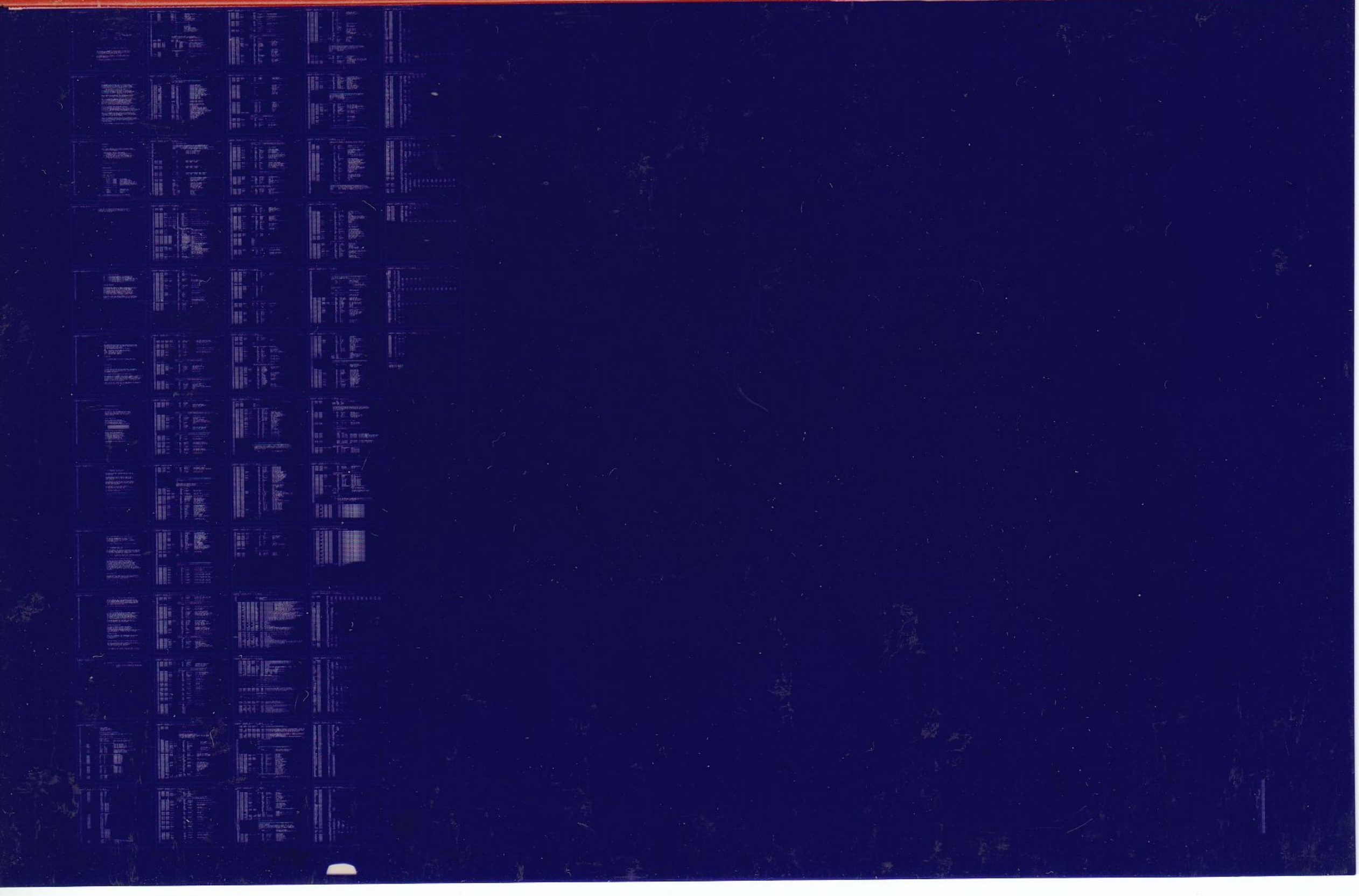
M7142

ACCPT TST
CZVTOA0

AH-F208A-MC

FICHE 1 OF 1

MAR 1979
digital
MADE IN USA



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                        .REM ^
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IDENTIFICATION

PRODUCT CODE: AC-F207A-MC

PRODUCT NAME: CZVTOA0 M7142 (SERIAL VIDEO BOARD)
ACCEPTANCE TEST

PROGRAM DATE: JANUARY 1979

MAINTAINER: DIAGNOSTICS - MERRIMACK

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                1.      ABSTRACT
                        --------

                THIS PROGRAM IS AN ACCEPTANCE TEST OF THE M7142 SERIAL VIDEO BOARD.
                THE PROGRAM CONSISTS OF FIVE PARTS, ALL OF WHICH REQUIRE
                OPERATOR INSPECTION OR INTERACTION. THE PROGRAM IS CAPABLE
                OF HANDLING MULTIPLE UNITS IN A SEQUENTIAL DLV-11 FASHION (REF 8.2).
                **********************************************************
                        ONLY ONE M7142 IS TESTED AT ONE TIME.
                **********************************************************
                THE PROGRAM WILL DEFAULT TO THE CONSOLE TTY (REF 5.0 AND 8.2).
                ALL CHARACTERS AND COMMANDS ARE TESTED. IN THE KEYBOARD CHARACTER
                TEST THE BREAK, AND REPEAT "FUNCTION" KEYS ARE NOT TESTED.

                PART 1  CONSISTS OF A SERIES OF TEST PATTERNS DISPLAYED ON THE
                SCREEN (REF 9. FOR DESCRIPTION). THE OPERATOR MUST VISUALLY
                INSPECT EACH TEST PATTERN FOR ERROR DETECTION.

                PART 2  IS A KEYBOARD CHARACTER TEST. THIS TEST IS TO DETERMINE
                THAT THE TERMINAL IS GENERATING THE EXPECTED ASCII CODES.
                IN THIS TEST AN OPERATOR WILL BE REQUIRED TO FOLLOW THE
                INSTRUCTIONS DISPLAYED ON THE SCREEN AND EXECUTE THEM.
                DUE TO THE FLEXIBILITY OF DIFFERENT PROCESSORS OR OPTIONS,
                PARITY BIT TESTING MUST BE SELECTED BY THE OPERATOR. THE OPERATOR
                SELECTS THE TYPE OF PARITY TO BE TESTED BY SW 00-01

                PART 3 IS A KEYBOARD OCTAL VALUE LOOP. WHEN A KEY IS DEPRESSED,
                THE OCTAL VALUE WILL BE DISPLAYED ON THE SCREEN.
                IF THE KEY DEPRESSED WAS PRINTABLE, IT WILL ALSO BE DISPLAYED
                ON THE SCREEN. SOME NON-PRINTING CHARACTERS (SUCH AS CTRL-C,CTRL-D...
                OR CR, LF...) HAVE BEEN "DEFINED" IN THE PROGRAM SO IF ANY OF THESE
                KEYS ARE DEPRESSED, IT'S TWO LETTER EQUIVALENT WILL BE DISPLAYED.

                PART 4 IS A KEYBOARD ECHO LOOP. WHEN A KEY IS DEPRESSED, THE
                CHARACTER IS ECHOED TO THE SCREEN. NO TESTING OF THE CHARACTER
                IS PERFORMED. THIS ALLOWS THE OPERATOR A 'LOCAL' MODE OF OPERATION
                BETWEEN THE M7142 AND THE HOST COMPUTER.

                PART 5 IS A CHARACTER ATTRIBUTE TEST (M.S.B. SELETECTED).  A FULL
                SCREEN OF FIVE BLOCKS (FIVE LINES EACH) IS PRINTED WITH ALTERNATE
                BLOCKS HAVING ANY ENABLED CHARACTER ATTRIBUTES SELECTED BY SETTING THE
                MOST SIGNIFICANT BIT (MSB) IN  EACH OF THE CHARACTER CODES
                AS THEY ARE PRINTED.

                THIS TEST IS DESIGNED TO TEST THAT M.S.B.=1 IN  THE CHARACTER CODE
                WILL CAUSE ANY ENABLED CHARACTER ATTRIBUTES TO BE SELECTED.
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                                2.      REQUIREMENTS
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                                2.1     EQUIPMENT

                                        PDP-11 FAMILY COMPUTER WITH 6K WORDS OF READ/WRITE MEMORY
                                        M7142 SERIAL VIDEO BOARD WITH (SCREEN AND KEYBOARD) CONNECTED
                                           VIA A DLV-11 TYPE INTERFACE.

                                        - "FORM-FEED INIT." MUST BE JUMPER ENABLED.
                                        - "SI/SO CHARACTER ATTRIBUTE SELECTION" MUST BE ENABLED
                                                IN ORDER FOR TEST "F" TO RUN CORRECTLY.
                                        - "MSB SET IN CHAR. CODE TO SELECT CHAR. ATTRIBUTE" MUST BE
                                                ENABLED IN ORDER FOR TEST "M" TO RUN CORRECTLY.
                                        - AT LEAST ONE CHAR. ATTRIBUTE MUST BE SELECTED FOR TESTS
                                                "F" AND "M" TO RUN CORRECTLY.


                                2.2     STORAGE

                                        THIS PROGRAM USES 8K OF MEMORY.



                                3.      LOADING PROCEDURE
                                        -----------------

                                        PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED.

                                4.      STARTING PROCEDURE
                                        ------------------

                                4.1     CONTROL SWITCH SETTINGS

                                        STANDARD PDP-11 FORMAT

                                                SW 15 = 1  (100000)     HALT ON ERROR
                                                SW 14 = 1  (040000)     LOOP ON PRESENT TEST
                                                SW 13 = 1  (020000)     INHIBIT ERROR TYPEOUTS
                                                SW 12 = 1  (010000)     INHIBIT PROGRAM SUB-TEST DELAY
                                                SW 10 = 1  (002000)     SKIP KEYBOARD CHARACTER TEST (I)
                                                SW 09 = 1  (001000)     SELECT NON-DEFAULT (NON-CONSOLE)
                                                                        ADDRESSES FOR M7142'S BEING TESTED
                                                SW 08 = 1  (000400)     LOOP ON TEST IN SWR <7:0>

                                        KEYBOARD CHARACTER TEST ONLY

                                                SW02   =        1       ENABLE PARITY BIT TEST
                                                SW00-01=        00      EVEN PARITY CHECK
                                                SW00-01=        01      ODD PARITY CHECK
                                                SW00-01=        10      ALWAYS A 0
                                                SW00-01=        11      ALWAYS A 1

                        SPECIAL NOTE:   IF THE COMPUTER UTILIZED IS A LSI 11 OR A COMPUTER
                                WITHOUT A SWITCH REGISTER,THE PROGRAM WILL UTILIZE LOCATIONS
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                        174 AND 176 AS A "DISPLAY" REGISTER AND A "SWITCH" REGISTER
                        RESPECTIVELY. THE OPERATOR WILL BE RESPONSIBLE FOR THE
                        LOADING OF THE "SWITCH" REGISTER LOCATION PRIOR TO STARTING
                        OR RESTARTING THE PROGRAM.
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163
164                                   4.2     STARTING ADDRESS OR ADDRESSES
165
166                                           200     IS THE STARTING ADDRESS OF THE ACCEPTANCE TEST
167                                           204     IS THE RESTART ADDRESS OF THE ACCEPTANCE TEST
168                                           210     IS THE STARTING ADDRESS OF THE FULL KEYBOARD CHAR. TEST
169                                           214     IS THE STARTING ADDRESS OF THE KEYBOARD OCTAL VALUE LOOP
170                                           220     IS THE STARTING ADDRESS OF THE KEYBOARD ECHO LOOP
171                                           224     IS THE STARTING ADDRESS OF THE CHARACTER ATTRIBUTE
172                                                           TEST (M.S.B. SELECTED)
173
174
175                                   5.      OPERATING PROCEDURE
176                                           ------------------
177
178                                           THE OPERATOR MUST INSERT THE CORRECT INFORMATION IN THE SWITCH
179                                           REGISTER WHEN REQUIRED BY THE PROGRAM OR AN ERROR WILL OCCUR.
180                                           ONCE STARTED, THE TEST WILL RUN IN ITS NORMAL MANNER
181                                           WHICH INCLUDES THE EXECUTION OF A "QUICK" KEYBOARD TEST
182                                           THAT REQUIRES OPERATOR INTERVENTION UNLESS SW 10 IS SET
183                                           IN THE SWITCH REGISTER.  HOWEVER, IF SW 10 IS NOT SET
184                                           THE PROGRAM DOES "TIMEOUT" AND PRINT A "TIMEOUT MESSAGE" IF
185                                           A KEY IS NOT DEPRESSED IN A RESONABLE PERIOD OF TIME.
186
187                                           IF THE M7142 IS NOT THE CONSOLE TERMINAL WITH IT'S FIRST DEVICE
188                                           ADDRESS AT 177560, THEN SW 09 MUST BE SET TO TELL THE PROGRAM
189                                           WHERE IT IS.  SW 09 MUST ALSO BE SET IF MORE THAN ONE M7142
190                                           IS TO BE TESTED.
191
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192
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195
196                                 6.      ERRORS
197                                         ------
198
199                                         MOST ERRORS MUST BE DETECTED BY VISUAL INSPECTION OF PATTERNS
200                                         PRINTED ON THE SCREEN.  ONLY THE KEYBOARD TESTS RESULT IN ANY
201                                         ERROR REPORTING AND TYPEOUT. REFER TO THE "ERROR POINTER TABLE"
202                                         FOR TYPE AND DESCRIPTION OF ERRORS.
203                                         THE ERROR INFORMATION CONSISTS OF THE FOLLOWING:
204
205                                         ERRPC - LOCATION AT WHICH AN ERROR WAS DETECTED
206                                         VTNOW - CURRENT DLV-11 BUS ADDRESS OF M7142 UNDER TEST
207                                         TSTNUM- TEST NUMBER OF FAILING TEST
208                                         EXPT  - EXPECTED INPUT CHARACTER
209                                         RCVD  - RECEIVED INPUT CHARACTER
210
211                                 7.      RESTRICTIONS
212                                         ------------
213
214                                             THE OPERATOR SHOULD SET SW 09 IF THE M7142 UNDER TEST
215                                             IS NOT THE CONSOLE TTY, OR NOT AT THE ADDRESS = 177560.
216
217
218
219
220                                 8.      MISCELLANEOUS
221                                         ------------
222
223                                 8.1     EXECUTION TIME
224
225                                         EXECUTION TIME WILL VARY WITH THE "BAUD" RATE, THE PROGRAM
226                                         WILL TYPE 'END PASS' ON THE CONSOLE WHEN A PASS HAS BEEN COMPLETED.
227                                         THE KEYBOARD LOOP AND CHARACTER TEST WILL NOT EXIT UNTIL
228                                         THE PROGRAM IS RESTARTED.
229
230                                 8.2     DEVICE ADDRESS PROGRAM LOCATIONS (AT APPROX. 1222)
231
232                                         THE LOCATION "FIRST" CONTAINS THE FIRST DLV11 ADDRESS IF SEVERAL M7142'S
233                                         ARE BEING TESTED. THE DEFAULT IS THE CONSOLE ADDRESS <177560>
234                                         THE LOCATION "LAST" CONTAINS THE LAST DLV11 ADDRESS IF SEVERAL M7142'S
235                                         ARE BEING TESTED. LOCATION "VTNOW" CONTAINS THE CURRENT DLV11 BASE
236                                         ADDRESS. IF SEVERAL M7142'S ARE BEING TESTED, THEIR ADDRESSES ARE
237                                         ASSUMED TO BE 10 OCTAL BYTES APART.
238
239                                         *NOTE:  IF THE LOCS. "FIRST" OR "LAST" ARE CHANGED, THE OPERATOR MUST
240                                         START THE TEST AGAIN AT LOC. 200.  THE PROGRAM WILL USE THE BASE
241                                         ADDRESS TO UPDATE THE ACTUAL PROGRAM VALUES.
242
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243
244
245
246                                   9.      PROGRAM DESCRIPTION <SCREEN>
247                                           ----------------------
248
249
250                                   9.1  A  FULL SCREEN OF THE LETTER E
251
252                                           THIS TEST WILL FILL THE SCREEN WITH THE LETTER E.
253                                           THIS TEST WILL LOAD THE SCREEN RAM WITH A SINGLE
254                                           CHARACTER IN ALL LOCATIONS. THIS TEST IS USED TO
255                                           VISUALLY CHECK THE LINEARITY AND CENTERING OF THE
256                                           M7142/CRT SYSTEM.
257
258
259                                   9.2  B  SIMPLE CHARACTER SET
260
261                                           ONE FULL LINE OF EACH CHARACTER
262                                           (CODES 40 THRU 176) OF THE CHARACTER
263                                           SET.  THIS WILL ALSO TEST THAT ALL WORDS
264                                           IN THE SCREEN RAM CAN BE LOADED.
265                                           THIS WILL ALSO EXERCISE THE SCROLLING FUNCTION.
266
267                                           IE:  AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
268                                                BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
269                                                CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
270                                                DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
271
272                                   9.3  C  INCREMENTING AND SLIDING CHARACTER SET
273
274                                           ONE FULL LINE OF AN INCREMENTING
275                                           CHARACTER SET ACROSS THE FULL SCREEN
276                                           STARTING WITH THE CODE 40 (SPACE)
277                                           THE NEXT LINE SHOULD BEGIN WITH THE
278                                           "!" CHARACTER (CODE 41) ETC.  CONTINUE
279                                           THE PATTERN BY INCREMENTING THE
280                                           FIRST COLUMN CHARACTER UNTIL THE
281                                           FULL CHARACTER SET HAS BEEN EXHAUSTED.
282
283                                           THIS PATTERN WILL VERIFY THAT THE FULL
284                                           CHARACTER SET CAN BE DISPLAYED IN EACH
285                                           SCREEN WORD.
286
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                                9.4  D  CURSOR MOTION TEST (CR,TAB,LF,BKSP,VT USED)
                                          (FORM-FEED INITIALIZED)

                                   THIS TEST IS THE BASIC CURSOR MOTION TEST USING THE
                                   CARRIAGE-RETURN, TAB, LINE-FEED, BACKSPACE, AND VERTICAL
                                   TAB CAHRACTERS.

                                   THE FIRST PART OF THE TEST PRINTS A LINE OF TEXT,
                                   "CARRIAGE-RETURN'S" BACK TO THE LEFT MARGIN AND THEN
                                   "TAB'S" OVER THE TEXT TO BE SURE A "TAB" DOESN'T
                                   ERASE CHARACTERS.

                                   THE SECOND PART OF THE TEST MOVES THE CURSOR DOWN BY
                                   PRINTING SOME LINE-FEEDS, PRINTS A MESSAGE, AND THEN
                                   BACKSPACES OVER THAT MESSAGE TO BE SURE A BACKSPACE
                                   DOES NOT ERASE CHARACTERS.

                                   THE THIRD PART OF THE TEST DOES A SERIES OF
                                   VERTICAL TABS TO BE SURE THAT A VERTICAL TAB ADVANCES
                                   THE CURSOR DOWN THE SCREEN ONE LINE.

                                   THE FOLLOWING DIAGRAM IS WHAT THE SCREEN SHOULD LOOK LIKE
                                   WHEN THE TEST IS COMPLETE:

                                   ------------------------------------------------
                                   + TAB OVER-NO CHARACTER ERASE <CR><CR>          +
                                   +<LF>                                           +
                                   +    <LF>                                       +
                                   +        <LF>                                   +
                                   +<CR>    <CR><LF> BACKSPACE OVER-NO CHAR. ERASE +
                                   +<VT>                                           +
                                   +    <VT>                                       +
                                   +        <VT>                                   +
                                   +            <VT>                               +
                                   +                <VT><CR>                       +
                                   +                                               +
                                   +                                               +
                                   ------------------------------------------------

                                   NOTE: "FORM-FEED-INIT." FUNCTION MUST BE ENABLED.
                                   -----
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331
332
333
334                                   9.5  3  DIRECT CURSOR ADDRESSING (D.C.A.) FORM-FEED INITIALIZED
335
336                                      THIS TEST WILL BE RUN USING THE "ESC-Y" SEQUENCE.
337                                      THIS TEST WILL RANDOMLY FILL THE SCREEN.
338                                      THE END RESULT WILL BE A FULL SCREEN OF 25 STATEMENTS,
339                                      EACH STATEMENT ROTATED RIGHT ONE CHAR. WITH RESPECT
340                                      TO THE LINE ABOVE IT.
341
342                                             NOTE: "FORM-FEED-INIT." FUNCTION MUST BE ENABLED.
343                                             -----
344
345
346                                   9.6  F  CHARACTER ATTRIBUTE TESTS (SO/SI SELECTED)
347                                             (FORM-FEED INITIALIZED)
348
349                                      THIS TEST PRINTS A FULL SCREEN OF FIVE BLOCKS (FIVE LINES EACH)
350                                      WITH ALTERNATE BLOCKS HAVING ANY ENABLED CHARACTER ATTRIBUTES
351                                      SELECTED USING A "SO (CNTRL-N)" TO SELECT CHAR. ATTRIBUTES AND
352                                      "SI (CNTRL-O)" TO DESELECT CHAR. ATTRIBUTES.
353
354                                             NOTE: THE ABILITY TO SELECT CHAR. ATTRIBUTES USING SO/SI
355                                             -----   AND AT LEAST ONE CHAR. ATTIBUTE MUST BE ENABLED.
356
357
358                                   9.7  G  SCROLL SPEED JUMP TESTS (FORM-FEED INTIALIZED)
359
360                                      THIS TEST USES SETS OF VERTICAL TABS TO TEST THE
361                                      SCROLLING ABILITIES OF THE M7142.  THE SCREEN IS
362                                      FIRST FILLED WITH 25 LINES OF SINGLE CHARACTERS ACROSS
363                                      ALL COLUMNS.  THE TOP LINE WILL CONTAIN ALL A'S AND
364                                      THE BOTTOM LINE SHOULD BE A SERIES OF Y'S AND A SCROLL COUNT
365                                      AT THE RIGHT END OF THE LAST LINE. THEN 3 SETS OF 25
366                                      VERTICAL TABS ARE SENT (WITH A DELAY BETWEEN SETS) TO SEE
367                                      IF THE SCREEN SCROLLS CORRECTLY.  AFTER EACH SET OF VERTICAL
368                                      TABS, THE TOP LINE SHOULD STILL BE ALL A'S , BUT NOW THE BOTTOM
369                                      LINE SHOULD BE A SERIES OF Y'S AND THE "SCROLL-COUNT" WILL BE
370                                      INCREMENTED.
371
372
373
374                                   9.8  H  COLUMN ADDRESS TEST
375
376                                      THIS TEST PRINTS 25 LINES OF A FULL LINE OF AN INCREMENTING
377                                      CHARACTER SET.  EACH LINE STARTS WITH THE CHARACTER "/".
378                                      FOLLOWED BY "0123456789:;<" AND SO ON SO THAT EACH COLUMN ON THE
379                                      SCREEN IS FILLED WITH A SINGLE CHARACTER.
380
381                                      THIS PATTERN WILL VERIFY THAT EACH COLUMN IS UNIQUELY ADDRESSABLE.
382
383
384
385                                   9.9  I  "QUICK" KEYBOARD CHARACTER TEST
386
```

```
                        IF SW 10 IS SET (=1) THEN THIS TEST IS NOT EXECUTED.

                        THIS IS A PARTIAL TEST IF THE KEYBOARD INCLUDED IN EVERY
                        PASS OF THIS ACCEPTANCE PROCEDURE TO PROVIDE A QUICK CHECK
                        OF THE KEYBOARD INTERFACE UNLESS  SW 10 IS SET.  SW 0 AND 1
                        HAVE THE SAME USE AS IN THE FULL-BLOWN KEYBOARD CHARACTER
                        TEST.  THE FULL-BLOWN TEST SHOULD BE RUN TO ADEQUATELY CHECK
                        THE KEYBOARD. (SEE SECTION 9.10).

                        ONLY PRINTING CHARACTERS ARE ECHOED AS THE KEYS ARE PRESSED.



      9.10 J  FULL KEYBOARD CHARACTER TEST

                        THIS TEST IS DESIGNED TO VERIFY THAT CORRECT CHARACTER CODES
                        AND PARITY BIT ARE GENERATED WHEN A KEY IS DEPRESSED.
                        THIS TEST REQUIRES THE OPERATOR TO EXECUTE THE
                        INSTRUCTIONS DISPLAYED ON THE SCREEN. THE OPERATOR SHOULD
                        ONLY DEPRESS ONE KEY AT A TIME, WITH SOME EXCEPTIONS.
                        THE PROGRAM WILL INFORM THE OPERATOR WHICH ROW TO TEST.
                        ONLY PRINTING CHARACTERS ARE ECHOED AS THE KEYS ARE PRESSED.

                        IN TESTING THE PARITY BIT, SW 0 AND 1 ARE USED TO
                        INFORM THE PROGRAM OF THE EXPECTED PARITY. AN INCORRECT
                        SWITCH SETTING WILL RESULT IN AN ERROR.


      9.11 K  KEYBOARD OCTAL VALUE LOOP

                        THIS LOOP IS PROVIDED TO ENABLE THE OPERATOR
                        TO EXAMINE THE OCTAL VALUE OF A CHARACTER. WHEN A KEY IS
                        DEPRESSED, THE OCTAL VALUE WILL BE DISPLAYED.
                        IF THE CHARACTER WAS A PRINTABLE CHARACTER, IT WILL BE DISPLAYED.
                        THOSE CODES DEFINED AS "CONTROL" WILL BE DISPLAYED AS A
                        TWO LETTER MNEMONIC (IE. DE=DELETE, BL=BELL, CL=CURSOR LEFT ETC.)

      9.12 L  KEYBOARD ECHO LOOP

                        WHEN A KEY IS DEPRESSED, THE CHARACTER WILL BE DISPLAYED.
                        NO MODIFICATION OR DATA TEST IS PERFORMED. THIS TEST CAN
                        BE USED TO DETERMINE IF THERE IS A "UART" OR SERIAL
                        LINE PROBLEM.


      9.13 M  CHARACTER ATTRIBUTE TEST (M.S.B. OF CHAR. CODE SELECTED)

                        THIS TEST IS STARTED BY USING A SEPERATE STARTING ADDRESS
                        AND IS DESIGNED TO TEST THAT SETTING THE M.S.B. OF THE CHARACTER
                        CODES SENT TO THE M7142 WILL CAUSE ENABLED
                        CHARACTER ATTRIBUTES TO BE DISPLAYED.


                        A FULL SCREEN OF FIVE "BLOCKS" (FIVE LINES EACH) IS PRINTED
                        WITH ALTERNATE BLOCKS HAVING ANY ENABLED CHARACTER ATTRIBUTES
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   443                                  SELECTED USING 'M.S.B.'' ON EACH OF THE CHARACTERS AS THEY ARE
   444                                  PRINTED.
   445
   446                                          NOTE:  THE ABILITY TO SELECT CHARACTER ATTRIBUTES USING
   447                                          -----   THE M.S.B. AND AT LEAST ONE CHAR. ATTRIBUTE MUST BE
   448                                                  ENABLED.
   449
   450
   451
```

```
                        .TITLE  CZVTOA0
                        ;*COPYRIGHT (C) 1978
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY DIAGNOSTIC ENGINEERING
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                        ;*
                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                  STACK=  1100
                        .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                        .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

                        ;*MISCELLANEOUS DEFINITIONS
000011                  HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                  LF=     12              ;;CODE FOR LINE FEED
000015                  CR=     15              ;;CODE FOR CARRIAGE RETURN
000200                  CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776                  PS=     177776          ;;PROCESSOR STATUS WORD
                        .EQUIV  PS,PSW
177774                  STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                  PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                  DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                  DDISP=  177570          ;;HARDWARE DISPLAY REGISTER

                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0=     %0              ;;GENERAL REGISTER
000001                  R1=     %1              ;;GENERAL REGISTER
000002                  R2=     %2              ;;GENERAL REGISTER
000003                  R3=     %3              ;;GENERAL REGISTER
000004                  R4=     %4              ;;GENERAL REGISTER
000005                  R5=     %5              ;;GENERAL REGISTER
000006                  R6=     %6              ;;GENERAL REGISTER
000007                  R7=     %7              ;;GENERAL REGISTER
000006                  SP=     %6              ;;STACK POINTER
000007                  PC=     %7              ;;PROGRAM COUNTER

                        ;*PRIORITY LEVEL DEFINITIONS
000000                  PR0=    0               ;;PRIORITY LEVEL 0
000040                  PR1=    40              ;;PRIORITY LEVEL 1
000100                  PR2=    100             ;;PRIORITY LEVEL 2
000140                  PR3=    140             ;;PRIORITY LEVEL 3
000200                  PR4=    200             ;;PRIORITY LEVEL 4
000240                  PR5=    240             ;;PRIORITY LEVEL 5
000300                  PR6=    300             ;;PRIORITY LEVEL 6
000340                  PR7=    340             ;;PRIORITY LEVEL 7

                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
```

```
                        004000          SW11=   4000
                        002000          SW10=   2000
                        001000          SW09=   1000
                        000400          SW08=   400
                        000200          SW07=   200
                        000100          SW06=   100
                        000040          SW05=   40
                        000020          SW04=   20
                        000010          SW03=   10
                        000004          SW02=   4
                        000002          SW01=   2
                        000001          SW00=   1
                                        .EQUIV  SW09,SW9
                                        .EQUIV  SW08,SW8
                                        .EQUIV  SW07,SW7
                                        .EQUIV  SW06,SW6
                                        .EQUIV  SW05,SW5
                                        .EQUIV  SW04,SW4
                                        .EQUIV  SW03,SW3
                                        .EQUIV  SW02,SW2
                                        .EQUIV  SW01,SW1
                                        .EQUIV  SW00,SW0

                                        ;*DATA BIT DEFINITIONS (BIT0C TO BIT15)
                        100000          BIT15=  100000
                        040000          BIT14=  40000
                        020000          BIT13=  20000
                        010000          BIT12=  10000
                        004000          BIT11=  4000
                        002000          BIT10=  2000
                        001000          BIT09=  1000
                        000400          BIT08=  400
                        000200          BIT07=  200
                        000100          BIT06=  100
                        000040          BIT05=  40
                        000020          BIT04=  20
                        000010          BIT03=  10
                        000004          BIT02=  4
                        000002          BIT01=  2
                        000001          BIT00=  1
                                        .EQUIV  BIT09,BIT9
                                        .EQUIV  BIT08,BIT8
                                        .EQUIV  BIT07,BIT7
                                        .EQUIV  BIT06,BIT6
                                        .EQUIV  BIT05,BIT5
                                        .EQUIV  BIT04,BIT4
                                        .EQUIV  BIT03,BIT3
                                        .EQUIV  BIT02,BIT2
                                        .EQUIV  BIT01,BIT1
                                        .EQUIV  BIT00,BIT0

                                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
                        000004          ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
                        000010          RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
                        000014          TBITVEC=14              ;;"T" BIT
                        000014          TRTVEC= 14              ;;TRACE TRAP
```

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                        000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
                        000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
                        000024                  PWRVEC= 24              ;;POWER FAIL
                        000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
                        000034                  TRAPVEC=34              ;;"TRAP" TRAP
                        000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
                        000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
                        000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR

                                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                                ;*
                                                ;*      SWITCH                  USE
                                                ;*      ------          --------------------
                                                ;*        15            HALT ON ERROR
                                                ;*        14            LOOP ON TEST
                                                ;*        13            INHIBIT ERROR TYPEOUTS
                                                ;*        12            INHIBIT SUB-TEST DELAY'S
                                                ;*        10            SKIP KEYBOARD CHARACTER TEST
                                                ;*         9            SELECT NON-CONSOLE ADDRESS
                                                ;*         8            LOOP ON TEST IN SWR<7:0>

                                                .SBTTL  TRAP CATCHER

                        000000                          .=0
                                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                        000174                          .=174
000174  000000                         DISPREG: .WOPD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000                         SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                                .SBTTL  STARTING ADDRESS(ES)
000200  000137  001274                          JMP     @#BEGIN ;;JUMP TO STARTING ADDRESS OF PROGRAM
000204  000137  001314                          JMP     RBEGIN          ;JUMP TO RESTART ADDRESS
000210  000137  001340                          JMP     BEGIN1          ;JUMP TO FULL KEYBOARD CHAR. TEST
000214  000137  001360                          JMP     BEGIN2          ;JUMP TO CHAR OCTAL VALUE LOOP
000220  000137  001330                          JMP     BEGIN3          ;JUMP TO ASCII ECHO LOOP
000224  000137  001350                          JMP     BEGIN4          ;JUMP TO CHAR. ATTRIB. TEST (BIT7 SELECT)
                                                .SBTTL  ACT11 HOOKS

                                                ;;**************************************************************
                                                ;HOOKS REQUIRED BY ACT11
                        000230                          $SVPC=.                 ;SAVE PC
                        000046                          .=46
000046  003764                                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                        000052                          .=52
000052  000000                                  .WORD   0               ;;2)SET LOC.52 TO ZERO
                        000230                          .=$SVPC                 ;; RESTORE PC
```

```
                                .SBTTL  COMMON TAGS

                                ;;*****************************************************************
                                ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                ;*USED IN THE PROGRAM.

                        001100          .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000          $PASS:  .WORD   0               ;;CONTAINS PASS COUNT
001102     000          $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103     000          $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114     000          $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115     001          $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                  .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                  .WORD   0
001134     000          $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135     000          $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000                  .WORD   0
001140  177570          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001144  177560          $TKS:   177560                  ;;TTY KBD STATUS
001146  177562          $TKB:   177562                  ;;TTY KBD BUFFER
001150  177564          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154     000          $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155     002          $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156     012          $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A 'LINE FEED"
001157     000          $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  000000          $REGAD: .WORD   0               ;;CONTAINS THE ADDRESS FROM
                                                        ;;WHICH  ($REG0) WAS OBTAINED
001162  000000          $REG0:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001164  000000          $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001166     077          $QUES:  .ASCII  /?/             ;;QUESTION MARK
001167     015          $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001170  000012          $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;*****************************************************************
```

```
                                .SBTTL  ERROR POINTER TABLE

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

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


001172                          $ERRTB:


                                ;ITEM   1
001172  011665                          EM1             ;ERROR FLAG ON HOST TRANSMIT STATUS
001174  012024                          DH1             ;ERRPC  VTNOW   TSTNUM
001176  012122                          DT1             ;$ERRPC VTNOW   TSTNUM
001200  000000                          0

                                ;ITEM   2
001202  011732                          EM2             ;NO HOST INPUT FLAG RECEIVED
001204  012024                          DH1             ;ERRPC  VTNOW   TSTNUM
001206  012122                          DT1             ;$ERRPC VTNOW   TSTNUM
001210  000000                          0


                                ;ITEM   3
001212  011761                          EM3             ;INCORRECT OR UNEXPECTED INPUT CHARACTER
001214  012053                          DH3             ;ERRPC  VTNOW   TSTNUM   EXPT    RCVD
001216  012132                          DT3             ;$ERRPC VTNOW   TSTNUM   $GDDAT $BDDAT
001220  000000                          0

001222  177560          FIRST:  177560                  ;FIRST DEVICE ADDRESS OF SEQUENTIAL DLV-11-A/B TYPE DEVI
                                                        ;DEFAULT TO THE CONSOLE ADDRESS
001224  000000          LAST:   0                       ;LAST DEVICE ADDRESS OF DLV-11-A/B TYPE
001226  177560          VTNOW:  177560                  ;CURRENT DEVICE BUS ADDRESS
001230  000000          TSTNUM: 0                       ;ERROR PATTERN

001232  000015          TIMEO:  15                      ;CHARACTER FLAG TIMEOUT CONSTANT
001234  000005          SUBTST: 5                       ;SUBTEST DELAY CONSTANT
001236  000070          LASTLN: 70                      ;LAST VALID LINE # +40
001240  003720          TOTALC: 2000.                   ;TOTAL CHARACTER COUNT
001242  000031          VH0:    25.                     ;VERTICAL LINE COUNT
001244  000014          VH1:    12.                     ;1/2 VERTICAL LINE COUNT
001246  000006          VH2:    6.                      ;1/4 VERTICAL LINE COUNT
001250  000000          PRTCNT: 0
001252  177560          VTIS:   177560                  ;DEVICE ADDRESSES
001254  177562          VTIB:   177562                  ;IN DATA
001256  177564          VTOS:   177564                  ;OUT STAT
001260  177566          VTOB:   177566                  ;OUT DATA
001262  000000          STCHAR: 0                       ;TEMP REG'S
001264  000200          LASTCH: 200                     ;FIRST NON-VALID CHARACTER
```

```
                                TEMP0:  0                       ;
                                WIDTH:  80.                     ;COLUMN WIDTH
                                SAVE4:  0                       ;"TYPE TITLE GET DEVICE INFO" INDICATOR

001274  012737  002112  002110  BEGIN:  MOV     #TST1,WHERE     ;STARTING ACCEPTANCE TEST ADDRESS
001302  005037  001272          BEGIN:  CLR     SAVE4
001306  005037  001250          RBEGIN: CLR     PRTCNT
001312  000430                  BEGIN3: BR      GINA
001314  005037  001250          BEGIN1: CLR     PRTCNT          ;RESTART ADDRESS
001320  012737  002112  002110  BEGIN4: MOV     #TST1,WHERE
001326  000417                  BEGIN2: BR      GIN
001330  012737  004606  002110          MOV     #KRBECH,WHERE   ;START AT ECHO LOOP
001336  000413                  GIN:    BR      GIN
001340  012737  004052  002110          MOV     #KRBTST,WHERE   ;STARTING KEYBOARD CHAR. TEST ADDRESS
001346  000407                          BR      GIN
001350  012737  004644  002110          MOV     #CHRATT,WHERE   ;STARTING CHARACTER ATTRIBUTE (BIT8) ADDRESS
001356  000403                          BR      GIN
001360  012737  004316  002110          MOV     #KRBECO,WHERE   ;STARTING CHARACTER LOOP ADDRESS
001366  012737  000001  001272  GIN:    MOV     #1,SAVE4
001374  000005                  GINA:   RESET
                                .SBTTL  INITIALIZE THE COMMON TAGS
                                ;,CLEAR THE COMMON TAGS ($CMTAG) AREA
001376  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
001402  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
001404  022706  001140                  CMP     #SWR,R6 ;;DONE?
001410  001374                          BNE     .-6             ;;LOOP BACK IF NO
001412  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
001416  012737  014550  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
001424  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
001432  012737  014666  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
001440  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
001446  012737  015704  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
001454  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
001462  012737  015762  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
001470  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
001476  013737  003732  003724          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
001504  012737  001504  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
001512  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
001516  012737  001552  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
001524  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
001532  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
001540  022777  177777  177372          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
001546  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
001550  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
001552  012716  001560          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
001556  000002                          RTI
001560  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
001566  012737  000174  001142          MOV     #DISPREG,DISPLAY
001574  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

001600  005037  005172                  CLR     IGNORE
```

```
                                                CLR     LOOP
                                                MOV     #MSCOPE,@#IOTVEC
                                                TST     SAVE4           ;TEST FLAG
                                                BNE     SBEGIN          ;BR IF NON-ZERO
                                                TYPE
                                                TITLE
                                                BIT     #BIT9,@SWR
                                                BEQ     SBEGIN          ;BR IF CLEARED
                                                MOV     #12$,4          ;SET UP SLAVE TIMEOUT
                                                MOV     #340,6          ;LOCK OUT ANY INTERRUPTS
                                        11$:    TYPE
                                                WHATO                   ;FIND OUT THE DEVICE ADDRESS
                                                RDOCT
                                                MOV     (SP)+,FIRST     ;SAVE THE ADDRESS
                                                CMP     #160000,FIRST
                                                BHI     11$             ;BR IF INVALID
                                                TST     @FIRST          ;TEST IF VALID
                                                CLR     LAST
                                                TYPE
                                                WHAT1                   ;FIND OUT THE LAST ADDRESS
                                                RDOCT
                                                MOV     (SP)+,LAST      ;SAVE LAST ADDRESS
                                                TST     @LAST           ;TEST IF VALID
                                                MOV     #6,@#4
                                                CLR     @#6
                                                BR      SBEGIN
                                        12$:    CMP     (SP)+,(SP)+     ;ADJUST STACK FROM TIMEOUT
                                                TYPE
                                                INVLID                  ;INVALID ADDRESS MESSAGE
                                                BR      11$             ;LET OPERATOR HAVE ANO TRY
                                SBEGIN: MOV     FIRST,VTNOW     ;LOAD INITIAL DEVICE ADDRESS

                                RSTRT:  MOV     #VTIS,R0        ;LOAD POINTER
                                        MOV     VTNOW,R1        ;LOAD INPUT STAT
                                        MOV     R1,(R0)+
                                        TST     (R1)+
                                        MOV     R1,(R0)+
                                        TST     (R1)+
                                        MOV     R1,(R0)+
                                        TST     (R1)+
                                        MOV     R1,(R0)
```

```
                                                                                
                                                                                
                                                                                
002004  012737  003720  001240  13$:    MOV     #2000.,TOTALC           ;LOAD TOTAL CHARACTER COUNT
002012  012737  000031  001242          MOV     #25.,VH0                ;LOAD MAX VERTICAL LINE COUNT
002020  012737  000070  001236          MOV     #70,LASTLN              ;LOAD LAST LINE VALUE +40 FOR DCA TESTING
                                                                                
002026  013737  001242  001244  6$:     MOV     VH0,VH1                 ;LOAD OTHER LINE COUNTS
002034  006237  001244                  ASR     VH1
002040  013737  001244  001246          MOV     VH1,VH2
002046  006237  001246                  ASR     VH2
002052  012737  000177  001264          MOV     #177,LASTCH             ;LOAD FIRST NON-VALID CHARACTER
                                                                                
002060  004537  005340          12$:    JSR     R5,AMSG                 ;INIT THE DEVICE WITH A FORM-FEED
002064  011205                          FRMFED
002066  004737  005266                  JSR     PC,ADELAY               ;WAIT FOR FORM-FEED TO FINISH
002072  004537  005340                  JSR     R5,AMSG                 ;PRINT TITLE OF DIAGNOSTIC
002076  006426                          TITLE
002100  004737  005214                  JSR     PC,DELAY
002104  000177  000000                  JMP     @WHERE
002110  002112                  WHERE:  TST1
                                                                                
                                                                                
                                        ;;**************************************************************
                                        ;*TEST 1        A       FULL SCREEN OF A CHARACTER
                                        ;;**************************************************************
002112  000004                  TST1:   SCOPE
                                                                                
002114  004537  005340                  JSR     R5,AMSG
002120  006516                          M91
002122  012701  000105          FILLWC: MOV     #'E,R1          ;LOAD CHARACTER BYTE
002126  004737  004754                  JSR     PC,FILBUF       ;LOAD THE LINE WITH CHAR
002132  013737  001242  002162          MOV     VH0,10$         ;LOAD COUNT
002140  012737  000001  005160  1$:     MOV     #1,XOFFOK       ;INSURE XOFF/XON CONTROL.
002146  004737  005056                  JSR     PC,XPRNT        ;DISPLAY THE LINE
002152  005337  002162                  DEC     10$
002156  001370                          BNE     1$              ;LOOP UNTIL DONE
002160  000401                          BR      11$             ;EXIT
002162  000000                  10$:    0
002164  004737  005214          11$:    JSR     PC,DELAY
                                                                                
                                                                                
                                                                                
                                        ;;**************************************************************
                                        ;*TEST 2        B       SINGLE CHARACTER ACROSS ALL COLS. <ALL CHARACTERS>
                                        ;;**************************************************************
002170  000004                  TST2:   SCOPE
002172  004537  005340                  JSR     R5,AMSG         ;DISPLAY HEADING
002176  006566                          M93
002200  012737  000040  001262          MOV     #40,STCHAR      ;SET-UP STARTING CHARACTER
002206  013737  001242  001266          MOV     VH0,TEMP0       ;LOAD COUNT
002214  013701  001262  1$:     MOV     STCHAR,R1       ;LOAD R1= TO CHARACTER
002220  004737  004754                  JSR     PC,FILBUF       ;LOAD A BUFFER WITH THAT CHARACTER
002224  004737  005056                  JSR     PC,XPRNT        ;DISPLAY A FULL LINE FROM THE BUFFER
002230  005337  001266                  DEC     TEMP0           ;DONE ?
002234  001005                          BNE     2$              ;FINISHED
```

```
002236  004737  005214                    JSR     PC,DELAY
002242  013737  001242  001266            MOV     VHO,TEMPO
002250  005237  001262          2$:       INC     STCHAR             ;UPDATE THE CHARACTER
002254  023737  001264  001262            CMP     LASTCH,STCHAR      ;TEST FOR FINAL CHARACTER
002262  001354                            BNE     1$                 ;BRANCH IF NOT COMPLETED
002264  004737  005214                    JSR     PC,DELAY           ;TEST DELAY SWITCH




                                ;;*****************************************************************
                                ;*TEST 3          C       ROTATING CHARACTERS ACROSS ALL COLS. <ALL CHARACTERS>
                                ;;*****************************************************************
002270  000004                  TST3:     SCOPE
002272  004537  005340                    JSR     R5,AMSG            ;DISPLAY HEADING
002276  006632                            M94
002300  012737  000040  001262            MOV     #40,STCHAR         ;SET-UP STARTING CHARACTER
002306  013737  001242  001266            MOV     VHO,TEMPO          ;LOAD TEMP
002314  013701  001262          1$:       MOV     STCHAR,R1          ;LOAD R1=TO CHARACTER
002320  004537  005010                    JSR     R5,LIC             ;LOAD A BUFFER STARTING WITH
002324  001270                            WIDTH                      ; THAT CHARACTER AND WIDTH <BYTE>
002326  004737  005056                    JSR     PC,XPRNT           ;DISPLAY A FULL LINE FROM THE BUFFER
002332  005337  001266                    DEC     TEMPO              ;DONE ?
002336  001005                            BNE     2$                 ;BR IF YES
002340  004737  005214                    JSR     PC,DELAY
002344  013737  001242  001266            MOV     VHO,TEMPO
002352  005237  001262          2$:       INC     STCHAR             ;UPDATE THE STARTING CHARACTER
002356  023737  001264  001262            CMP     LASTCH,STCHAR      ;TEST FOR FINAL CHARACTER
002364  001353                            BNE     1$                 ;BRANCH IF NOT COMPLETED
002366  004737  005214                    JSR     PC,DELAY           ;TEST DELAY SWITCH


                                ;;*****************************************************************
                                ;*TEST 4          D       CURSOR MOTION TEST (FORM-FEED INIT USED)
                                ;;*****************************************************************
002372  000004                  TST4:     SCOPE
002374  004537  005340                    JSR     R5,AMSG            ;ERASE-SCREEN (FORM-FEED INIT.)
002400  011205                            FRMFED
002402  004737  005266                    JSR     PC,ADELAY          ;WAIT FOR FORM-FEED INIT TO FINISH
002406  004537  005340                    JSR     R5,AMSG            ;DISPLAY HEADING
002412  006665                            M96

002414  012700  022066          MOVTAB:   MOV     #BUFFER,R0         ;LOAD POINTER TO BUFFER
002420  012701  012540                    MOV     #MTAB,R1           ;LOAD POINTER TO TAB MESSAGE
002424  112120                  1$:       MOVB    (R1)+,(R0)+        ;PUT TAB MESSAGE INTO BUFFER
002426  100376                            BPL     1$
002430  004737  005056                    JSR     PC,XPRNT           ;DISPLAY THIS LINE
002434  004737  005214                    JSR     PC,DELAY           ;TEST DELAY SWITCH

002440  012700  022066          MOVBSP:   MOV     #BUFFER,R0         ;LOAD POINTER TO BUFFER
002444  012701  012654                    MOV     #MBKSP,R1          ;LOAD POINTER TO BACKSPACE MESSAGE
002450  112120                  2$:       MOVB    (R1)+,(R0)+        ;PUT MESSAGE INTO BUFFER
002452  100376                            BPL     2$
002454  004737  005056                    JSR     PC,XPRNT           ;DISPLAY THIS LINE
002460  004737  005214                    JSR     PC,DELAY           ;TEST DELAY SWITCH

```

```
                                MOVVT:  MOV     #BUFFER,R0      ;LOAD POINTER TO BUFFER
                                        MOV     #MVT,R1         ;LOAD POINTER TO VERT. TAB MESSAGE
                                3$:     MOVB    (R1)+,(R0)+     ;PUT VERT. TAB MESSAGE INTO BUFFER
                                        BPL     3$
                                        JSR     PC,XPRNT        ;DISPLAY THIS LINE
                                        JSR     PC,DELAY        ;TEST DELAY SWITCH


                                ;;*****************************************************************
                                ;*TEST 5        E       DIRECT CURSOR ADDRESS TEST (FORM-FEED INIT USED)
                                ;;*****************************************************************
                                TST5:   SCOPE


                                ;RANDOM NUMBERS ARE GENERATED AND USED AS "X" AND "Y" COORDINATES
                                ;ADDRESSING A 2000 CHARACTER PRINTOUT.
                                ;VERFICATION OF DISPLAY IS PERFORMED VISUALLY BY THE USER
                                ;USING THE "ESC-Y" SEQUENCE.

                                4$:     JSR     R5,AMSG
                                        FRMFED
                                        JSR     PC,ADELAY       ;WAIT FOR FORM-FEED INIT TO FINISH
                                        JSR     R5,AMSG         ;IDENTIFY TEST
                                        M98
                                        MOVB    #33,BUFFER      ;LOAD "ESC" CODE
                                        MOVB    #'Y,BUFFER+1    ;LOAD ASCII "Y" (D.C.A. ENABLE)

                                DCATST: MOV     #123456,$LONUM  ;PRIME RANDOM NUMBER GENERATOR
                                        MOV     #176543,$HINUM
                                        MOV     TOTALC,OVRAL    ;LOAD CHAR COUNT
                                        MOV     #BUFFER+20,R0   ;LOAD DESTINATION BUFFER
                                2$:     MOV     #MSGTXT,R1      ;LOAD MESSAGE POINTER
                                1$:     MOV     (R1)+,(R0)+     ;LOAD 2 CHARACTERS
                                        CMPB    #377,(R1)       ;TEST FOR LAST CHAR
                                        BNE     1$              ;BR UNTIL DONE
                                        MOV     #-1,BUFFER+4    ;LOAD MESSAGE TERMINATOR (IN 485)

                                GENER:  JSR     PC,$RAND        ;GENERATE RANDOM NUMBER
                                        MOV     $HINUM,R0       ;GET RANDOM NUMBER
                                        BIC     #177700,R0      ;RANDOM NO. MUST BE TWO DIGITS
                                        CMP     R0,#37          ;NO, MUST BE LESS THAN 40
                                        BLOS    GENER           ;LOWER, REGENERATION
                                        CMP     R0,LASTLN       ;NO, MUST NOT BE GREATER THAN 70
                                        BHI     GENER           ;GREATER, REGENERATION
                                        MOV     R0,YADDS        ;STORE RANDOM Y COORDINATE
                                        MOV     R0,R1           ;COPY DATA
                                        MOV     #BUFFER+20,SET  ;LOAD BASE POINTER
                                        SUB     #40,R1          ;MINIMUM Y INDEX
                                        BEQ     GENRX           ;RESULT, MINIMUM Y COORDINATE
                                1$:     ADD     #80.,SET        ;SETUP  Y INDEX LOCATION FOR PRINTOUT
                                        DEC     R1
                                        BNE     1$              ;Y COORDINATE IS SET
                                GENRX:  JSR     PC,$RAND        ;GENERATE RANDOM NUMBER
```

```
  977  002706  013700  015700                    MOV     $RINUM,R0       ;GET A RANDOM NUMBER
  978  002712  042700  177600                    BIC     #177600,R0      ;RANDOM NO. MAY BE LESS THAN 200
  979  002716  020027  000037                    CMP     R0,#37          ; MUST NOT BE LESS THAN 40
  980  002722  101767                            BLOS    GENRX           ;LOWER, REGENERATION
  981  002724  020027  000157                    CMP     R0,#157         ; MUST NOT BE GREATER THAN 157
  982  002730  101364                            BHI     GENRX           ;GREATER, REGENERATION
  983  002732  010037  003024                    MOV     R0,XADDS        ;STORE RANDOM X COORDINATE
  984  002736  162700  000040                    SUB     #40,R0          ;SETUP MINIMUM X INDEX
  985  002742  060037  003026                    ADD     R0,SET          ;SETUP X COOR, FOR PNTOUT.
  986  002746  013701  003026                    MOV     SET,R1          ;SETUP CHECK
  987  002752  105711                            TSTB    (R1)            ;HAS CURRENT CHAR, ALREADY BEEN USED?
  988  002754  001720                            BEQ     GENER           ;YES, REGENERATE
  989  002756  113737  003022  022070            MOVB    YADDS,BUFFER+2  ;LOAD Y COORDINATE
  990  002764  113737  003024  022071            MOVB    XADDS,BUFFER+3  ;LOAD X COORDINATE
  991  002772  111137  022072                    MOVB    (R1),BUFFER+4   ;LOAD CHARACTER TO BE PRINTED
  992  002776  105011                            CLRB    (R1)            ;INDICATE USE OF CURSOR POSITION
  993  003000  004737  005056                    JSR     PC,XPRNT        ;EXECUTE AND PRINT CHARACTER
  994  003004  005337  003030                    DEC     OVRAL           ;MAXIMUM NO. OF COORDINATES
  995  003010  001302                            BNE     GENER           ;BR BACK UNTIL DONE
  996
  997  003012  004737  005214                    JSR     PC,DELAY        ;DELAY TESTING
  998  003016  000137  003032                    JMP     TST6            ;SKIP OVER STORAGE LOCS. TO NEXT TEST
  999
 1000  003022  000000                    YADDS:  0
 1001  003024  000000                    XADDS:  0
 1002  003026  000000                    SET:    0
 1003  003030  000000                    OVRAL:  0
 1004
 1005
 1006
 1007
 1008
 1009                                    ;;*****************************************************************
 1010                                    ;*TEST 6        F       CHARACTER ATTRIBUTE TEST (SI-SO SELECT)
 1011                                    ;;*****************************************************************
 1012  003032  000004                    TST6:   SCOPE
 1013
 1014  003034  004537  005340                    JSR     R5,AMSG         ;ERASE AND INIT SCREEN WITH FORM-FEED
 1015  003040  011205                            FRMFED
 1016  003042  004737  005266                    JSR     PC,ADELAY       ;WAIT FOR FORM-FEED TO FINISH
 1017  003046  004537  005340                    JSR     R5,AMSG         ;DISPLAY HEADER
 1018  003052  007043                            M9221
 1019  003054  004537  005340                    JSR     R5,AMSG         ;SELECT ANY ENABLED CHAR. ATTRIBUTES
 1020  003060  011512                            SO
 1021  003062  004737  005174                    JSR     PC,BLKPRT       ;GO PRINT ATTR. MSG. FIVE TIMES
 1022  003066  004537  005340                    JSR     R5,AMSG         ;DESELECT ANY CHAR. ATTRIBUTES
 1023  003072  011515                            SI
 1024  003074  004737  005174                    JSR     PC,BLKPRT       ;GO PRINT ATTR. MSG FIVE TIMES
 1025  003100  004537  005340                    JSR     R5,AMSG         ;SELECT ANY ENABLED CHAR. ATTRIBUTES
 1026  003104  011512                            SO
 1027  003106  004737  005174                    JSR     PC,BLKPRT       ;GO PRINT ATTR. MSG. FIVE TIMES
 1028  003112  004537  005340                    JSR     R5,AMSG         ;DESELECT ANY CHAR. ATTRIBUTES
 1029  003116  011515                            SI
 1030  003120  004737  005174                    JSR     PC,BLKPRT       ;GO PRINT ATTR. MSG. FIVE TIMES
 1031  003124  004537  005340                    JSR     R5,AMSG         ;SELECT ANY ENABLED CHAR. ATTRIBUTES
 1032  003130  011512                            SO
```

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1033  003132  004737  005174                  JSR     PC,BLKPRT       ;GO PRINT ATTR. MSG. FIVE TIMES
1034  003136  004537  005340                  JSR     R5,AMSG         ;DESELECT ANY CHAR. ATTRIBUTES
1035  003142  011515                          SI
1036  003144  004737  005214                  JSR     PC,DELAY        ;AND GO CHECK DELAY
1037
1038                                  ;;*****************************************************************
1039                                  ;*TEST 7         G       SCROLL SPEED JUMP TEST
1040                                  ;;*****************************************************************
1041  003150  000004                  TST7:   SCOPE
1042
1043  003152  004537  005340                  JSR     R5,AMSG         ;ERASE AND INIT SCREEN WITH FORM-FEED
1044  003156  011205                          FRMFED
1045  003160  004737  005266                  JSR     PC,ADELAY       ;WAIT FOR FORM-FEED TO FINISH
1046  003164  004537  005340                  JSR     R5,AMSG         ;DISPLAY HEADER
1047  003170  006746                          M97
1048  003172  012737  000101  001262          MOV     #101,STCHAR     ;SETUP STARTING CHARACTER
1049  003200  013701  001262          1$:     MOV     STCHAR,R1       ;LOAD R1 WITH CHAR. CODE
1050  003204  004737  004754                  JSR     PC,FILBUF       ;LOAD LINE BUFFER WITH THAT CHAR.
1051  003210  004737  005056                  JSR     PC,XPRNT        ;DISPLAY A FULL LINE FROM THE BUFFER
1052  003214  005237  001262                  INC     STCHAR          ;PUT NEXT CHAR. CODE IN R1
1053  003220  023727  001262  000132          CMP     STCHAR,#132     ;SEE IF HAVE DONE 25 LINES YET
1054  003226  001364                          BNE     1$
1055  003230  004537  005340                  JSR     R5,AMSG         ;PUT SCROLL COUNT ON LAST LINE
1056  003234  011210                          SCRL
1057
1058  003236  012737  000003  001266          MOV     #3,TEMPO        ;SET-UP LOOP COUNTER
1059  003244  112737  000060  011236          MOVB    #60,SCRNO       ;INIT SCROLL COUNT MESSAGE
1060  003252  012701  000031          2$:     MOV     #25.,R1         ;SET-UP VT COUNTER
1061  003256  012700  000013                  MOV     #13,R0          ;PUT VERT. TAB CHAR. CODE IN R0
1062  003262  110077  175772          3$:     MOVB    R0,@VTOB        ;LOAD CHAR. IN OUTPUT BUFFER
1063  003266  105777  175764          4$:     TSTB    @VTOS           ;WAIT UNTIL PRINTED
1064  003272  100375                          BPL     4$
1065  003274  005301                          DEC     R1              ;DECREMENT VT COUNTER
1066  003276  001371                          BNE     3$              ;LOOP UNTIL 25. VT'S PRINTED
1067  003300  105237  011236                  INCB    SCRNO           ;INCREMENT SCROLL COUNT MSG.
1068  003304  004537  005340                  JSR     R5,AMSG         ;UPDATE SCROLL COUNT MSG ON LAST LINE
1069  003310  011210                          SCRL
1070  003312  004737  005214                  JSR     PC,DELAY        ;THEN DELAY BETWEEN SETS OF VT'S
1071  003316  005337  001266                  DEC     TEMPO
1072  003322  001353                          BNE     2$              ;LOOP UNTIL 3 SETS HAVE BEEN DONE
1073
1074                                  ;;*****************************************************************
1075                                  ;*TEST 10        H       COLUMN ADDRESS TEST
1076                                  ;;*****************************************************************
1077  003324  000004                  TST10:  SCOPE
1078  003326  004537  005340                  JSR     R5,AMSG         ;DISPLAY HEADING
1079  003332  007006                          M99
1080  003334  012737  000057  001262          MOV     #57,STCHAR      ;SET-UP STARTING CHARACTER
1081  003342  013737  001242  001266          MOV     VH0,TEMPO       ;LOAD TEMP
1082  003350  005037  001162                  CLR     $REG0           ;CLEAR LINE COUNTER
1083  003354  013701  001262          1$:     MOV     STCHAR,R1       ;LOAD R1=TO CHARACTER
1084  003360  004537  005010                  JSR     R5,LIC          ;LOAD A BUFFER   ITING WITH
1085  003364  001270                          WIDTH                   ; THAT CHARACTER AND WIDTH <BYTE>
1086  003366  004737  005056                  JSR     PC,XPRNT        ;DISPLAY A FULL LINE FROM THE BUFFER
1087  003372  005337  001266                  DEC     TEMPO           ;DONE ?
1088  003376  001005                          BNE     2$              ;BR IF YES
```

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1089  003400  004737  005214                  JSR     PC,DELAY
1090  003404  013737  001242  001266          MOV     VH0,TEMP0
1091  003412  005237  001162          2$:     INC     $REG0           ;INCREMENT THE LINE COUNTER
1092  003416  023737  001242  001162          CMP     VH0,$REG0       ;TEST FOR FULL SCREEN
1093  003424  001353                          BNE     1$              ;BRANCH IF NOT COMPLETED
1094  003426  004737  005214                  JSR     PC,DELAY        ;TEST DELAY SWITCH
1095
1096                                  ;;*****************************************************************
1097                                  ;*TEST 11        I       QUICK KEYBOARD CHARACTER TEST
1098                                  ;;*****************************************************************
1099  003432  000004                  1ST11:  SCOPE
1100  003434  032777  002000  175476  QKBTST: BIT     #BIT10,@SWR     ;SEE IF BIT10 OF SWR SET
1101  003442  001402                          BEQ     1$              ;IF IT ISN'T EXECUTE KEYBD. CHAR. TEST
1102  003444  000137  003624                  JMP     $EOP            ;IF IT IS GO TO $EOP
1103  003450  012703  012146          1$:     MOV     #V52RW,R3       ;SET UP FOR LOWER CASE CHAR.
1104  003454  012706  001100          2$:     MOV     #STACK,SP
1105  003460  004537  005340          A:      JSR     R5,AMSG         ;DISPLAY HEADER
1106  003464  007206                          MKB
1107  003466  012302                          MOV     (R3)+,R2        ;LOAD ROW #
1108  003470  004537  005340                  JSR     R5,AMSG         ;ISSUE ROW1 MESSAGE.
1109  003474  007375                          MKBB2
1110  003476  004737  005456          2$:     JSR     PC,TSTROW       ;CHECK THE ROW
1111
1112  003502  012302                  B:      MOV     (R3)+,R2        ;LOAD ROW #
1113  003504  004537  005340                  JSR     R5,AMSG         ;2ND ROW
1114  003510  007463                          MKBC
1115  003512  004737  005456                  JSR     PC,TSTROW       ;CHECK 2ND ROW
1116
1117  003516  012302                  C:      MOV     (R3)+,R2        ;LOAD ROW #
1118  003520  004537  005340                  JSR     R5,AMSG         ;ISSUE ROW 3 MESSAGE.
1119  003524  007524                          MKBD2
1120  003526  004737  005456          2$:     JSR     PC,TSTROW       ;CHECK ROW 3
1121
1122  003532  012302                          MOV     (R3)+,R2        ;LOAD ROW #
1123  003534  004537  005340                  JSR     R5,AMSG
1124  003540  007614                          MKBE
1125  003542  004737  005456                  JSR     PC,TSTROW       ;CHECK ROW 4
1126
1127  003546  012702  012164                  MOV     #ROW5,R2
1128  003552  004537  005340                  JSR     R5,AMSG
1129  003556  007705                          MKBF
1130  003560  004737  005456                  JSR     PC,TSTROW       ;CHECK ROW 5
1131
1132                                  ;COMPLETION OF KEYBOARD-KEYPAD TEST
1133
1134  003564  004537  005340          QKBDON: JSR     R5,AMSG         ;END OF KEYBOARD TEST
1135  003570  010235                          MKBR
1136  003572  000137  003624                  JMP     $EOP            ;GO TO END OF PASS
1137  003576  013053          DISPCH: MTEXT0
1138  003600  013157                  MTEXT1
1139  003602  013260                  MTEXT2
1140  003604  013362                  MTEXT3
1141  003606  013445                  MTEXT4
1142  003610  013547                  MTEXT5
1143  003612  013650                  MTEXT6
1144  003614  013702                  MTEXT7
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1145  003616  014002                          MTEXT8
1146  003620  000000                          0
1147  003622  000000                          0
1148
1149
1150                                  .SBTTL  END OF PASS ROUTINE
1151
1152                                  ;;*****************************************************************
1153                                  ;*INCREMENT THE PASS NUMBER ($PASS)
1154                                  ;*INDICATE END-OF-PROGRAM AFTER 1 PASSES THRU THE PROGRAM
1155                                  ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
1156                                  ;*IF THERES A MONITOR GO TO IT
1157                                  ;*IF THERE ISN'T JUMP TO NOWEOP
1158
1159  003624                          $EOP:
1160  003624  000004                          SCOPE
1161  003626  005737  001224                  TST     LAST                    ;TEST IF MORE
1162  003632  001414                          BEQ     1$                      ;BR IF NONE
1163  003634  023737  001224  001226          CMP     LAST,VTNOW              ;IS THIS THE LAST ONE
1164  003642  001410                          BEQ     1$                      ;BR IF YES
1165  003644  062737  000010  001226          ADD     #10,VTNOW
1166  003652  012737  002112  002110          MOV     #TST1,WHERE
1167  003660  000137  001756                  JMP     RSTRT                   ;TEST NEXT ONE
1168  003664  005737  001100          1$:     TST     $PASS                   ;TEST IF FIRST PASS
1169  003670  001002                          BNE     2$                      ;BR IF NOT
1170  003672  104401  011642                  TYPE    ,PASHED                 ;TYPE EOP HEADER
1171  003676  000005                  2$:     RESET
1172  003700  004737  005266                  JSR     PC,ADELAY       ;EXTRA DELAY
1173
1174  003704  005037  001102                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
1175  003710  005237  001100                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
1176  003714  042737  100000  001100          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
1177  003722  005327                          DEC     (PC)+           ;;LOOP?
1178  003724  000001          $EOPCT: .WORD   1
1179  003726  003022                          BGT     $DOAGN          ;;YES
1180  003730  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
1181  003732  000001          $ENDCT: .WORD   1
1182  003734  003724                          $EOPCT
1183  003736  104401  004003                  TYPE    ,$ENDMG         ;;TYPE "END PASS #"
1184  003742  013746  001100                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
1185  003746  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
1186  003750  104401  004000                  TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
1187  003754  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
1188  003760  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
1189  003762  000005                          RESET                   ;;CLEAR THE WORLD
1190  003764  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
1191  003766  000240                          NOP                     ;;SAVE ROOM
1192  003770  000240                          NOP                     ;;FOR
1193  003772  000240                          NOP                     ;;ACT11
1194  003774                          $DOAGN:
1195  003774  000137                          JMP     @(PC)+          ;;RETURN
1196  003776  004020                  $RTNAD: .WORD   NOWEOP
1197  004000     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
1198  004003     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
1199  004010  050040  051501  020123
1200  004016  000043
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1201  004020  005737  001250          NOWEOP: TST     PRTCNT
1202  004024  100002                          BPL     11$
1203  004026  105337  001250                  DECB    PRTCNT
1204  004032  012737  002112  002110  11$:    MOV     #TST1,WHERE
1205  004040  104401  004000                  TYPE    ,$ENULL
1206  004044  000137  001750                  JMP     $BEGIN
1207                                  ;;*****************************************************************
1208                                  ;*TEST 12        J       FULL KEYBOARD CHARACTER TEST
1209                                  ;;*****************************************************************
1210  004050  000004                  TST12:  SCOPE
1211  004052  012703  012146          KRBTST: MOV     #V52RW,R3       ;SET UP FOR LOWER CASE CHAR.
1212  004056  012706  001100          2$:     MOV     #STACK,SP
1213  004062  004537  005340          A1:     JSR     R5,AMSG         ;ERASE AND INIT SCREEN WITH FORM-FEED
1214  004066  011205                          FRMFED
1215  004070  004737  005266                  JSR     PC,ADELAY       ;WAIT FOR FORM-FEED TO FINISH
1216  004074  004537  005340                  JSR     R5,AMSG         ;DISPLAY HEADER
1217  004100  010350                          MKBX
1218  004102  012302                          MOV     (R3)+,R2        ;LOAD ROW #
1219  004104  004537  005340                  JSR     R5,AMSG         ;ISSUE ROW1 MESSAGE.
1220  004110  007375                          MKBB2
1221  004112  004737  005456          2$:     JSR     PC,TSTROW       ;CHECK THE ROW
1222
1223  004116  012302                  B1:     MOV     (R3)+,R2        ;LOAD ROW #
1224  004120  004537  005340                  JSR     R5,AMSG         ;2ND ROW
1225  004124  007463                          MKBC
1226  004126  004737  005456                  JSR     PC,TSTROW       ;CHECK 2ND ROW
1227
1228  004132  012302                  C1:     MOV     (R3)+,R2        ;LOAD ROW #
1229  004134  004537  005340                  JSR     R5,AMSG         ;ISSUE ROW 3 MESSAGE.
1230  004140  007524                          MKBD2
1231  004142  004737  005456          2$:     JSR     PC,TSTROW       ;CHECK ROW 3
1232
1233  004146  012302                          MOV     (R3)+,R2        ;LOAD ROW #
1234  004150  004537  005340                  JSR     R5,AMSG
1235  004154  007614                          MKBE
1236  004156  004737  005456                  JSR     PC,TSTROW       ;CHECK ROW 4
1237
1238  004162  012702  012164                  MOV     #ROW5,R2
1239  004166  004537  005340                  JSR     R5,AMSG
1240  004172  007705                          MKBF
1241  004174  004737  005456                  JSR     PC,TSTROW       ;CHECK ROW 5
1242
1243                                  ;TEST THE "LEFT"-SHIFT KEY
1244
1245  004200  004537  005340          D:      JSR     R5,AMSG         ;DEPRESS THE "LEFT-SHIFT" KEY
1246  004204  007762                          MKBG
1247  004206  012302                          MOV     (R3)+,R2        ;LOAD ROW 1 SHIFTED TABLE
1248  004210  004537  005340                  JSR     R5,AMSG         ;ISSUE ROW1 MESSAGE.
1249  004214  007375                          MKBB2
1250  004216  004737  005456          2$:     JSR     PC,TSTROW       ;TEST THE ROW
1251  004222  004537  005340                  JSR     R5,AMSG         ;RELEASE THE SHIFT KEY
1252  004226  007253                          MKB1
1253
1254                                  ;TEST THE "RIGHT-SHIFT" KEY
1255
1256  004230  004537  005340          E:      JSR     R5,AMSG         ;SET THE "RIGHT-SHIFT" KEY
```

```
1257  004234  010031                        MKBGA
1258  004236  012302                        MOV     (R3)+,R2        ;LOAD TABLE POINTER
1259  004240  004537  005340                JSR     R5,AMSG         ;ISSUE ROW1 MESSAGE.
1260  004244  007375                        MKBB2
1261  004246  004737  005456        2$:     JSR     PC,TSTROW       ;TEST THE ROW AGAIN WITH THE RIGHT-SHIFT SET
1262  004252  004537  005340                JSR     R5,AMSG
1263  004256  007253                        MKB1                    ;RELEASE SHIFT KEY
1264                                ;TEST THE CONTROL MODE
1265
1266  004260  004537  005340        F:      JSR     R5,AMSG         ;SET CTRL
1267  004264  010101                        MKBH
1268  004266  012302                        MOV     (R3)+,R2        ;LOAD ROW 1 CTRL TABLE
1269  004270  004537  005340                JSR     R5,AMSG         ;ISSUE ROW1 MESSAGE.
1270  004274  007375                        MKBB2
1271  004276  004737  005456        2$:     JSR     PC,TSTROW       ;TEST THE ROW
1272
1273                                ;COMPLETION OF KEYBOARD TEST
1274
1275  004302  004537  005340        KRBDON: JSR     R5,AMSG         ;END OF KEYBOARD TEST
1276  004306  010235                        MKBR
1277  004310  000137  004052                JMP     KRBTST          ;LOOP ON TEST
1278
1279
1280                                ;;*****************************************************************
1281                                ;*TEST 13       K       KEYBOARD OCTAL VALUE LOOP
1282                                ;;*****************************************************************
1283  004314  000004                TST13:  SCOPE
1284  004316  012706  001100        KRBECO: MOV     #STACK,SP
1285  004322  004537  005340                JSR     R5,AMSG                 ;DISPLAY HEADER
1286  004326  010460                        MKE
1287  004330  004737  006334        1$:     JSR     PC,GETCHR               ;GET CHAR
1288  004334  000775                        BR      1$              ;;BR BACK IF NO INPUT
1289  004336  004737  005360                JSR     PC,OCTAL                ;CONVERT R0 TO OCTAL
1290  004342  113737  005450  010703        MOVB    DIG0,MKEB               ;LOAD DIGIT
1291  004350  113737  005452  010704        MOVB    DIG1,MKEB+1             ;LOAD DIGIT
1292  004356  113737  005454  010705        MOVB    DIG2,MKEB+2             ;LOAD DIGIT
1293  004364  042700  177600                BIC     #177600,R0
1294  004370  001001                        BNE     10$
1295  004372  005200                        INC     R0
1296  004374  012701  004504        10$:    MOV     #BFCHR,R1               ;LOAD POINTER
1297  004400  121100                5$:     CMPB    (R1),R0                 ;TEST IF = TO VALUE IN TABLE ?
1298  004402  001403                        BEQ     3$                      ;BR IF FOUND
1299  004404  005721                        TST     (R1)+                   ;MOVE POINTER
1300  004406  001374                        BNE     5$                      ;BR IF MORE
1301  004410  000407                        BR      2$                      ;BR IF NOT IN LIST
1302  004412  062701  000036        3$:     ADD     #BFCHAR-BFCHR,R1        ;UPDATE POINTER
1303  004416  112137  010676                MOVB    (R1)+,MKEA1             ;LOAD 1ST CHAR
1304  004422  112137  010677                MOVB    (R1)+,MKEA1+1           ;LOAD 2ND
1305  004426  000420                        BR      4$
1306  004430  120027  000040        2$:     CMPB    R0,#40                  ;TEST IF LESS THAN 40
1307  004434  101010                        BHI     6$                      ;BR IF ABOVE
1308  004436  062700  000100                ADD     #100,R0                 ;MAKE PRINTABLE
1309  004442  110037  010677                MOVB    R0,MKEA1+1              ;SAVE CHAR
1310  004446  112737  000136  010676        MOVB    #136,MKEA1              ;ADD A '^' BEFORE CHARACTER
1311  004454  000405                        BR      4$
1312  004456  112737  000040  010677  6$:   MOVB    #40,MKEA1+1             ;LOAD SPACE
```

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1313  004464  110037  010676          4$:     MOVB    R0,@#KEA1       ;LOAD CHARACTER
1314  004470  005237  005172                  INC     IGNORE          ;IGNORE DOUBLE CHARACTER FLAG
1315  004474  004537  005340                  JSR     R5,@#MSG        ;DISPLAY MESSAGE
1316  004500  010665                          .WORD   KEA
1317  004502  000712                          BR      1$              ;LOOP BACK
1318
1319                                  ;TABLE OF DEFINED CHARACTERS
1320
1321  004504  000010                  BFCHR:  10                      ;BACKSPACE (CURSOR LEFT CODE)
1322  004506  000011                          11                      ;TAB CODE
1323  004510  000012                          12                      ;LINE FEED CODE
1324  004512  000013                          13                      ;VERTICAL TAB
1325  004514  000014                          14                      ;FORM FEED
1326  004516  000015                          15                      ;CARRIAGE RETURN CODE
1327  004520  000016                          16                      ;SO (^N)
1328  004522  000017                          17                      ;SI (^O)
1329  004524  000033                          33                      ;ESCAPE CODE
1330  004526  000040                          40                      ;SPACE CODE
1331  004530  000177                          177                     ;DELETE CODE
1332  004532  000000                          0
1333  004534  000000                          0
1334  004536  000000                          0
1335  004540  000000                          0
1336
1337                                  ;DEFINED CHARACTER EQUIVALENTS
1338
1339  004542  051502                  BFCHAR: .ASCII  /BS/                    ;BACKSPACE (CURSOR LEFT)
1340  004544  052110                          .ASCII  /HT/                    ;H TAB
1341  004546  043114                          .ASCII  /LF/                    ;LINE FEED
1342  004550  052126                          .ASCII  /VT/                    ;VERTICAL TAB
1343  004552  043106                          .ASCII  /FF/                    ;FORM-FEED
1344  004554  051103                          .ASCII  /CR/                    ;CARIAGE RETURN
1345  004556  047523                          .ASCII  /SO/                    ;SO - ^N
1346  004560  044523                          .ASCII  /SI/                    ;SI - ^O
1347  004562  051505                          .ASCII  /ES/                    ;ESCAPE
1348  004564  050123                          .ASCII  /SP/                    ;SPACE
1349  004566  042504                          .ASCII  /DE/                    ;DELETE
1350  004570  000000  000000  000000          0,0,0,0,0,0
1351  004576  000000  000000  000000
1352                                          .EVEN
1353                                  ;;*****************************************************************
1354                                  ;*TEST 14        L       KEYBOARD ECHO LOOP
1355                                  ;;*****************************************************************
1356  004604  000004                  TST14:  SCOPE
1357  004606  012706  001100          KRBECH: MOV     #STACK,SP
1358  004612  004537  005340                  JSR     R5,@#MSG        ;DISPLAY HEADER
1359  004616  010712                          .WORD   KEH
1360
1361  004620  004737  006334          1$:     JSR     PC,@#GETCHR     ;GET CHARACTER
1362  004624  000775                          BR      1$
1363  004626  110077  174426                  MOVB    R0,@#VTOB       ;LOAD THE CHARACTER
1364  004632  105777  174420          2$:     TSTB    @#VTOS          ;WAIT FOR DONE
1365  004636  100375                          BPL     2$
1366  004640  000767                          BR      1$              ;LOOP BACK
1367
1368
```

```
1369                                    ;;*****************************************************************
1370                                    ;*TEST 15       M       CHARACTER ATTRIBUTE TEST (M.S.B. SELECT)
1371                                    ;;*****************************************************************
1372  004642  000004                    TST15:  SCOPE
1373
1374  004644  004537  005340            CHRATT: JSR     R5,AMSG         ;DISPLAY HEADER
1375  004650  007124                            M9222
1376  004652  005002                            CLR     R2              ;CLEAR BLOCK COUNTER
1377  004654  005037  001162            1$:     CLR     $REGO           ;CLEAR LINE COUNTER
1378  004660  012700  011242            6$:     MOV     #ATTR8,R0       ;SETUP MESSAGE POINTER
1379  004664  112001                    2$:     MOVB    (R0)+,R1        ;GET A CHARACTER
1380  004666  120127  000377                    CMPB    R1,#377         ;SEE IF REACHED END OF LINE YET
1381  004672  001413                            BEQ     5$
1382  004674  032702  000001                    BIT     #BIT0,R2        ;SEE IF ON AN EVEN OR ODD BLOCK
1383  004700  001002                            BNE     3$              ;IF ON EVEN BLOCK SET CHAR. ATTR.
1384  004702  052701  000200                    BIS     #BIT7,R1        ;SET M.S.B. OF THE CHAR. CODE
1385  004706  110177  174346            3$:     MOVB    R1,@VTOB        ;LOAD THE CHAR.
1386  004712  105777  174340            4$:     TSTB    @VTOS           ;WAIT UNTIL PRINTED
1387  004716  100375                            BPL     4$
1388  004720  000761                            BR      2$              ;GO GET NEXT CHAR.
1389
1390  004722  005237  001162            5$:     INC     $REGO           ;INCREMENT LINE COUNTER
1391  004726  022737  000005  001162            CMP     #5,$REGO        ;SEE IF 5 LINES OF BLOCK PRINTED YET?
1392  004734  001351                            BNE     6$              ;CONTINUE IF BLOCK NOT DONE
1393  004736  005202                            INC     R2              ;ELSE INCREMENT BLOCK COUNTER
1394  004740  022702  000005                    CMP     #5,R2           ;SEE IF SCREEN FULL (5 BLOCKS)?
1395  004744  001343                            BNE     1$              ;IF NO CONTINUE
1396  004746  004737  005214                    JSR     PC,DELAY        ;WAIT A WHILE BEFORE  LOOPING ON TEST
1397  004752  000734                            BR      CHRATT
1398
1399
1400                                    ;************** PROGRAM SUBROUTINES   ******************************
1401
1402                                    ;LOAD A SINGLE CHARACTER ACROSS THE SCREEN WIDTH
1403                                    ;
1404
1405  004754  013702  001270            FILBUF: MOV     WIDTH,R2        ;LOAD WIDTH VALUE
1406  004760  012700  022066            FILBFB: MOV     #BUFFER,R0      ;SET-UP BUFFER POINTER
1407  004764  112720  000015                    MOVB    #15,(R0)+       ;LOAD 'CR'
1408  004770  112720  000012                    MOVB    #12,(R0)+       ;LOAD 'FL'
1409  004774  110120                    FILBFA: MOVB    R1,(R0)+        ;SAVE THE CHARACTER IN THE BUFFER
1410  004776  005302                            DEC     R2              ;FINISHED?
1411  005000  001375                            BNE     FILBFA          ;BRANCH IF NOT COMPLETED
1412  005002  112710  000377                    MOVB    #377,(R0)       ;LOAD TERM.
1413  005006  000207                            RTS     PC              ;EXIT
1414
1415                                    ;LOAD A INCREMENTING CHARACTER ACROSS THE SCREEN WIDTH
1416                                    ;ONLY 40 THRU 177 ARE LEGAL CHARACTERS
1417
1418  005010  012700  022066            LIC:    MOV     #BUFFER,R0      ;SET-UP BUFFER POINTER
1419  005014  013502                            MOV     @(5)+,R2        ;SET-UP WIDTH
1420  005016  112720  000015                    MOVB    #15,(R0)+       ;LOAD 'CR'
1421  005022  112720  000012                    MOVB    #12,(R0)+       ;LOAD 'LF'
1422  005026  110120                    LICA:   MOVB    R1,(R0)+        ;SAVE A CHARACTER IN THE BUFFER
1423  005030  005201                            INC     R1              ;UPDATE THE CHARACTER
1424  005032  023701  001264                    CMP     LASTCH,R1       ;TEST FOR
```

```
1425  005036  001002                  BNE     LICB            ;BRANCH IF NOT
1426  005040  012701  000040          MOV     #40,R1          ;MAKE A LEGAL CHARACTER
1427  005044  005302          LICB:   DEC     R2              ;DECREMENT COUNT
1428  005046  001367                  BNE     LICA            ;BRANCH IF NOT COMPLETED
1429  005050  112710  000377          MOVB    #377,(R0)       ;LOAD TERM
1430  005054  000205                  RTS     R5              ;EXIT
1431
1432                          ;DISPLAY SUBROUTINE
1433
1434  005056  012700  022066  XPRNT:  MOV     #BUFFER,R0      ;SETUP BUFFER POINTER
1435  005062  105777  174170  XPRNTA: TSTB    @VTOS           ;TEST READY
1436  005066  100404                  BMI     XPRNTB          ;BRANCH IF SET
1437  005070  005777  174162          TST     @VTOS           ;TEST ERROR
1438  005074  100372                  BPL     XPRNTA          ;BRANCH IF RESET
1439  005076  104001                  ERROR   1               ;ERROR FLAG SET ON TRANSMITTER STATUS
1440  005100  112001  XPRNTB: MOVB    (R0)+,R1
1441  005102  122701  000377          CMPB    #377,R1
1442  005106  001413                  BEQ     1$              ;BR IF END OF MSG.
1443  005110  122701  000033  5$:     CMPB    #33,R1          ;TEST FOR ESC
1444  005114  001003                  BNE     3$              ;BR IF NOT
1445  005116  005237  005170          INC     ANESC           ;SET SOFT FLAG
1446  005122  000402                  BR      4$
1447  005124  005037  005170  3$:     CLR     ANESC           ;CLEAR SOFT FLAG
1448  005130  110177  174124  4$:     MOVB    R1,@VTOB        ;LOAD CHAR
1449  005134  000752                  BR      XPRNTA          ;GO GET NEXT CHAR.
1450
1451                          ;NORMAL EXIT
1452
1453  005136  005037  005160  1$:     CLR     XOFFOK
1454  005142  005037  005172          CLR     IGNORE
1455  005146  005037  005156          CLR     XOFFBR
1456  005152  000207                  RTS     PC              ;EXIT
1457
1458  005154  000000          LOOP:   0
1459  005156  000000          XOFFBR: 0
1460  005160  000000          XOFFOK: 0
1461  005162  000000          AXOFF:  0
1462  005164  000000          XOFFRC: 0
1463  005166  000000          XONRC:  0
1464  005170  000000          ANESC:  0
1465  005172  000C00          IGNORE: 0               ;WHEN SET IGNORE KEYBOARD FLAGS
1466
1467
1468                          ;SUBROUTINE TO PRINT A BLOCK OF 5 LINES EACH (FOR CHAR. ATTR. TEST F - SO/SI)
1469
1470  005174  012702  000005  BLKPRT: MOV     #5,R2           ;SET UP LINE COUNTER
1471  005200  004537  005340  1$:     JSR     R5,AMSG         ;TYPE CHAR. ATTR. MSG (SO/SI)
1472  005204  011366                  ATTRS
1473  005206  005302                  DEC     R2              ;DECREMENT LINE COUNTER
1474  005210  001373                  BNE     1$              ;LOOP UNTIL MSG PRINTED 5 TIMES
1475  005212  000207                  RTS     PC              ;THEN RETURN
1476
1477
1478                          ;PROGRAM DELAY ROUTINE
1479
1480  005214  013737  001234  005262  DELAY:  MOV     SUBTST,10$      ;LOAD COUNT
```

```
1481  005222  005037  005264                  CLR     11$
1482  005226  032777  010000  173704  2$:     BIT     #BIT12,@SWR     ;TEST SR
1483  005234  001006                          BNE     3$              ;BR IF SET
1484  005236  005337  005264                  DEC     11$             ;DELAY
1485  005242  001371                          BNE     2$
1486  005244  005337  005262                  DEC     10$
1487  005250  100366                          BPL     2$              ;DELAY
1488  005252  000240                  3$:     NOP
1489  005254  000240                          NOP
1490  005256  000240                          NOP
1491  005260  000207                          RTS     PC              ;EXIT
1492
1493  005262  000002                  10$:    2
1494  005264  000000                  11$:    0
1495
1496  005266  013737  001234  005334  ADELAY: MOV     SUBTST,10$
1497  005274  005037  005336                  CLR     11$
1498  005300  006237  005334                  ASR     10$
1499  005304  006237  005334                  ASR     10$
1500  005310  005337  005336          2$:     DEC     11$
1501  005314  001375                          BNE     2$
1502  005316  005337  005334                  DEC     10$
1503  005322  100372                          BPL     2$
1504  005324  000240                          NOP
1505  005326  000240                          NOP
1506  005330  000240                          NOP
1507  005332  000207                          RTS     PC
1508  005334  000000                  10$:    0
1509  005336  000000                  11$:    0
1510
1511
1512                                  ;HEADER SUBROUTINE FOR M7142
1513
1514  005340  012537  005350          AMSG:   MOV     (R5)+,10$       ;GET POINTER
1515  005344  004537  006412          1$:     JSR     R5,MTOB         ;MOVE TO BUFFER
1516  005350  000000                  10$:    0
1517  005352  004737  005056          11$:    JSR     PC,XPRNT        ;DISPLAY IT
1518  005356  000205                          RTS     R5              ;EXIT
1519
1520
1521                                  ;OCTAL - 3 BIT CONVERSION
1522
1523  005360  010001                  OCTAL:  MOV     R0,R1           ;LOAD R1
1524  005362  042701  177770                  BIC     #177770,R1      ;MASK
1525  005366  062701  000060                  ADD     #60,R1
1526  005372  110137  005454                  MOVB    R1,DIG2         ;SAVE LSD
1527  005376  010001                          MOV     R0,R1
1528  005400  006001                          ROR     R1
1529  005402  006001                          ROR     R1
1530  005404  006001                          ROR     R1
1531  005406  042701  17777C                  BIC     #177770,R1
1532  005412  062701  000060                  ADD     #60,R1
1533  005416  110137  005452                  MOVB    R1,DIG1         ;SAVE IT
1534  005422  010001                          MOV     R0,R1
1535  005424  006101                          ROL     R1
1536  005426  006101                          ROL     R1
```

```
1537  005430  000301                        SWAB    R1
1538  005432  042701  177770                BIC     #177770,R1
1539  005436  062701  000060                ADD     #60,R1
1540  005442  110137  005450                MOVB    R1,DIGO         ;SAVE MSD
1541  005446  000207                        RTS     PC              ;EXIT
1542
1543  005450  000000              DIGO:     0
1544  005452  000000              DIG1:     0
1545  005454  000000              DIG2:     0
1546
1547                                ;SUBROUTINE FOR THE KEYBOARD CHARACTER TEST
1548  005456  004537  005340      TSTROW: JSR     R5,AMSG         ;DISPLAY HEADER
1549  005462  007310                        MKBA
1550  005464  004737  006334      1$:       CALL    GETCHR          ;GET A CHARACTER
1551  005470  000775                        BR      1$              ;WAIT FOR INPUT
1552  005472  004737  005716                CALL    PARITY          ;ADJUST CHAR IF PARITY
1553  005476  120027  000040                CMPB    R0,#40          ;SEE IF  IT IS A PRINTING CHAR.
1554  005502  002410                        BLT     12$             ;ECHO IF IT IS (40-176)
1555  005504  120027  000176                CMPB    R0,#176
1556  005510  003005                        BGT     12$
1557  005512  110077  173542                MOVB    R0,@VTOB        ;ECHO THE CHAR.
1558  005516  105777  173534      11$:      TSTB    @VTOS           ;WAIT UNTIL ECHO'D
1559  005522  100375                        BPL     11$
1560  005524  120037  005706      12$:      CMPB    R0,100$         ;CMP EXPCT AND RCVD
1561  005530  001003                        BNE     2$              ;TYPE ERROR INFO
1562  005532  005722                        TST     (R2)+
1563  005534  100353                        BPL     1$              ;LOOP TILL DONE
1564  005536  000207                        RETURN                  ;EXIT TEST
1565
1566                                ;COME HERE IF EXPECTED NOT EQUAL TO RECVD
1567                                ;CONVERT RESULTS TO OCTAL FOR TYPEOUT
1568
1569  005540  010037  001126        2$:       MOV     R0,$BDDAT       ;LOAD BAD CHARACTER
1570  005544  004737  005360                  JSR     PC,OCTAL        ;CONVERT TO OCTAL
1571  005550  113737  005450  010226        MOVB    DIGO,MKBQB      ;LOAD OCTAL #
1572  005556  113737  005452  010227        MOVB    DIG1,MKBQB+1
1573  005564  113737  005454  010230        MOVB    DIG2,MKBQB+2
1574  005572  042700  177600                BIC     #177600,R0
1575  005576  120027  000040                CMPB    R0,#40          ;TEST IF PRINTABLE
1576  005602  101002                        BHI     10$             ;BR IF PRINTABLE
1577  005604  112700  000056                MOVB    #56,R0          ;CONVERT TO A "*" CHARACTER
1578  005610  110037  010222      10$:      MOVB    R0,MKBQ2        ;SAVE CHAR
1579  005614  011200                        MOV     (R2),R0         ;GET GOOD CHAR
1580  005616  053700  005714                BIS     MASK2,R0
1581  005622  010037  001124                MOV     R0,$GDDAT       ;LOAD GOOD CHARACTER
1582  005626  004737  005360                JSR     PC,OCTAL        ;CONVERT IT
1583  005632  113737  005450  010207        MOVB    DIGO,MKBQA      ;LOAD DIGIT
1584  005640  113737  005452  010210        MOVB    DIG1,MKBQA+1
1585  005646  113737  005454  010211        MOVB    DIG2,MKBQA+2
1586  005654  042700  177600                BIC     #177600,R0
1587  005660  110037  010203                MOVB    R0,MKBQ1        ;SAVE CHAR
1588  005664  023737  001252  001144        CMP     VTIS,$TKS       ;TEST IF ON CTY
1589  005672  001403                        BEQ     3$              ;BR IF YES
1590  005674  004537  005340                JSR     R5,AMSG         ;DISPLAY ERROR  MESSAGE
1591  005700  010142                        MKBQ
1592  005702  104003              3$:       ERROR   3               ;CHARACTER RECVD NOT EQUAL TO EXPECTED
```

```
1593  005704  000667                        BR      1$              ;BR BACK AND TEST THE CHARACTER AGAIN
1594
1595  005706  000000              100$:     0
1596  005710  000000              101$:     0
1597  005712  177600              MASK1:    177600
1598  005714  000000              MASK2:    0
1599
1600                              ;TEST TO ADD PARITY TO EXPCTD CHAR
1601  005716  012737  177600  005712  PARITY: MOV     #177600,MASK1
1602  005724  005037  005714          CLR     MASK2
1603  005730  032777  000004  173202  BIT     #BIT2,@SWR      ;TEST SWR
1604  005736  001416                  BEQ     4$              ;DO NOT TEST PARITY BIT
1605  005740  042737  000200  005712  BIC     #BIT7,MASK1     ;ENABLE PARITY BIT
1606  005746  032777  000002  173164  BIT     #BIT1,@SWR      ;TEST IF FORCED PARITY
1607  005754  001417                  BEQ     5$              ;BR IF NOT FORCED PARITY BIT
1608  005756  032777  000001  173154  BIT     #BIT0,@SWR      ;TEST FOR EVEN/ODD PARITY
1609  005764  001403                  BEQ     4$              ;BR IF ALLWAYS OFF
1610  005766  052737  000200  005714  BIS     #BIT7,MASK2     ;SET BIT 7
1611  005774  111237  005706  4$:     MOVB    (R2),100$       ;GET EXPECTED
1612  006000  053737  005714  005706  BIS     MASK2,100$      ;SET BIT 7 IF EXPECTED
1613  006006  043700  005712          BIC     MASK1,R0        ;MASK VALUE READ
1614  006012  000207                  RETURN                  ;EXIT ROUTINE
1615  006014  005037  005710  5$:     CLR     101$            ;CLEAR TEMP
1616  006020  111237  005706          MOVB    (R2),100$       ;CLEAR CHAR SAVE
1617  006024  006037  005706  20$:    ROR     100$            ;ROTATE CHAR
1618  006030  103002                  BCC     21$             ;BR IF NO CARRY
1619  006032  005237  005710          INC     101$            ;UPDATE CNT
1620  006036  105737  005706  21$:    TSTB    100$            ;DONE ?
1621  006042  001370                  BNE     20$             ;BR IF NOT
1622  006044  032777  000001  173066  BIT     #BIT0,@SWR      ;TEST EVEN/ODD
1623  006052  001407                  BEQ     23$             ;BR IF OPER. SAYS EVEN
1624  006054  006037  005710          ROR     101$            ;
1625  006060  103403                  BCS     22$             ;BR IF ODD ALREADY
1626  006062  052737  000200  005714  BIS     #BIT7,MASK2     ;SET PARITY BIT
1627  006070  000741          22$:    BR      4$              ;BR TO TEST CHAR
1628  006072  006037  005710  23$:    ROR     101$            ;
1629  006076  103003                  BCC     24$             ;BR IF EVEN ALREADY
1630  006100  052737  000200  005714  BIS     #BIT7,MASK2
1631  006106  000732          24$:    BR      4$              ;BR TO TEST CHAR
1632
1633
1634
1635
1636                              .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
1637
1638                              ;;*****************************************************************
1639                              ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
1640                              ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
1641                              ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
1642                              ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
1643                              ;*REPLACED WITH SPACES.
1644                              ;*CALL:
1645                              ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
1646                              ;*      TYPDS                   ;;GO TO THE ROUTINE
1647
1648  006110                      $TYPDS:
```

```
1649  006110  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
1650  006112  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
1651  006114  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
1652  006116  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
1653  006120  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
1654  006122  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
1655  006126  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
1656  006132  100004                          BPL     1$              ;;BR IF INPUT IS POS.
1657  006134  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
1658  006136  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
1659  006144  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
1660  006146  012703  006324                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
1661  006152  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
1662  006156  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
1663  006160  016001  006314                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
1664  006164  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
1665  006166  002402                          BLT     4$              ;;BR IF DONE
1666  006170  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
1667  006172  000774                          BR      3$
1668  006174  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
1669  006176  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
1670  006200  001002                          BNE     5$              ;;FALL THROUGH IF 0
1671  006202  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
1672  006204  100407                          BMI     7$              ;;BR IF YES
1673  006206  106316                  5$:     ASLB    (SP)            ;;MSD?
1674  006210  103003                          BCC     6$              ;;BR IF NO
1675  006212  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
1676  006220  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
1677  006224  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
1678  006230  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
1679  006232  005720                          TST     (R0)+           ;;JUST INCREMENTING
1680  006234  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
1681  006240  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
1682  006242  003002                          BGT     8$              ;;GO TO EXIT
1683  006244  010502                          MOV     R5,R2           ;;GET THE LSD
1684  006246  000764                          BR      6$              ;;GO CHANGE TO ASCII
1685  006250  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
1686  006252  100003                          BPL     9$              ;;BR IF NO
1687  006254  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
1688  006262  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
1689  006264  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
1690  006266  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
1691  006270  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
1692  006272  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
1693  006274  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
1694  006276  104401  006324                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
1695  006302  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
1696  006310  012616                          MOV     (SP)+,(SP)
1697  006312  000002                          RTI                     ;;RETURN TO USER
1698  006314  023420                  $DTBL:  10000.
1699  006316  001750                          1000.
1700  006320  000144                          100.
1701  006322  000012                          10.
1702  006324  000004                  $DBLK:  .BLKW   4
1703
1704                                  ;SUBROUTINE TO GET A CHARACTER FROM THE KEYBOARD
```

```
 1705
 1706  006334  013737  001232  006406  GETCHR: MOV     TIME0,TIME1     ;LOAD TIME COUNTER
 1707  006342  005037  006410                  CLR     TIME2
 1708
 1709  006346  105777  172700          1$:     TSTB    @VTIS           ;TEST INPUT STATUS
 1710  006352  100005                          BPL     2$              ;BR IF CLEARED
 1711  006354  017700  172674                  MOV     @VTIB,R0        ;READ A CHAR
 1712  006360  062716  000002                  ADD     #2,(SP)         ;UPDATE RETURN
 1713  006364  000207                          RTS     PC              ;EXIT
 1714
 1715  006366  005337  006410          2$:     DEC     TIME2           ;DELAY
 1716  006372  001365                          BNE     1$
 1717  006374  005337  006406                  DEC     TIME1           ;FINISHED ?
 1718  006400  100362                          BPL     1$              ;LOOP TILL TIME EXPIRED
 1719  006402  104002                          ERROR   2               ;NO INPUT FLAG FROM DEVICE
 1720  006404  000207                          RTS     PC              ;EXIT
 1721
 1722  006406  000000          TIME1:  0
 1723  006410  000000          TIME2:  0
 1724
 1725                          ;MOVE TO THE OUTPUT BUFFER
 1726
 1727  006412  012500          MTOB:   MOV     (R5)+,R0        ;LOAD DEST.
 1728  006414  012701  022066          MOV     #BUFFER,R1      ;LOAD R1
 1729  006420  112021          1$:     MOVB    (R0)+,(R1)+     ;LOAD BYTE
 1730  006422  100376                  BPL     1$              ;BR UNTIL DONE
 1731  006424  000205                  RTS     R5              ;EXIT
 1732
```

```
1733
1734                                    .SBTTL  ASCII MESSAGES
1735                                    ;ASCII MESSAGES
1736                                    ;       MESSAGES TO BE PRINTED BY "XPRNT" SUBROUTINE MUST BE TERMINATED
1737                                    ;       BY A "377".
1738
006426  006415  020012  055103  TITLE:  .ASCIZ  <15><15><12>\ CZVTOA M7142 SERIAL VIDEO BOARD ACCEPTANCE TEST\<15><12><0
006516  005015  005015  020040  M91:    .ASCIZ  <15><12><15><12>/  FULL SCREEN OF THE CHARACTER E/<15><12><377>
006566  005015  005015  020040  M93:    .ASCIZ  <15><12><15><12>/  SINGLE CHARACTER PER LINE /<15><12><377>
006632  005015  005015  020040  M94:    .ASCIZ  <15><12><15><12>/  ROTATING PATTERN /<15><12><377>
006665     015  006412  020012  M96:    .ASCIZ  <15><12><15><12>/  CURSOR MOTION TEST (CR,TAB,LF,BKSP,VT) /<15><12><377>
006746  005015  005015  020040  M97:    .ASCIZ  <15><12><15><12>/  SCROLL SPEED JUMP TEST/<15><12><377>
007006  005015  005015  020040  M99:    .ASCIZ  <15><12><15><12>/  COLUMN ADDRESS TEST/<15><12><377>
007043     015  006412  020012  M9221:  .ASCIZ  <15><12><15><12>/  CHARACTER ATTRIBUTE TEST (SO-SI SELECT)/<15><12><377>
007124  005015  005015  020040  M9222:  .ASCIZ  <15><12><15><12>/  CHARACTER ATTRIBUTE TEST (M.S.B. SELECT)/<15><12><377
007206  005015  005015  020040  MKB:    .ASCII  <15><12><15><12>/  QUICK KEYBOARD CHARACTER TEST/<15><12>
007253     015  051012  046105  MKB1:   .ASCIZ  <15><12>/RELEASE THE "SHIFT" KEY/<15><12><377>
007310  042514  052106  052040  MKBA:   .ASCIZ  /LEFT TO RIGHT IN A ROW, DEPRESS ONE KEY AT A TIME/<15><12><377>
007375     015  006412  051412  MKBB2:  .ASCIZ  <15><12><15><12>/STARTING WITH THE TOP ROW EXCEPT THE BREAK KEY/<15><12>
007463     015  006412  051412  MKBC:   .ASCIZ  <15><12><15><12>/START WITH THE SECOND ROW/<15><12><377>
007524  005015  005015  052123  MKBD2:  .ASCIZ  <15><12><15><12>/START WITH THE THIRD ROW .BEGIN ROW WITH "A" KEY/<15><1
007614  005015  005015  052123  MKBE:   .ASCIZ  <15><12><15><12>/START WITH THE FOURTH ROW EXCEPT SHIFT AND REPEAT/<15><
007705     015  006412  042012  MKBF:   .ASCIZ  <15><12><15><12>/DEPRESS THE SPACE BAR (THE FIFTH ROW)/<15><12><377>
007762  005015  047516  020127  MKBG:   .ASCII  <15><12>/NOW HOLD DOWN THE "LEFT-SHIFT" KEY/<15><12><377>
010031     015  047012  053517  MKBGA:  .ASCII  <15><12>/NOW HOLD DOWN THE "RIGHT-SHIFT" KEY/<15><12><377>
010101     015  047012  053517  MKBH:   .ASCII  <15><12>/NOW HOLD DOWN THE "CTRL" KEY/<15><12><377>
010142  005015  044103  051101  MKBQ:   .ASCII  <15><12>/CHARACTER WAS IN ERROR/<15><12>
010174  047507  042117  036440          .ASCII  /GOOD = /
010203     040     040     075  MKBQ1:  .BYTE   40,40,75,40
010207     040     040     040  MKBQA:  .BYTE   40,40,40,40,40
010214  040502  020104  020075          .ASCII  /BAD = /
010222     040     040     075  MKBQ2:  .BYTE   40,40,75,40
010226     040     040     040  MKBQB:  .BYTE   40,40,40,15,12,377,0
010235     015  045412  054505  MKBR:   .ASCIZ  <15><12>/KEYBOARD CHARACTER TEST COMPLETE/<15><12><377>
010303     015  044412  053116  INVLID: .ASCIZ  <15><12>/INVALID BUS ADDRESS-PLEASE RETRY/<15><12>
010350  005015  005015  025040  MKBX:   .ASCII  <15><12><15><12>/ *** FULL KEYBOARD CHARACTER TEST ***/<15><12>
010423     015  051012  046105  MKBX1:  .ASCIZ  <15><12>/RELEASE THE "SHIFT" KEY/<15><12><377>

010460  005015  045440  054505  MKE:    .ASCII  <15><12>/ KEYBOARD ASCII AND OCTAL LOOP/<15><12>
010522     015     012          .BYTE   15,12
010524  044127  047105  040440          .ASCII  /WHEN A KEY IS DEPRESSED, THE ASCII CHARACTER AND/
010604     015     012          .BYTE   15,12
010606  052040  042510  052040          .ASCIZ  / THE THREE DIGIT OCTAL CODE WILL BE ECHOED/
010661     015     012     377  .BYTE   15,12,377,0
010665     015  041412  040510  MKEA:   .ASCII  <15><12>/CHAR = /
010676     040     040     040  MKEA1:  .BYTE   40,40,40,75,40
010703     040     040     040  MKEB:   .BYTE   40,40,40,15,12,377,0
010712  005015  042513  041131  MKEH:   .ASCIZ  <15><12>/KEYBOARD ECHO LOOP/<15><12><377>
010742  056033  057433  005015  MQ0:    .ASCIZ  <33><134><33><137><15><12><12>/LOOP ON TEST PATTERN LETTER (A THRU M) ?
011027     033  015534  006537  MQ1:    .ASCIZ  <33><134><33><137><15><12><12>/START AT TEST PATTERN LETTER (A THRU M) ?
011115     015  005012  051124  MQ2:    .ASCIZ  <15><12><12>/TRY AGAIN /<15><12><377>
011136  005015  005015  020040  M98:    .ASCIZ  <15><12><15><12>/   DIRECT CURSOR ADDRESSING TEST /<377>
011205     014  000377          FRMFED: .ASCIZ  <14><377>
011210     010     010     010  SCRL:   .BYTE   10,10,10,10,10,10,10,10,10,10,10
011223     040  051440  051103          .ASCII  /  SCROLL # /
011236     060     000     377  SCRNO:  .BYTE   60,0,377,0
```

```
011242  005015  044124  026505  ATTR8:  .ASCII  <15><12>/THE-CHARACTER-ATTRIBUTE(S)-ON-THIS-LINE-IS/
011316  040450  042522  026451          .ASCIZ  /(ARE)-SELECTED(DESELECTED)-BY-"M.S.B"./<377>
011366  005015  044124  026505  ATTRS:  .ASCII  <15><12>/THE-CHARACTER-ATTRIBUTE(S)-ON-THIS-LINE-IS/
011442  040450  042522  026451          .ASCIZ  /(ARE)-SELECTED(DESELECTED)-BY-"S0-S1"./<377>
011512  177416     000          SO:     .ASCIZ  <16><377>
011515     017  000377          S1:     .ASCIZ  <17><377>
011520  005015  043012  051111  WHAT0:  .ASCIZ  <15><12><12>/FIRST LINE DEVICE ADDRESS ? = /<377>
011563     015  005012  040514  WHAT1:  .ASCIZ  <15><12><12>/LAST LINE DEVICE ADDRESS (CR IF NONE) ? = /<377>
011642  005015  020040  020040  PASMED: .ASCIZ  <15><12>/          PASS #/
011665     105  051122  051117  EM1:    .ASCIZ  /ERROR FLAG SET ON TRANSMITTER STATUS/
011732  047516  044440  050116  EM2:    .ASCIZ  /NO INPUT FLAG DETECTED/
011761     125  042516  050130  EM3:    .ASCIZ  /UNEXPECTED OR INCORRECT INPUT CHAR/
012024  051105  050122  020103  DH1:    .ASCIZ  /ERRPC   VTNOW   TSTNUM/
012053     105  051122  041520  DH3:    .ASCIZ  /ERRPC   VTNOW   TSTNUM   EXPCT   RECV/
           012122                       .EVEN
012122  001116  001226  001230  DT1:    $ERRPC,VTNOW,TSTNUM,0
012132  001116  001226  001230  DT3:    $ERRPC,VTNOW,TSTNUM,$GDDAT,$BDDAT,0

                                        .SBTTL  KEYBOARD CHARACTER CODE TABLES

                                ;THE ACTUAL KEYBOARD LAYOUT IS REQUIRED

012146  012166  012224  012262  V52RW:  ROW12,ROW22,ROW32,ROW42,ROW12S,ROW12S,ROW12C


012164  100040                  ROW5:   .WORD   100040

                                ;M7142 KEYBOARD EQUIVALENCES(LOWER CASE CHAR.)

012166  000033  000061  000062  ROW12:  .WORD   33,61,62,63,64,65,66,67,70,71,60,55,75,140,100010
012224  000011  000161  000167  ROW22:  .WORD   11,161,167,145,162,164,171,165,151,157,160,133,134,12,100177
012262  000141  000163  000144  ROW32:  .WORD   141,163,144,146,147,150,152,153,154,73,47,173,100015
012314  000172  000170  000143  ROW42:  .WORD   172,170,143,166,142,156,155,54,56,100057

                                ;SHIFTED ROW CODES
012340  000033  000041  000100  ROW12S: .WORD   33,41,100,43,44,45,136,46,52,50,51,137,53,176,100010

                                ;CONTROL ROW CODES

012376  000033  000021  000022  ROW12C: .WORD   33,21,22,23,24,25,26,27,30,31,20,15,35,0,100010



012434  005015  042513  020131  ERCHR:  .ASCII  <15><12>/KEY CODE ERROR/<377>
012455     123  040524  052122  INSTR:  .ASCII  /START 1ST ROW LEFT TO RIGHT/<15><12>
012512  051120  041517  042505          .ASCII  /PROCEED TO LAST ROW/<15><12><377>

012540  005015  020012  040524  MTAB:   .ASCII  <15><12><12>/ TAB OVER-NO CHARACTER ERASE <CR>/<15>
012605     011     011     011          .BYTE   11,11,11,11,11,11,11,11,11,11,11,11,11,11,11,11,11,11,11
012631     011     011     011          .BYTE   11,11,11,11,11,11,11,11,11,11,11,11,11
012646  041474  037122  177415          .ASCII  /<CR>/<15><377>
012654  036012  043114  005076  MBKSP:  .ASCII  <12>/<LF>/<12>/<LF>/<12>/<LF>/<12>/<LF>/
012700  041040  041501  051513          .ASCII  / BACKSPACE OVER-NO CHAR. ERASE/
012736     010     010     010          .BYTE   10,10,10,10,10,10,10,10,10,10,10,10,10,10,10
012755     010     010     010          .BYTE   10,10,10,10,10,10,10,10,10,10,10,10,10,10,10
012774     010     010     010          .BYTE   10,10,10,10,10,10,10,10,10,377
```

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        013006  036015  051103  006476  MVT:    .ASCII  <15>/<CR>/<15><13>/<VT>/<13>/<VT>/
        013026  036013  052126  005476          .ASCII  <13>/<VT>/<13>/<VT>/<13>/<VT><CR>/<15><377>

        013053     015  005012  044124  MTEXT0: .ASCIZ  <15><12><12>/THIS SOFTWARE IS FURNISHED TO PURCHASER UNDER A LICENSE FOR
        013157     015  047412  020116  MTEXT1: .ASCIZ  <15><12>/ON A SINGLE COMPUTER SYSTEM AND CAN BE COPIED (WITH INCLUSION/<
        013260  005015  043117  042040  MTEXT2: .ASCIZ  <15><12>/OF DEC'S COPYRIGHT NOTICE) ONLY FOR USE IN SUCH SYSTEM, EXCEPT/
        013362  005015  051501  046440  MTEXT3: .ASCIZ  <15><12>/AS MAY OTHERWISE BE PROVIDED IN WRITING BY DEC./<377>

        013445     015  005012  044124  MTEXT4: .ASCIZ  <15><12><12>/THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHO
        013547     015  047012  052117  MTEXT5: .ASCIZ  <15><12>/NOTICE AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY DIGITAL/<
        013650  005015  050505  044525  MTEXT6: .ASCIZ  <15><12>/EQUIPMENT CORPORATION./<377>
        013702  005015  042012  041505  MTEXT7: .ASCIZ  <15><12><12>/DEC ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY OF
        014002  005015  052111  020123  MTEXT8: .ASCII  <15><12>/ITS SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DEC./
        014073     015     012     377          .BYTE   15,12,377,0
  (1)                                   .SBTTL  TTY INPUT ROUTINE
  1739
  1740                                  ;;*****************************************************************
  1741                                  .ENABL  LSB
  1742
  1743                                  .DSABL  LSB
  1744
  1745
  1746                                  ;;*****************************************************************
  1747                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
  1748                                  ;*CALL:
  1749                                  ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
  1750                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
  1751                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
  1752                                  ;
  1753
  1754  014100  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
  1755  014102  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
  1756  014110  105777  165030          1$:     TSTB    @$TKS           ;;WAIT FOR
  1757  014114  100375                          BPL     1$              ;;A CHARACTER
  1758  014116  117766  165024  000004          MOVB    @$TKB,4(SP)     ;;READ THE TTY
  1759  014124  042766  177600  000004          BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
  1760  014132  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
  1761  014140  001013                          BNE     3$              ;;BRANCH IF NO
  1762  014142  105777  164776          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
  1763  014146  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
  1764  014150  117746  164772                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
  1765  014154  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
  1766  014160  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
  1767  014164  001366                          BNE     2$              ;;IF NOT DISCARD IT
  1768  014166  000750                          BR      1$              ;;YES, RESUME
  1769  014170  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
  1770  014176  002407                          BLT     4$              ;;BRANCH IF YES
  1771  014200  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
  1772  014206  003003                          BGT     4$              ;;BRANCH IF YES
  1773  014210  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
  1774  014216  000002                  4$:     RTI                     ;;GO BACK TO USER
  1775                                  ;;*****************************************************************
  1776                                  ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
  1777                                  ;*CALL:
  1778                                  ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
  1779                                  ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
```

```
1780                                    ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
1781
1782  014220  010346                    $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
1783  014222  012703  014326            1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
1784  014226  022703  014336            2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
1785  014232  101405                            BLOS    4$              ;;BR IF YES
1786  014234  104406                            RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
1787  014236  112613                            MOVB    (SP)+,(R3)      ;;GET CHARACTER
1788  014240  122713  000177            10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
1789  014244  001003                            BNE     3$              ;;SKIP IF NOT
1790  014246  104401  001166            4$:     TYPE    ,$QUES          ;;TYPE A '?'
1791  014252  000763                            BR      1$              ;;CLEAR THE BUFFER AND LOOP
1792  014254  111337  014324            3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
1793  014260  104401  014324                    TYPE    ,9$
1794  014264  122723  000015                    CMPB    #15,(R3)+       ;;CHECK FOR RETURN
1795  014270  001356                            BNE     2$              ;;LOOP IF NOT RETURN
1796  014272  105063  177777                    CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
1797  014276  104401  001170                    TYPE    ,$LF            ;;TYPE A LINE FEED
1798  014302  012603                            MOV     (SP)+,R3        ;;RESTORE R3
1799  014304  011646                            MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
1800  014306  016666  000004  000002            MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
1801  014314  012766  014326  000004            MOV     #$TTYIN,4(SP)
1802  014322  000002                            RTI                     ;;RETURN
1803  014324     000                    9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
1804  014325     000                            .BYTE   0               ;;TERMINATOR
1805  014326  000010                    $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
1806  014336  052536  005015     000   $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
1807  014343     136  006507  000012   $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
1808  014350  005015  053523  020122   $MSWR:  .ASCIZ  <15><12>/SWR = /
1809  014356  020075     000
1810  014361     040  047040  053505   $MNEW:  .ASCIZ  /  NEW = /
1811  014366  036440  000040
1812                                    .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
1813
1814                                    ;;**************************************************************
1815                                    ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
1816                                    ;*CHANGE IT TO BINARY.
1817                                    ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGA'
1818                                    ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
1819                                    ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
1820                                    ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
1821                                    ;*CALL:
1822                                    ;*      RDOCT                   ;;READ AN OCTAL NUMBER
1823                                    ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
1824                                    ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT
1825
1826  014372  011646                    $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
1827  014374  016666  000004  000002            MOV     4(SP),2(SP)     ;;INPUT NUMBER
1828  014402  010046                            MOV     R0,-(SP)        ;;PUSH R0 ON STACK
1829  014404  010146                            MOV     R1,-(SP)        ;;PUSH R1 ON STACK
1830  014406  010246                            MOV     R2,-(SP)        ;;PUSH R2 ON STACK
1831  014410  104407                    1$:     RDLIN                   ;;READ AN ASCIZ LINE
1832  014412  01260C                            MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
1833  014414  010037  014520                    MOV     R0,5$           ;;AND SAVE IT
1834  014420  005001                            CLR     R1              ;;CLEAR DATA WORD
1835  014422  005002                            CLR     R2
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1836  014424  112046           2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
1837  014426  001420                    BEQ     3$              ;;IF ZERO GET OUT
1838  014430  122716  000060            CMPB    #'0,(SP)        ;;MAKE SURE THIS CHARACTER
1839  014434  003026                    BGT     4$              ;;IS AN OCTAL DIGIT
1840  014436  122716  000067            CMPB    #'7,(SP)
1841  014442  002423                    BLT     4$
1842  014444  006301                    ASL     R1              ;;*2
1843  014446  006102                    ROL     R2
1844  014450  006301                    ASL     R1              ;;*4
1845  014452  006102                    ROL     R2
1846  014454  006301                    ASL     R1              ;;*8
1847  014456  006102                    ROL     R2
1848  014460  042716  177770            BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
1849  014464  062601                    ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
1850  014466  000756                    BR      2$              ;;LOOP
1851  014470  005726           3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
1852  014472  010166  000012            MOV     R1,12(SP)       ;;SAVE THE RESULT
1853  014476  010237  014530            MOV     R2,$HIOCT
1854  014502  012602                    MOV     (SP)+,R2        ;;POP STACK INTO R2
1855  014504  012601                    MOV     (SP)+,R1        ;;POP STACK INTO R1
1856  014506  012600                    MOV     (SP)+,R0        ;;POP STACK INTO R0
1857  014510  000002                    RTI                     ;;RETURN
1858  014512  005726           4$:     TST     (SP)+           ;;CLEAN PARTIAL FROM STACK
1859  014514  105010                    CLRB    (R0)            ;;SET A TERMINATOR
1860  014516  104401                    TYPE                    ;;TYPE UP THRU THE BAD CHAR.
1861  014520  000000           5$:     .WORD   0
1862  014522  104401  001166            TYPE    ,$QUES          ;;"?" "CR" & "LF"
1863  014526  000730                    BR      1$              ;;TRY AGAIN
1864  014530  000000           $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
1865  014532  032777  001000  164400   MSCOPE: BIT     #BIT9,@SWR      ;TEST BIT 7
1866  014540  001403                    BEQ     $SCOPE          ;NOT SET
1867  014542  005737  005154            TST     LOOP            ;TEST LOOP
1868  014546  001041                    BNE     $OVER           ;SET LOOP ON TEST
1869
1870                                    .SBTTL  SCOPE HANDLER ROUTINE
1871
1872                                    ;;**************************************************************
1873                                    ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
1874                                    ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
1875                                    ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
1876                                    ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
1877                                    ;*SW14=1         LOOP ON TEST
1878                                    ;*SW08=1         LOOP ON TEST IN SWR<7:0>
1879                                    ;*CALL
1880                                    ;*      SCOPE           ;;SCOPE=IOT
1881
1882  014550                    $SCOPE:
1883  014550  032777  040000  164362   1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
1884  014556  001035                    BNE     $OVER           ;;YES IF SW14=1
1885                                    ;#####START OF CODE FOR THE XOR TESTER#####
1886  014560  000416           $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
1887                                                            ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
1888  014562  013746  000004            MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
1889  014566  012737  014606  000004    MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
1890  014574  005737  177060            TST     @#177060        ;;TIME OUT ON XOR?
1891  014600  012637  000004            MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
```

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1892  014604  000414                          BR      $SVLAD          ;;GO TO THE NEXT TEST
1893  014606  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
1894  014610  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
1895  014614  000416                          BR      $OVER           ;;LOOP ON THE PRESENT TEST
1896  014616                          6$:;#####END OF CODE FOR THE XOR TESTER#####
1897  014616  032777  000400  164314          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
1898  014624  001404                          BEQ     $SVLAD          ;;BR IF NO
1899  014626  127737  164306  001102          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
1900  014634  001406                          BEQ     $OVER           ;;BR IF YES
1901  014636  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
1902  014642  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
1903  014646  105037  001103                  CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
1904  014652  013777  001102  164262  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
1905  014660  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
1906  014664  000002                          RTI                     ;;FIXES PS
1907
1908                                  .SBTTL  ERROR HANDLER ROUTINE
1909
1910                                  ;;**************************************************************
1911                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
1912                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
1913                                  ;*AND GO TO $ERRTYP ON ERROR
1914                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
1915                                  ;*SW15=1         HALT ON ERROR
1916                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
1917                                  ;*CALL
1918                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
1919
1920  014666                          $ERROR:
1921  014666  113737  001102  001230          MOVB    $TSTNM,TSTNUM
1922  014674  105237  001103          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
1923  014700  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
1924  014702  013777  001102  164232          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
1925  014710  005237  001112                  INC     $ERTTL          ;;INC THE ERROR COUNT
1926  014714  011637  001116                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
1927  014720  162737  000002  001116          SUB     #2,$ERRPC
1928  014726  117737  164164  001114          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
1929  014734  032777  020000  164176          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
1930  014742  001004                          BNE     20$             ;;SKIP TYPEOUTS
1931  014744  004737  015000                  JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
1932  014750  104401  001167                  TYPE    ,$CRLF
1933  014754                          20$:
1934  014754  005777  164160          2$:     TST     @SWR            ;;HALT ON ERROR
1935  014760  100001                          BPL     3$              ;;SKIP IF CONTINUE
1936  014762  000000                          HALT                    ;;HALT ON ERROR!
1937  014764                          3$:
1938  014764  022737  003764  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
1939  014772  001001                          BNE     6$              ;;BRANCH IF NO
1940  014774  000000                          HALT                    ;;YES
1941  014776                          6$:
1942  014776  000002                          RTI                     ;;RETURN
1943
1944                                  .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
1945
1946                                  ;;**************************************************************
1947                                  ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
```

```
                        ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
                        ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

015000                  $ERRTYP:
015000  104401  001167          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
015004  010046                  MOV     R0,-(SP)        ;;SAVE R0
015006  005000                  CLR     R0              ;;PICKUP THE ITEM INDEX
015010  153700  001114          BISB    @#$ITEMB,R0
015014  001004                  BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                        ;;TYPE THE PC OF THE ERROR
015016  013746  001116          MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                        ;;ERROR ADDRESS
015022  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
015024  000426                  BR      6$              ;;GET OUT
015026  005300          1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
015030  006300                  ASL     R0              ;;      WORK FOR THE ERROR TABLE
015032  006300                  ASL     R0
015034  006300                  ASL     R0
015036  062700  001172          ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
015042  012037  015052          MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
015046  001404                  BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
015050  104401                  TYPE                    ;;TYPE THE "ERROR MESSAGE"
015052  000000          2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
015054  104401  001167          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
015060  012037  015070  3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
015064  001404                  BEQ     5$              ;;SKIP TYPEOUT IF 0
015066  104401                  TYPE                    ;;TYPE THE "DATA HEADER"
015070  000000          4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
015072  104401  001167          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
015076  011000          5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
015100  001004                  BNE     7$              ;;GO TYPE THE DATA
015102  012600          6$:     MOV     (SP)+,R0        ;;RESTORE R0
015104  104401  001167          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
015110  000207                  RTS     PC              ;;RETURN
015112                  7$:
015112  013046                  MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
015114  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
015116  005710                  TST     (R0)            ;;IS THERE ANOTHER NUMBER?
015120  001770                  BEQ     6$              ;;BR IF NO
015122  104401  015130          TYPE    ,8$             ;;TYPE TWO(2) SPACES
015126  000771                  BR      7$              ;;LOOP
015130  020040      000 8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
        015134                  .EVEN

                        .SBTTL  TYPE ROUTINE

                        ;;******************************************************************
                        ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                        ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                        ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                        ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                        ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                        ;*
                        ;*CALL:
                        ;*1) USING A TRAP INSTRUCTION
                        ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
```

```
2004                                    ;*OR
2005                                    ;*      TYPE
2006                                    ;*      MESADR
2007                                    ;*
2008
2009  015134  105737  001157            $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
2010  015140  100002                            BPL     1$              ;;BR IF YES
2011  015142  000000                            HALT                    ;;HALT HERE IF NO TERMINAL
2012  015144  000407                            BR      3$              ;;LEAVE
2013  015146  010046                    1$:     MOV     R0,-(SP)        ;;SAVE R0
2014  015150  017600  000002                    MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
2015  015154  112046                    2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
2016  015156  001005                            BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
2017  015160  005726                            TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
2018  015162  012600                    60$:    MOV     (SP)+,R0        ;;RESTORE R0
2019  015164  062716  000002            3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
2020  015170  000002                            RTI                     ;;RETURN
2021  015172  122716  000011            4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
2022  015176  001430                            BEQ     8$
2023  015200  122716  000200                    CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
2024  015204  001006                            BNE     5$
2025  015206  005726                            TST     (SP)+           ;;POP  <CR><LF> EQUIV
2026  015210  104401                            TYPE                    ;;TYPE A CR AND LF
2027  015212  001167                            $CRLF
2028  015214  105037  015350                    CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
2029  015220  000755                            BR      2$              ;;GET NEXT CHARACTER
2030  015222  004737  015304            5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
2031  015226  123726  001156            6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
2032  015232  001350                            BNE     2$              ;;IF NO GO GET NEXT CHAR.
2033  015234  013746  001154                    MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
2034                                            ;;AND THE NULL CHAR.
2035  015240  105366  000001            7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
2036  015244  002770                            BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
2037  015246  004737  015304                    JSR     PC,$TYPEC       ;;GO TYPE A NULL
2038  015252  105337  015350                    DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
2039  015256  000770                            BR      7$              ;;LOOP
2040
2041                                    ;HORIZONTAL TAB PROCESSOR
2042
2043  015260  112716  000040            8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
2044  015264  004737  015304            9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
2045  015270  132737  000007  015350            BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
2046  015276  001372                            BNE     9$              ;;TAB STOP
2047  015300  005726                            TST     (SP)+           ;;POP SPACE OFF STACK
2048  015302  000724                            BR      2$              ;;GET NEXT CHARACTER
2049  015304  105777  163640            $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
2050  015310  100375                            BPL     $TYPEC
2051  015312  116677  000002  163632            MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
2052  015320  122766  000015  000002            CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
2053  015326  001003                            BNE     1$              ;;BRANCH IF NO
2054  015330  105037  015350                    CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
2055  015334  000406                            BR      $TYPEX          ;;EXIT
2056  015336  122766  000012  000002    1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
2057  015344  001402                            BEQ     $TYPEX          ;;BRANCH IF YES
2058  015346  105227                            INCB    (PC)+           ;;COUNT THE CHARACTER
2059  015350  000000            $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
```

```
2060  015352  000207                  $TYPEX: RTS     PC
2061
2062
2063                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
2064
2065                                  ;;**********************************************************************
2066                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
2067                                  ;*OCTAL (ASCII) NUMBER AND TYPE IT.
2068                                  ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
2069                                  ;*CALL:
2070                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
2071                                  ;*      TYPOS                   ;;CALL FOR TYPEOUT
2072                                  ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
2073                                  ;*      .BYTE   M               ;;M=1 OR 0
2074                                  ;*                                      ;;1=TYPE LEADING ZEROS
2075                                  ;*                                      ;;0=SUPPRESS LEADING ZEROS
2076                                  ;*
2077                                  ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
2078                                  ;*$TYPOS OR $TYPOC
2079                                  ;*CALL:
2080                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
2081                                  ;*      TYPON                   ;;CALL FOR TYPEOUT
2082                                  ;*
2083                                  ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
2084                                  ;*CALL:
2085                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
2086                                  ;*      TYPOC                   ;;CALL FOR TYPEOUT
2087
2088  015354  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
2089  015360  116637  000001  015577          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
2090  015366  112637  015601                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
2091  015372  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
2092  015376  000406                          BR      $TYPON
2093  015400  112737  000001  015577  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
2094  015406  112737  000006  015601          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
2095  015414  112737  000005  015576  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
2096  015422  010346                          MOV     R3,-(SP)        ;;SAVE R3
2097  015424  010446                          MOV     R4,-(SP)        ;;SAVE R4
2098  015426  010546                          MOV     R5,-(SP)        ;;SAVE R5
2099  015430  113704  015601                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
2100  015434  005404                          NEG     R4
2101  015436  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
2102  015442  110437  015600                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
2103  015446  113704  015577                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
2104  015452  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
2105  015456  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
2106  015460  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
2107  015462  000404                          BR      3$              ;;GO DO MSB
2108  015464  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
2109  015466  006105                          ROL     R5
2110  015470  006105                          ROL     R5
2111  015472  010503                          MOV     R5,R3
2112  015474  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
2113  015476  105337  015600                  DECB    $OMODE          ;;TYPE THIS DIGIT?
2114  015502  100016                          BPL     7$              ;;BR IF NO
2115  015504  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
```

```
2116  015510  001002                        BNE     4$              ;;TEST FOR 0
2117  015512  005704                        TST     R4              ;;SUPPRESS THIS 0?
2118  015514  001403                        BEQ     5$              ;;BR IF YES
2119  015516  005204                4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
2120  015520  052703  000060                BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
2121  015524  052703  000040        5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
2122  015530  110337  015574                MOVB    R3,8$           ;;SAVE FOR TYPING
2123  015534  104401  015574                TYPE    ,8$             ;;GO TYPE THIS DIGIT
2124  015540  105337  015576        7$:     DECB    $OCNT           ;;COUNT BY 1
2125  015544  003347                        BGT     2$              ;;BR IF MORE TO DO
2126  015546  002402                        BLT     6$              ;;BR IF DONE
2127  015550  005204                        INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
2128  015552  000744                        BR      2$              ;;GO DO THE LAST DIGIT
2129  015554  012605                6$:     MOV     (SP)+,R5        ;;RESTORE R5
2130  015556  012604                        MOV     (SP)+,R4        ;;RESTORE R4
2131  015560  012603                        MOV     (SP)+,R3        ;;RESTORE R3
2132  015562  016666  000002  000004        MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
2133  015570  012616                        MOV     (SP)+,(SP)
2134  015572  000002                        RTI                     ;;RETURN
2135  015574     000                8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
2136  015575     000                        .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
2137  015576     000                $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
2138  015577     000                $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
2139  015600  000000                $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
2140                                .SBTTL  RANDOM NUMBER GENERATOR ROUTINE
2141
2142                                ;;*****************************************************************
2143                                ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
2144                                ;*WITH A RANGE OF 0 TO 2(+33)-1.
2145                                ;*CALL:
2146                                ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
2147                                ;*      RETURN                  ;;RETURN HERE THE RANDOM
2148                                ;*                              ;;NUMBER WILL BE IN
2149                                ;*                              ;;$HINUM,$LONUM
2150
2151  015602                        $RAND:
2152  015602  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
2153  015604  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
2154  015606  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
2155  015610  013700  015702                MOV     $LONUM,R0       ;;SET R0 WITH LOW
2156  015614  013701  015700                MOV     $HINUM,R1       ;;SET R1 WITH HIGH
2157  015620  012702  177771                MOV     #-7,R2          ;;SET SHIFT COUNT
2158  015624  006300                1$:     ASL     R0              ;;SHIFT R0 LEFT AND
2159  015626  006101                        ROL     R1              ;;ROTATE CARRY INTO R1 AND
2160  015630  005202                        INC     R2              ;;CHECK FOR DONE
2161  015632  001374                        BNE     1$              ;;CONTINUE SHIFT LOOP
2162  015634  063700  015702                ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
2163  015640  005501                        ADC     R1              ;;PROPOGATE CARRY
2164  015642  063701  015700                ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
2165  015646  062700  001057                ADD     #1057,R0        ;;ADD LOW CONSTANT
2166  015652  005501                        ADC     R1              ;;PROPOGATE CARRY
2167  015654  062701  047401                ADD     #47401,R1       ;;ADD HIGH CONSTANT
2168  015660  010037  015702                MOV     R0,$LONUM       ;;SAVE R0
2169  015664  010137  015700                MOV     R1,$HINUM       ;;SAVE R1
2170  015670  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
2171  015672  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
```

```
                                        MOV     (SP)+,R0        ;;POP STACK INTO R0
                                        RTS     PC              ;;RETURN
                                $HINUM: .WORD   176543
                                $LONUM: .WORD   123456
                                .SBTTL  TRAP DECODER

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

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


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

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

                                .SBTTL  TRAP TABLE

                                ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                ;*BY THE "TRAP" INSTRUCTION.

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

                                        $RDCHR  ;;CALL=RDCHR    TRAP+6(104406)  TTY TYPEIN CHARACTER ROUTINE
                                        $RDLIN  ;;CALL=RDLIN    TRAP+7(104407)  TTY TYPEIN STRING ROUTINE
                                        $RDOCT  ;;CALL=RDOCT    TRAP+10(104410) READ AN OCTAL NUMBER FROM TTY
                                .SBTTL  POWER DOWN AND UP ROUTINES

                                ;;**************************************************************
                                ;POWER DOWN ROUTINE
                                $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
                                        MOV     #340,@#PWRVEC+2 ;;PRIO:7
                                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
                                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
                                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
                                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
                                        MOV     R4,-(SP)        ;;PUSH R4 ON STACK
```

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 2228  016010  010546                          MOV     R5,-(SP)          ;;PUSH R5 ON STACK
 2229  016012  017746  163122                  MOV     @SWR,-(SP)        ;;PUSH @SWR ON STACK
 2230  016016  010637  016126                  MOV     SP,$SAVR6         ;;SAVE SP
 2231  016022  012737  016034  000024          MOV     #$PWRUP,@#PWRVEC  ;;SET UP VECTOR
 2232  016030  000000                          HALT
 2233  016032  000776                          BR      .-2               ;;HANG UP
 2234
 2235                                  ;;*****************************************************************
 2236                                  ;POWER UP ROUTINE
 2237  016034  012737  016122  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC  ;;SET FOR FAST DOWN
 2238  016042  013706  016126                  MOV     $SAVR6,SP         ;;GET SP
 2239  016046  005037  016126                  CLR     $SAVR6            ;;WAIT LOOP FOR THE TTY
 2240  016052  005237  016126          1$:     INC     $SAVR6            ;;WAIT FOR THE INC
 2241  016056  001375                          BNE     1$                ;;OF  WORD
 2242  016060  012677  163054                  MOV     (SP)+,@SWR        ;;POP STACK INTO @SWR
 2243  016064  012605                          MOV     (SP)+,R5          ;;POP STACK INTO R5
 2244  016066  012604                          MOV     (SP)+,R4          ;;POP STACK INTO R4
 2245  016070  012603                          MOV     (SP)+,R3          ;;POP STACK INTO R3
 2246  016072  012602                          MOV     (SP)+,R2          ;;POP STACK INTO R2
 2247  016074  012601                          MOV     (SP)+,R1          ;;POP STACK INTO R1
 2248  016076  012600                          MOV     (SP)+,R0          ;;POP STACK INTO R0
 2249  016100  012737  015762  000024          MOV     #$PWRDN,@#PWRVEC  ;;SET UP THE POWER DOWN VECTOR
 2250  016106  012737  000340  000026          MOV     #340,@#PWRVEC+2   ;;PRIO:7
 2251  016114  104401                          TYPE                      ;REPORT THE POWER FAILURE
 2252  016116  016130                  $PWRMG: .WORD   $POWER            ;;POWER FAIL MESSAGE POINTER
 2253  016120  000002                          RTI
 2254  016122  000000                  $ILLUP: HALT                      ;;THE POWER UP SEQUENCE WAS STARTED
 2255  016124  000776                          BR      .-2               ;; BEFORE THE POWER DOWN WAS COMPLETE
 2256  016126  000000                  $SAVR6: 0                         ;;PUT THE SP HERE
 2257  016130  005015  047520  042527  $POWER: .ASCIZ   <15><12>''POWER''
 2258  016136  000122
 2259                                          .EVEN
 2260  016140  000000                  RETRY:  .WORD   0
 2261
 2262                                  ; THIS TEXT IS THE SOURCE OF THE CHARACTERS TO BE PLACED IN THE MESSAGE
 2263                                  ; AREA ''BUFFER'' FOR THE DIRECT CURSOR ADDRESSING TEST (E).
 2264                                  ;       THE BUFFER IS 2000. CHARS. LONG FOR TEST 'E' AND SHOULD BE TERMINATED
 2265                                  ;       BY 3 OR 4 ''377'''S AS A TERMINATOR.
 2266
 2267                                          .NLIST  BEX
     016142                           MSGTXT:
  (1)016142  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
  (1)016212  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
  (1)016263     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
  (1)016333     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
  (1)016404  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
  (1)016454  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
  (1)016525     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
  (1)016575     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
  (1)016646  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
  (1)016716  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
  (1)016767     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
  (1)017037     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
  (1)017110  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
  (1)017160  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
  (1)017231     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
```

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(1)  017301     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  017352  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  017422  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  017473     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  017543     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  017614  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  017664  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  017735     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  020005     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  020056  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  020126  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  020177     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  020247     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  020320  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  020370  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  020441     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  020511     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  020562  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  020632  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  020703     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  020753     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  021024  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  021074  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  021145     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  021215     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  021266  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  021336  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  021407     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  021457     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  021530  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  021600  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
(1)  021651     115  030467  031064          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
(1)  021721     124  046101  042455          .ASCII  \TAL-EQUIPMENT-CORP.-MERRIMACK-N.H.-M7142-\
     021772  033515  032061  026462          .ASCII  \M7142-DIRECT-CURSOR-ADDRESSING-TEST-DIGI\
     022042  040524  026514  050505          .ASCII  \TAL-EQUIPMENT-CO\
     022062     377     377     377  MSGTND: .BYTE   377,377,377,377
                                     .LIST   BEX
2268 022066  001762                 BUFFER: .BLKW   1010.
2269         000001                         .END
```

```
A       003460          1105#
ADELAY  005266           824     903     945    1016    1045    1172    1215    1496#
AMSG    005340           822     825     837     856     879     901     904     943     946    1014    1017    1019    1022
                        1025    1028    1031    1034    1043    1046    1055    1068    1078    1105    1108    1113    1118
                        1123    1128    1134    1213    1216    1219    1224    1229    1234    1239    1245    1248    1251
                        1256    1259    1262    1266    1269    1275    1285    1315    1358    1374    1471    1514#   1548
                        1590
ANESC   005170          1445*   1447*   1464#
ATTRS   011366          1472    1738#
ATTR8   011242          1378    1738#
AXOFF   005162          1461#
A1      004062          1213#
B       003502          1112#
BEGIN   001274           595     717#
BEGIN1  001340           597     726#
BEGIN2  001360           598     730#
BEGIN3  001330           599     724#
BEGIN4  001350           600     728#
BFCHAR  004542          1302    1339#
BFCHR   004504          1296    1302    1321#
BIT0  = 000001           557#    1382    1608    1622
BIT00 = 000001           547#     557
BIT01 = 000002           546#     556
BIT02 = 000004           545#     555
BIT03 = 000010           544#     554
BIT04 = 000020           543#     553
BIT05 = 000040           542#     552
BIT06 = 000100           541#     551
BIT07 = 000200           540#     550
BIT08 = 000400           539#     549    1897
BIT09 = 001000           538#     548
BIT1  = 000002           556#    1606
BIT10 = 002000           537#    1100
BIT11 = 004000           536#
BIT12 = 010000           535#    1482
BIT13 = 020000           534#    1929
BIT14 = 040000           533#    1883
BIT15 = 100000           532#
BIT2  = 000004           555#    1603
BIT3  = 000010           554#
BIT4  = 000020           553#
BIT5  = 000040           552#
BIT6  = 000100           551#
BIT7  = 000200           550#    1384    1605    1610    1626    1630
BIT8  = 000400           549#
BIT9  = 001000           548#     774    1865
BLKPRT  005174          1021    1024    1027    1030    1033    1470#
BPTVEC= 000014           564#
BUFFER  022066           907     914     921     948*    949*    954     959*    970     989*    990*    991*    1406    1418
                        1434    1728    2268#
B1      004116          1223#
C       003516          1117#
CHRATT  004644           728    1374#   1397
CR    = 000015           472#    2052    2062
CRLF  = 000200           473#    2023    2062
C1      004132          1228#
```

```
D       004200            1245#
DCATST  002546             951#
DDISP = 177570             479#    639     756
DELAY   005214             827     848     865     870     889     894     912     919     926     997    1036    1070    1089
                          1094    1396    1480#
DH1     012024             675     681    1738#
DH3     012053             688    1738#
DIGO    005450            1290    1540*   1543#   1571    1583
DIG1    005452            1291    1533*   1544#   1572    1584
DIG2    005454            1292    1526*   1545#   1573    1585
DISPCH  003576            1137#
DISPLA  001142             639#    756*    764*   1904*   1924*
DISPRE  000174             592#    764
DSWR  = 177570             478#    638     755
DT1     012122             676     682    1738#
DT3     012132             689    1738#
E       004230            1256#
EMTVEC= 000030             567#    743*    744*
EM1     011665             674    1738#
EM2     011732             680    1738#
EM3     011761             687    1738#
ERCHR   012434            1738#
ERRVEC= 000004             560#    753     754*    765*   1888    1889*   1891*   1894*
F       004260            1266#
FILBFA  004774            1409#   1411
FILBFB  004760            1406#
FILBUF  004754             840     861    1050    1405#
FILLWC  002122             839#
FIRST   001222             692#    781*    782     784     798
FRMFED  011205             823     902     944    1015    1044    1214    1738#
GENER   002616             961#    965     967     988     995
GENRX   002702             972     976#    980     982
GETCHR  006334            1287    1361    1550*   1706#
GIN     001366             723     725     727     729     731#
GINA    001374             720     732#
GNS   = ****** U           591    2207    2208    2209    2210    2211    2214    2215    2216
HT    = 000011             470#   2021    2062
IGNORE  005172             767*   1314*   1454*   1465#
INSTR   012455            1738#
INVLID  010303             796    1738#
IOTVEC= 000020             565#    741*    742*    769*
KRBDON  004302            1275#
KRBECH  004606             724    1357#
KRBECO  004316             730    1284#
KRBTST  004052             726    1211#   1277
LAST    001224             694#    785*    789*    790    1161    1163
LASTCH  001264             711#    820*    868     892    1424
LASTLN  001236             700#    814*    966
LF    = 000012             471#   2056    2062
LIC     005010             884    1084    1418#
LICA    005026            1422#   1428
LICB    005044            1425    1427#
LOOP    005154             768*   1458#   1867
MASK1   005712            1597#   1601*   1605*   1613
MASK2   005714            1580    1598#   1602*   1610*   1612    1626*   1630*
MBKSP   012654             915    1738#
```

```
MKB     007206          1106    1738#
MKBA    007310          1549    1738#
MKBB2   007375          1109    1220    1249    1260    1270    1738#
MKBC    007463          1114    1225    1738#
MKBD2   007524          1119    1230    1738#
MKBE    007614          1124    1235    1738#
MKBF    007705          1129    1240    1738#
MKBG    007762          1246    1738#
MKBGA   010031          1257    1738#
MKBH    010101          1267    1738#
MKBQ    010142          1591    1738#
MKBQA   010207          1583*   1584*   1585*   1738#
MKBQB   010226          1571*   1572*   1573*   1738#
MKBQ1   010203          1587*   1738#
MKBQ2   010222          1578*   1738#
MKBR    010235          1135    1276    1738#
MKBX    010350          1217    1738#
MKBX1   010423          1738#
MKB1    007253          1252    1263    1738#
MKE     010460          1286    1738#
MKEA    010665          1316    1738#
MKEA1   010676          1303*   1304*   1309*   1310*   1312*   1313*   1738#
MKEB    010703          1290*   1291*   1292*   1738#
MKEH    010712          1359    1738#
MOVBSP  002440           914#
MOVTAB  002414           907#
MOVVT   002464           921#
MQ0     010742          1738#
MQ1     011027          1738#
MQ2     011115          1738#
MSCOPE  014532           769    1865#
MSGTND  022062          2267#
MSGTXT  016142           955    2267#
MTAB    012540           908    1738#
MTEXT0  013053          1137    1738#
MTEXT1  013157          1138    1738#
MTEXT2  013260          1139    1738#
MTEXT3  013362          1140    1738#
MTEXT4  013445          1141    1738#
MTEXT5  013547          1142    1738#
MTEXT6  013650          1143    1738#
MTEXT7  013702          1144    1738#
MTEXT8  014002          1145    1738#
MTOB    006412          1515    1727#
MVT     013006           922    1738#
M91     006516           838    1738#
M9221   007043          1018    1738#
M9222   007124          1375    1738#
M93     006566           857    1738#
M94     006632           880    1738#
M96     006665           905    1738#
M97     006746          1047    1738#
M98     011136           947    1738#
M99     007006          1079    1738#
NOWEOP  004020          1196    1201#
OCTAL   005360          1289    1523#   1570    1582
```

```
OVRAL   003030            953*    994*   1003#
PARITY  005716           1552*   1601#
PASHED  011642           1170    1738#
PIRQ  = 177772            477#
PIRQVE= 000240            571#
PRTCNT  001250            705#    719*    721*   1201    1203*
PR0   = 000000            494#
PR1   = 000040            495#
PR2   = 000100            496#
PR3   = 000140            497#
PR4   = 000200            498#
PR5   = 000240            499#
PR6   = 000300            500#
PR7   = 000340            501#
PS    = 177776            474#    475
PSW   = 177776            475#
PWRVEC= 000024            566#    747*    748*   2221*   2222*   2231*   2237*   2249*   2250*
QKBDON  003564           1134#
QKBTST  003434           1100#
RBEGIN  001314            596     721#
RDCHR = 104406           1786    2214#
RDLIN = 104407           1831    2215#
RDOCT = 104410            780     788    2216#
RESVEC= 000010            561#
RETRY   016140           2260#
ROW12   012166           1738#
ROW12C  012376           1738#
ROW12S  012340           1738#
ROW22   012224           1738#
ROW32   012262           1738#
ROW42   012314           1738#
ROW5    012164           1127    1238    1738#
RSTRT   001756            800#   1167
SAVE4   001272            714#    718*    731*    770
SBEGIN  001750            771     775     793     798#   1206
SCRL    011210           1056    1069    1738#
SCRNO   011236           1059*   1067*   1738#
SET     003026            970*    973*    985*    986    1002#
SI      011515           1023    1029    1035    1738#
SO      011512           1020    1026    1032    1738#
STACK = 001100            465#    739    1104    1212    1284    1357
STCHAR  001262            710#    858*    860     867*    868     881*    883     891*    892     1048*   1049    1052*   1053
                         1080*   1083
STKLMT= 177774            476#
SUBTST  001234            699#   1480    1496
SWR     001140            638#    737     755*    757     763*    774    1100    1482    1603    1606    1608    1622    1865
                         1883    1897    1899    1929    1934    2229    2242*
SWREG   000176            593#    763
SW0   = 000001            529#
SW00  = 000001            519#    529
SW01  = 000002            518#    528
SW02  = 000004            517#    527
SW03  = 000010            516#    526
SW04  = 000020            515#    525
SW05  = 000040            514#    524
SW06  = 000100            513#    523
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```
SW07  = 000200             512#    522
SW08  = 000400             511#    521
SW09  = 001000             510#    520
SW1   = 000002             528#
SW10  = 002000             509#
SW11  = 004000             508#
SW12  = 010000             507#
SW13  = 020000             506#
SW14  = 040000             505#
SW15  = 100000             504#
SW2   = 000004             527#
SW3   = 000010             526#
SW4   = 000020             525#
SW5   = 000040             524#
SW6   = 000100             523#
SW7   = 000200             522#
SW8   = 000400             521#
SW9   = 001000             520#
TBITVE= 000014             562#
TEMPO   001266             712#    859*    863*    866*    882*    887*    890*   1058*   1071*   1081*   1087*   1090*
TIME0   001232             698#   1706
TIME1   006406            1706*   1717*   1722#
TIME2   006410            1707*   1715*   1723#
TITLE   006426             773     826    1738#
TKVEC = 000060             569#
TOTALC  001240             701#    812*    953
TPVEC = 000064             570#
TRAPVE= 000034             568#    745*    746*
TRTVEC= 000014             563#
TSTNUM  001230             696#   1738    1921*
TSTROW  005456            1110    1115    1120    1125    1130    1221    1226    1231    1236    1241    1250    1261    1271
                          1548#
TST1    002112             717     722     829     835#    1166    1204
TST10   003324            1077#
TST11   003432            1099#
TST12   004050            1210#
TST13   004314            1283#
TST14   004604            1356#
TST15   004642            1372#
TST2    002170             855#
TST3    002270             878#
TST4    002372             900#
TST5    002510             935#
TST6    003032             998    1012#
TST7    003150            1041#
TYPDS = 104405            1185    2211#
TYPE  = 104401             772     778     786     795    1170    1183    1186    1205    1694    1790    1793    1797    1860
                          1862    1932    1952    1969    1971    1974    1976    1980    1987    2026    2123    2207#   2251
TYPOC = 104402            1960    1984    2208#
TYPON = 104404            2210#
TYPOS = 104403            2209#
VH0     001242             702#    813*    816     841     859     866     882     890    1081    1090    1092
VH1     001244             703#    816*    817*    818
VH2     001246             704#    818*    819*
VTIB    001254             707#   1711
VTIS    001252             706#    800    1588    1709
```

```
VTNOW   001226            695#   798*   801    1163   1165*  1738
VTOB    001260            709#  1062*  1363*   1385*  1448*  1557*
VTOS    001256            708#  1063   1364    1386   1435   1437   1558
V52RW   012146           1103   1211   1738#
WHATO   011520            779   1738#
WHAT1   011563            787   1738#
WHERE   002110            717*   722*   724*   726*   728*   730*   828    829#   1166*  1204*
WIDTH   001270            713#   885   1085    1405
XADDS   003024            983*   990   1001#
XOFF  = 000023            700#
XOFFBR  005156           1455*  1459#
XOFFOK  005160            842*  1453*  1460#
XOFFRC  005164           1462#
XON   = 000021            700#
XONRC   005166           1463#
XPRNT   005056            843    862    886    911    918    925    993    1051   1086   1434#  1517
XPRNTA  005062           1435#  1438   1449
XPRNTB  005100           1436   1440#
YADDS   003022            968*   989   1000#
$AUTOB  001134            635#
$BDADR  001122            630#
$BDDAT  001126            632#  1569*  1738
$CHARC  015350           2028*  2038*  2045    2054*  2059#
$CKSWR= ****** U          2214
$CMTAG  001100            618#   734    735    743    749    750
$CM1  = 000002            650#   651#   652#
$CM2  = 000004            650#   651#   652#
$CM3  = 000002            648#   650
$CNTLG  014343           1807#
$CNTLU  014336           1806#
$CRLF   001167            653#  1806   1865    1932   1943   1952   1971   1976   1980   2027   2062
$DBLK   006324           1660   1694   1702#
$DOAGN  003774           1179   1188   1194#
$DTBL   006314           1663   1698#
$ENDAD  003764            607   1190#  1938
$ENDCT  003732            749   1181#
$ENDMG  004003           1183   1198#
$ENULL  004000           1186   1197#  1205
$EOP    003624           1102   1136   1159#
$EOPCT  003724            749*  1178#  1182
$ERFLG  001103            621#  1875   1903*  1907   1922*  1943
$ERMAX  001115            627#  1907
$ERROR  014666            743   1920#
$ERRPC  001116            628#  1738   1926*  1927*  1928   1943   1958
$ERRTB  001172            670#  1966
$ERRTY  015000           1931   1951#
$ERTTL  001112            625#  1925*  1943
$FILLC  001156            646#  2031   2062
$FILLS  001155            645#  2062
$GDADR  001120            629#
$GDDAT  001124            631#  1581*  1738
$GET42  003754           1187#
$GTSWR= ****** U          2213
$HD   = 000000             462
$HINUM  015700            952*   962    977    2156   2164   2169*  2174#
$HIOCT  014530           1853*  1864#
```

```
$ICNT   001104            622#
$ILLUP  016122           2221    2237    2254#
$INTAG  001135            636#
$ITEMB  001114            626#   1928*   1943    1955
$LF     001170            654#   1797    1806    1865    1943    2062
$LONUM  015702            951*   2155    2162    2168*   2175#
$LPADR  001106            623#    750*   1902*   1905    1907
$LPERR  001110            624#
$MAIL = ****** U          767    1902    1934    2015
$MNEW   014361           1810#
$MSWR   014350           1808#
$NULL   001154            644#   2033    2062
$NWTST= 000001            832#    852#    875#    897#    932#   1009#   1038#   1074#   1096#   1207#   1280#   1353#   1369#
$OCNT   015576           2095*   2124*   2137#
$OMODE  015600           2090*   2094*   2099    2102*   2113*   2139#
$OVER   014652           1868    1884    1895    1900    1904#
$PASS   001100            619#   1168    1175*   1176*   1184    1197
$POWER  016130           2252    2257#
$PWRDN  015762            747    2221#   2249
$PWRMG  016116           2252#
$PWRUP  016034           2231    2237#
$QUES   001166            652#   1790    1806    1862    1865    1943    2062
$RAND   015602            961     976    2151#
$RDCHR  014100           1754#   2214
$RDDEC= ****** U         2217
$RDLIN  014220           1782#   2215
$RDOCT  014372           1826#   2216
$RDSZ = 000010           1775#
$REGAD  001160            648#
$REG0   001162            650#   1082*   1091*   1092    1377*   1390*   1391
$REG1   001164            651#
$RTNAD  003776           1196#
$R2A  = ****** U         2217
$SAVRE= ****** U         2217
$SAVR6  016126           2230*   2238    2239*   2240*   2256#
$SCOPE  014550            741    1866    1882#
$SETUP= 000037            672#    740     741     743     745     747     749     750    1174    1743    1812    1883    1921
                         1937    1938
$STUP = 177777            672#
$SVLAD  014636           1892    1898    1901#
$SVPC = 000230            605#    610
$SWR  = 160400            452#    462     577     578     579     580     581     582     583     652     750     751     836
                          856     879     901     936    1013    1042    1078    1100    1156    1175    1189    1195    1197
                         1211    1284    1357    1373    1876    1877    1878    1883    1895    1897    1898    1901    1903
                         1907    1914    1915    1916    1917    1925    1929    1934    1937    1943    2253
$SWRMK= 000000            583     584    1878    1879    1899
$TKB    001146            641#   1741    1758    1764
$TKS    001144            640#   1588    1741    1756    1762
$TN   = 000016            452#    462     832     836#    852     856#    875     879#    897     901#    932     936#   1009
                         1013#   1038    1042#   1074    1078#   1096    1100#   1207    1211#   1280    1284#   1353   1357#
                         1369    1373#
$TPB    001152            643#   2051*   2062
$TPFLG  001157            647#   2009    2062
$TPS    001150            642#   2049    2062
$TRAP   015704            745    2184#
$TRAP2  015726           2195#   2206
```

```
$TRP   = 000011            2199#   2208#   2209#   2210#   2211#   2212#   2214    2215#   2216#   2217#
$TRPAD  015740             2189    2206#
$TSTNM  001102              620#   1174*   1875    1899    1901*   1904    1907    1921    1924    1943
$TTYIN  014326             1783    1784    1801    1805#
$TYPBN= ****** U           2212
$TYPDS  006110             1648#   2211
$TYPE   015134             2009#   2199    2207
$TYPEC  015304             2030    2037    2044    2049#   2050
$TYPEX  015352             2055    2057    2060#
$TYPOC  015400             2093#   2208
$TYPON  015414             2092    2095#   2210
$TYPOS  015354             2088#   2209
$XTSTR  014560             1886#
$$GET4= 000000             1189#
$OFILL  015577             2089*   2093*   2103    2138#
$40CAT= ****** U           1883    1931
.      = 026032             587#    591#    605     606#    608#    610#    617#    655     738     750    1197    1201    1702#
                           1738#   1741    1805#   1806    1812    1865    1907    1943    1990#   2062    2233    2255    2268#
```

```
ANYMOR    1149#   1160
COMMEN       1#    572#
ENDCOM       1#    572#
ERROR      466#   1439    1592    1719
ESCAPE       1#    572#
GETPRI       1#    572#
GETSWR       1#    572#
MULT         1#    572#
NEWTST       1#    572#    832     852     875     897     932    1009    1038    1074    1096    1207    1280    1353    1369
POP          1#    572#   1689    1854    2170    2242    2243
PUSH         1#    572#   1648    1828    2151    2223    2229
REPORT       1#    572#
SCOPE      467#    835     855     878     900     935    1012    1041    1077    1099    1160    1210    1283    1356    1372
SETPRI       1#    572#
SETTRA    2199#   2208    2209    2210    2211    2214    2215    2216
SETUP        1#    572#    733
SKIP         1#    572#   1288
SLASH        1#    572#
SPACE      572#
STARS        1#    572#    603     613     655     832     834     852     854     875     877     897     899     932     934
          1009    1011    1038    1040    1074    1076    1096    1098    1152    1207    1209    1280    1282    1353    1355
          1369    1371    1638    1740    1746    1775    1814    1872    1910    1946    1994    2065    2142    2178    2219
          2235
SWRSU        1#    572#    751#
TRMTRP    2199#
TYPBIN       1#    572#
TYPDEC       1#    572#   1184
TYPNAM       1#    572#
TYPNUM       1#    572#
TYPOCS       1#    572#
TYPOCT       1#    572#   1958    1982
TYPTXT       1#    572#
$$CMRE     611#    650     651
$$CMTM     611#
$$ESCA       1#    572#
$$NEWT       1#    572#    832     852     875     897     932    1009    1038    1074    1096    1207    1280    1353    1369
$$SET     2199#   2208    2209    2210    2211    2214    2215    2216
$$SKIP       1#    572#
.EQUAT       1#    452#    462
.HEADE       1#    452#
.KT11        1#
.SETUP       1#    452#    672
.SWRHI       1#    452#    573
.SWRLO     584#
.$ACT1       1#    452#    601
.$APTB       1#
.$APTH       1#
.$APTY       1#
.$ASTA       1#
.$CATC       1#    452#    585
.$CMTA       1#    452#    611
.$DB2D       1#
.$DB2O       1#
.$DIV        1#
.$EOP        1#    452#   1150
.$ERRO       1#    452#   1908
```

```
.$ERRT      1#    452#   1944
.$MULT      1#
.$PARM    452#
.$POWE      1#    452#   2217
.$RAND      1#    452#   2140
.$RDDE      1#
.$RDOC      1#    452#   1812
.$READ      1#    452#   1738
.$R2AZ      1#
.$SAVE      1#    452#
.$SB2D      1#
.$SB2O      1#
.$SCOP      1#    452#   1870
.$SIZE      1#
.$SPAC    452#
.$SUPR      1#
.$SWDO    452#
.$TRAP      1#    452#   2176
.$TYPB      1#
.$TYPD      1#    452#   1636
.$TYPE      1#    452#   1992
.$TYPO      1#    452#   2063
.$40CA      1#
.1170       1#


. ABS.  026032     000


 ERRORS DETECTED:  0

 CZVTOA/I,CZVTOA.SEQ/CRF/SOL=CZVTOA.SML,CZVTOA.P11
 RUN-TIME: 14 11 .8 SECONDS
 RUN-TIME RATIO: 30/26=1.1
 CORE USED:  32K  (63 PAGES)
```