digital

TED

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T E D

(Tape EDitor)

Your attention is invited to the last two pages
of this document. The "How to Obtain Software
Information" page tells you how to keep up-to-
date with DEC's software. The "Reader's Comments"
page, when filled in and mailed, is beneficial
to both you and DEC; all comments received are
acknowledged and are considered when documenting
subsequent manuals.

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1.0 INTRODUCTION

TED (Tape EDitor) allows selective modification of any specified block
of tape or disk via a CRT display and simple keyboard commands. Ten
locations of the block are displayed at a time with a movable cursor.
Multi-word as well as single-digit changes are easily accomplished.

2.0 HARDWARE REQUIREMENTS

TED will run on any PDP-12 system that supports DIAL-MS[1].

3.0 LOADING PROCEDURE

The program uses the DIAL-MS I/O routines for its input and output, and
reads the I/O routines from a system device (tape unit $\emptyset$ if tape system
or disk unit $\emptyset$ if disk system). Therefore, before loading, make sure
that the system has been initialized (by starting at 731$\emptyset$) for the par-
ticular machine configuration being used.

The program is loaded by the command

> → LO TED,u ↵

where u = unit. Starting address, if not self-starting, is 4$\emptyset$2$\emptyset$, LINC-
mode. After the program has been started and the I/O routines read
into core, the tape on unit $\emptyset$ may be dismounted if desired.

4.0 USAGE

An initial QANDA (question and answer) frame will appear

>   TED
>   (Tape Editor)
>
>   READ BLOCK____
>
>   FROM UNIT__

Legal blocks are $\emptyset\emptyset\emptyset\emptyset$-7777 and legal units are $\emptyset\emptyset$-77. If nonexistent
blocks or units are specified, results are questionable. A nonexistent
unit should give a "NO" message; type RETURN to return to DIAL, or re-
start at 4$\emptyset$2$\emptyset$.

---

[1]LAP6-DIAL-MS is referred to as DIAL-MS.

Once the block and unit have been specified (illegal characters will cause the frame to be redisplayed), the block will be read into core and the following display will appear.

```
UNIT XX
BLOCK XXXX
                    LOC / CONTENTS

                    ∅∅∅ / XXXX   XX
                    ∅∅1 / XXXX   XX
                    ∅∅2 / XXXX   XX
                    ∅∅3 / XXXX   XX
                    ∅∅4 / XXXX   XX
                    ∅∅5 / XXXX   XX
                    ∅∅6 / XXXX   XX
                    ∅∅7 / XXXX   XX
```

The extreme right column gives the two 6-bit ASCII equivalents of the octal number. Most of these are obvious (∅1=A, etc.), but there are a few exceptions:

> 43   (DIAL code for carriage return) is displayed as a curved down-arrow (↲).
>
> 47   (DIAL code for TAB) is displayed as a horizontal "T" (⊣).
>
> 37   (Back-arrow) is displayed as such even though DIAL ignores it (←).

The cursor, initially under the first digit of the contents of location ∅, may be moved by pressing the following keys (there is no Teletype[1] echo).

Key	Action
SPACE	Moves cursor one digit to right
RUBOUT	Moves cursor one digit to left
RETURN	Moves cursor down one line and to left
ALTMODE	Moves cursor up one line and to left
DIGITS ∅ - 7	When a digit is typed, the number typed replaces the digit under which the cursor is located. The cursor then moves one space to the right.

The "window" may be moved to display new locations by typing the following keys.

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[1]Teletype is a trademark of the Teletype Corporation.

Key	Action
CTRL/F[1]	Advances window by 10; thus, if initially locations 000-007 are displayed, CTRL/F will cause locations 010-017 to be displayed.
F	Same as CTRL/F, except by 1.
CTRL/B	Backs up window by 10 (just the reverse of CTRL/F).
B	Backs up window by 1 (the reverse of F).
LINEFEED + a number 000 to 377	Positions the window so that the specified location is at the top of the window. (371-377 position the display such that 370 is at the top of the window.)
LINEFEED + S	Searches the block starting at the current location (location displayed at the top of the window) for the contents of the Right Switches masked by the contents of the Left Switches. If the search is not successful, the window is positioned to location zero. If the search is successful, the location with the desired number is positioned at the top of the window. Exception: If a match is found in locations 371-377, the window is set starting at location 370 and the cursor is positioned under the first occurrence of the matching number.

In addition, if at any time the cursor is at the beginning or end of the window and a command is given that would move the cursor beyond the window, the window will be moved to give the desired result. Thus, if the cursor is on the last line of the window and RETURN is typed, the whole window will move up 1 frame.

If the window is at 000 or 377, attempts to go beyond the ends are ignored.

Various other keys are used to control the reading and writing of the blocks:

Key	Action
CTRL/R	Rereads the current block (RESTORE).
CTRL/C	Returns to initial QANDA display.
CTRL/W	Writes back the current block, with any changes, and returns to the initial display.

[1]A CTRL/F is typed by holding down the CTRL key and typing the letter F.

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Key	Action
CTRL/N	Reads in the next sequential block (does not write).
CTRL/P	Reads in the previous block (current block - 1).
CTRL/D	Returns to DIAL (active during most question and answer displays).

5.0 CORE LAYOUT

SEGMENT Ø	All the display routines and pointer update routines, except for QANDA.
SEGMENT 1	Locations Ø-377 are the tape block buffer.
SEGMENT 2	The code to call the QANDA displays and interpret the answers is here, plus the I/O calls. Also in this segment are the QANDA text frames.
SEGMENT 3	QANDA is in locations Ø-777 of this segment, along with routines that actually JMP to QANDA itself, since QANDA can only be called from its own segment. The DIAL-MS I/O routines are in locations 1ØØØ-1777 (absolute 7ØØØ-7777).

FIELD 1 is entirely free.

6.0 INTERNAL DESCRIPTION OF TED

Operation of TED is quite straightforward. The display is controlled by three main pointers, RBASE, LINE, and LINPOS. By setting these, the display routines are set to display the desired information. RBASE points to the word that is to be the top of the display "window". It can range from Ø to 37Ø. RBASE is added to BASE (the actual starting address in core of the tape or disk block being worked on) to provide a pointer to the core location of the first word to be displayed. It is the "relative base" of the window. Note that BASE is 2ØØØ, which is location Ø of an LMODE data field and a legal PDP-8 core location pointer at the same time. If BASE is changed, be careful to check for LMODE references that depend on it being 2ØØØ. LINPOS and LINE control the position of the cursor. LINE can range from Ø to 7 and indicates which of the eight locations currently being displayed on the scope the cursor should be under. LINPOS ranges from Ø to 3 and indicates the digit on the line. LINPOS may be thought of as the "X" and LINE the "Y" of the cursor, though they must be changed to actual scope coordinates before display.

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There are three major display routines. One of these is QANDA which is used to display the text "BLOCK XXXX, UNIT XX, LOC, CONTENTS." The QANDA internal keyboard check is removed to permit scanning of characters by the main program. The check is put back in when the first question frame is being displayed.

DISCUR takes the pointers LINPOS and LINE and converts them to a scope (X,Y), then displays the cursor.

DIS1∅ displays the location numbers, the octal contents, and the ASCII equivalents of the ten consecutive locations pointed to by RBASE. It uses the QANDA character pattern table for this purpose, but DIS1∅ handles its own DSC instructions.

When a key is typed, an operation dispatch routine scans a list of characters and transfers control to a number of little routines depending on the key that was typed. If "F" is typed, for example, control goes to the KF routine.

LINEFEED is a special case. When a LINEFEED is typed, the terminating 34 in the QANDA text string is moved from its initial location following "CONTENTS" to a location immediately after the "=" sign. This permits the "=" to be displayed in the lower left corner of the scope. If an "S" is then typed, the 34 is moved back to its original location, the left and right switches are read, and control goes to the "GOTS" routine. If a digit is typed, it is placed in the text string immediately after the "=" and the terminating 34 is moved over one half word. Up to 3 digits may be typed; after 3 digits, the only legal characters are RUBOUT (which backs up the 34 one half word) or carriage return (which causes the 3-digit number to be decoded). RUBOUT can also erase the "=" sign; in this case, the 34 is moved back and the original display resumed.

7.0 ASSEMBLY INSTRUCTIONS

TED is assembled as required by the DIAL Assembler. Briefly, the correct sequence is:

```
→ZE ⏎
→AS TED,u⏎        (u=unit)
→SB TED,u,L ⏎     (for load & go)
```

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```
0000                    *20
0001                    /         ****** TED ******
0002                    /
0003                    /            TAPE EDITOR
0004                    /
0005                    /COPYRIGHT 1971
0006                    /DIGITAL EQUIPMENT CORPORATION
0007                    /MAYNARD, MASS,  01754
0010                    /
0011                    /
0012                    /ALLOWS SELECTIVE EDITING OF ANY TAPE OR
0013                    /DISK BLOCK,  CONTROL KEYS ARE:
0014                    /
0015                    /CTRL/R --- RE-READ CURRENT BLOCK
0016                    /CTRL/C --- RETURN TO INITIAL DISPLAY
0017                    /CTRL/W --- WRITE CURRENT BLOCK, RETURN TO INITIAL DISPLAY
0020                    /CTRL/N --- READ NEXT SEQUENTIAL BLOCK
0021                    /CTRL/P --- READ PREVIOUS BLOCK (CURRENT BLOCK-1)
0022                    /CTRL/D --- RETURN TO DIAL
0023                    /
0024                    /FOR EDITING:
0025                    /<RETURN>          MOVES CURSOR DOWN 1 LINE
0026                    /<ALTMODE>         MOVES CURSOR UP ONE LINE
0027                    /<F>               MOVES WINDOW DOWN ONE LOCATION
0030                    /<B>               MOVES WINDOW UP ONE LOCATION
0031                    /<CTRL/F>          SAME AS F, EXCEPT 10
0032                    /<CTRL/B>          SAME FOR B
0033                    /DIGITS 0-7        REPLACE DIGIT CURSOR IS UNDER
0034                    /<SPACE>           MOVES CUROSR OVER 1 DIGIT
0035                    /<RUBOUT>          MOVES CURSOR BACK 1 DIGIT
0036                    /<LINEFEED+NUMBER>  MOVES WINDOW TO THAT LOCATION 000-370
0037                    /<LINEFEED+S>   SEARCHES STARTING AT CURRENT LINE (TOP OF WINDOW)
0040                    /                  FOR RSW MASKED BY LSW
0041                    /
0042                    /STARTING ADDRESS IS 4020, LINC MODE
0043                    /
0044                    /IN THE INTEREST OF REDUCING NOISE POLLUTION,
0045                    /THERE IS NO TELETYPE ECHO
0046                    /
0047                    /SGW
0050                    /3/71
0051                    /
0052                    /
0053                            EJECT
-
```

```
0054                    /PAGE 0
0055                          PMODE
0056                    /
0057                          *10
0060    0010   0000   COUNT1,  0
0061    0011   0000   COUNT2,  0
0062    0012   0000   GETPNT,  0
0063    0013   0000   PUTPNT,  0
0064    0014   0000   PUTB,    0
0065    0015   0000   PATPNT,  0
0066    0016   0000   XTEMP,   0
0067                          *20
0070    0020   0000   WRDCNT,  0
0071    0021   0000   MASK,    0          /MASK FOR "S" COMMAND
0072    0022   0000   MATCH,   0          /CHAR, TO MATCH ON "S" COMMAND
0073    0023   0000   LINE,    0          /LINE CURSOR IS ON, 0-7
0074    0024   0000   LINPOS,  0          /DIGIT CURSOR IS ON, 0-3
0075    0025   0000   HOLD,    0
0076    0026   4132   EXIT,    DLOOP      /HOW TO GET BACK TO DISPLAY LOOP
0077    0027   0000   TEMP,    0
0100    0030   7770   M10,     -10
0101    0031   0000   XCOR,    0          /X OF DIGIT BEING DISPLAYED
0102    0032   6727   IQ2,     Q2         /A QANDA THING
0103    0033   0000   YCOR,    0          /Y OF DIGIT BEING DISPLAYED
0104    0034   0077   P77,     77
0105    0035   7740   M40,     -40
0106    0036   3443   P3443,   3443
0107    0037   4356   SLASH1,  FRAME2+27
0110    0040   0020   P20,     20
0111    0041   0377   P377,    377
0112    0042   0000   WORD,    0
0113    0043   6476   BNUM,    NUMPAT!2000    /WHERE THE CHAR, PATTERNS ARE
0114    0044   7672   PCRMS,   +215-323       /+CAR.RET, - "S"
0115    0045   7401   M377,    -377
0116    0046   0007   P7,      7
0117    0047   7774   M4,      -4
0120    0050   4141   IDISPLA, DISPLAY    /POINTER TO DISPLAY EVERYTING
0121    0051   0600   IDIS10,  DIS10      /POINTER TO DISPLAY WINDOW
0122    0052   0522   IDISCUR, DISCUR     /POINTER TO DISPLAY CURSOR
0123    0053   7410   M370,    -370
0124    0054   7420   M360,    -360
0125    0055   0010   P10,     10
0126    0056   7771   M7,      -7
0127    0057   7520   M260,    -260
0130    0060   0370   P370,    370
0131    0061   0012   P12,     12
0132    0062   0000   CURY,    0          /Y OF CURSOR
0133    0063   0000   CHAR,    0          /TEMP, FOR KEY TYPED
0134    0064   2000   BASE,    2000       /WHERE THE BLOCK IS
0135    0065   0162   MCRRUB,  -215+377   /-CAR.RET, + RUBOUT
0136    0066   0043   P43,     43         /CAR, RET,
0137    0067   0034   P34,     34         /BACKSLASH
0140    0070   0000   RBASE,   0          /RELATIVE BASE OF "WINDOW"
0141    0071   6367   LNOPUT,  FRAME2+40!6000  /WHERE TO PUT 3 DIGITS TYPED AFTER "LINEFEED"
0142                          EJECT
```

```
0143        0072  7774  READ,    7774        /MS DIAL POINTERS
0144        0073  7775  WRITE,   7775
0145        0074  5772  P5772,   5772
0146        0075  7776  P7776,   7776
0147        0076  5773  P5773,   5773
0150        0077  7777  P7777,   7777
0151        0100  7200  PMOVE,   7200
0152        0101  0100  SYSBLK,  100         /SYS UNIT
0153        0102  0034           34          /*6000
0154        0103  0022           22          /BLK 22
0155        0104  0002           2           /2 BLKS
0156                            EJECT
```

```
0157                            PAGE
0160                    /COME HERE AFTER LINEFEEDS
0161                    /
0162    0200   7346    KLF,    CLA CLL CMA RTL  /-3
0163    0201   3016            DCA     XTEMP    /3 DIGITS
0164    0202   3025            DCA     HOLD     /ZERO OUT NUMBER
0165    0203   1071            TAD     LNOPUT   /TEXT FRAME ADDR,
0166    0204   3014            DCA     PUTB     /OF WHERE TO PUT NOS,
0167    0205   6141            LINC
0170                           LMODE
0171    0206   2066            ADD     P43      /CARRIAGE RETURN
0172    0207   1340            STH              /ZAP FIRST BACKSLASH
0173    0210   2356            FRAME2+27!2000
0174    0211   1000            LDA
0175    0212   0067            P34
0176    0213   1340            STH              /PUT BACKSLASH HERE
0177    0214   6367            FRAME2+40!6000
0200    0215   0002            PDP
0201                           PMODE
0202    0216   4450    LISN,   JMS I   IDISPLAY
0203    0217   6031            KSF
0204    0220   5216            JMP     .-2
0205    0221   6036            KRB              /READ TTY
0206    0222   3063            DCA     CHAR
0207    0223   1063            TAD     CHAR
0210    0224   1045            TAD     M377
0211    0225   7450            SNA              /RUBOUT?
0212    0226   5314            JMP     RUBGOT   /YES
0213    0227   1065            TAD     MCRRUB   /-215+377
0214    0230   7450            SNA              /CARRIAGE RET?
0215    0231   5272            JMP     CRGOT    /YES
0216    0232   1044            TAD     PCRMS
0217    0233   7650            SNA CLA          /S?
0220    0234   5744            JMP I   IGOTS
0221    0235   1016            TAD     XTEMP    /SEE WHERE BUFFER IS
0222    0236   7700            SMA CLA          /COUNT<0?
0223    0237   5216            JMP     LISN     /NO-SO ONLY RUBOUT OR CR LEGAL
0224    0240   1063            TAD     CHAR
0225    0241   1057            TAD     M260
0226    0242   7510            SPA              /<260?
0227    0243   5216            JMP     LISN     /YES-NO GOOD
0230    0244   1030            TAD     M10
0231    0245   7700            SMA CLA          />267?
0232    0246   5216            JMP     LISN     /YES
0233    0247   1063            TAD     CHAR     /GET THE CHAR
0234    0250   6141            LINC
0235                           LMODE
0236    0251   1354            STH     PUTB     /PUT IN DISPLAY
0237    0252   1000            LDA
0240    0253   0067            P34
0241    0254   1374            STH I   PUTB     /PUT "\" AFTER IT
0242    0255   0002            PDP
0243                           PMODE
0244    0256   7200            CLA
0245    0257   1063            TAD     CHAR
0246    0260   0046            AND     P7
0247    0261   3063            DCA     CHAR
0250    0262   1025            TAD     HOLD     /THE NUMBER WE"RE BUILDING
0251    0263   7104            CLL RAL
```

```
0252    0264  7006              RTL
0253    0265  1063              TAD     CHAR      /ADD IN MOST RECENT
0254    0266  3025              DCA     HOLD
0255    0267  2016              ISZ     XTEMP
0256    0270  7000              NOP               /IN CASE OF SKIP
0257    0271  5216              JMP     LISN      /WAIT FOR NEXT
0260    0272  7200    CRGOT,    CLA
0261    0273  1036              TAD     P3443
0262    0274  3437              DCA I   SLASH1
0263    0275  1025              TAD     HOLD      /GET LINE NO,
0264    0276  1045              TAD     M377
0265    0277  7540              SMA SZA           />377?
0266    0300  5426              JMP I   EXIT      /YES - IGNORE
0267    0301  1046              TAD     P7        /=-370
0270    0302  7700              SMA CLA           />370?
0271    0303  5306              JMP     .+3
0272    0304  1025              TAD     HOLD
0273    0305  5310              JMP     SL
0274    0306  1025              TAD     HOLD      /YES
0275    0307  0060              AND     P370      /SO MAKE IT 370
0276    0310  3070    SL,       DCA     RBASE     /SET RELATIVE BASE POINTER
0277    0311  3023              DCA     LINE      /SET CURSOR
0300    0312  3024              DCA     LINPOS    /TO UPPER LEFT
0301    0313  5426              JMP I   EXIT
0302    0314  7325    RUBGOT,   CLA CLL CML RAL IAC/+3
0303    0315  1016              TAD     XTEMP
0304    0316  7650              SNA CLA           /ALREADY ERASED ALL?
0305    0317  5341              JMP     SLSHBK    /YES-SO EXIT THIS MADNESS
0306    0320  7040              CMA
0307    0321  1014              TAD     PUTB      /BACK UP POINTER
0310    0322  3014              DCA     PUTB
0311    0323  7040              CMA
0312    0324  1016              TAD     XTEMP     /BACK UP COUNTER
0313    0325  3016              DCA     XTEMP
0314    0326  6141              LINC
0315                            LMODE
0316    0327  2067              ADD     P34
0317    0330  1374              STH I   PUTB      /PUT SLASH BACK 1/2 WORD
0320    0331  1000              LDA
0321    0332  0025              HOLD              /REMOVE LAST DIGIT TYPED
0322    0333  1560              BCL I
0323    0334  0007              0007
0324    0335  0303              ROR 3
0325    0336  4025              STC     HOLD
0326    0337  0002              PDP
0327                            PMODE
0330    0340  5216              JMP     LISN      /WAIT FOR NEXT CHAR
0331    0341  7332    SLSHBK,   CLA CLL CML RTR /TO RESET BACKSLASH
0332    0342  3025              DCA     HOLD      /PUT IN A RIDICULOUS LINE NUMBER
0333    0343  5272              JMP     CRGOT     /THEN GO TO CR ROUTINE
0334    0344  0400    IGOTS,    GOTS
0335                            EJECT
```

```
0336                            PAGE
0337                            /COME HERE AFTER <LINEFEED+S>
0340                            /
0341    0400    6141    GOTS,   LINC
0342                            LMODE
0343    0401    0517            LSW                 /READ LSW=MASK
0344    0402    4021            STC     MASK
0345    0403    0002            PDP
0346                            PMODE
0347    0404    7604            LAS                 /GET WHAT TO MATCH
0350    0405    0021            AND     MASK
0351    0406    3022            DCA     MATCH
0352    0407    7200    SCAN,   CLA                 /
0353    0410    1070            TAD     RBASE       /SET UP FOR AUTO-INDEX
0354    0411    1064            TAD     BASE        /FORM POINTER
0355    0412    3012            DCA     GETPNT
0356    0413    1412            TAD I   GETPNT
0357    0414    0021            AND     MASK
0360    0415    7041            CIA
0361    0416    1022            TAD     MATCH
0362    0417    7650            SNA CLA
0363    0420    5232            JMP     SAME        /GOOD
0364    0421    1070            TAD     RBASE       /BUMP
0365    0422    7001            IAC
0366    0423    3070            DCA     RBASE
0367    0424    1070            TAD     RBASE
0370    0425    1045            TAD     M377
0371    0426    7710            SPA CLA             /DONE?
0372    0427    5207            JMP     SCAN        /ONE MORE TIME
0373    0430    3025            DCA     HOLD
0374    0431    5652            JMP I   ICRGOT
0375    0432    1070    SAME,   TAD     RBASE       /NOW SEE WHERE WE ARE
0376    0433    7001            IAC
0377    0434    3025            DCA     HOLD
0400    0435    1025            TAD     HOLD
0401    0436    1053            TAD     M370
0402    0437    7710            SPA CLA             />=370?
0403    0440    5652            JMP I   ICRGOT      /NO
0404    0441    1025            TAD     HOLD
0405    0442    0046            AND     P7
0406    0443    3023            DCA     LINE
0407    0444    3024            DCA     LINPOS
0410    0445    1036            TAD     P3443
0411    0446    3437            DCA I   SLASH1
0412    0447    1060            TAD     P370
0413    0450    3070            DCA     RBASE
0414    0451    5426            JMP I   EXIT
0415    0452    0272    ICRGOT, CRGOT
0416                            /
0417                            EJECT
```

```
0420                        /COME HERE TO CHANGE A CHARACTER
0421                        /
0422    0453    7200    KDIGIT, CLA                 /COME HERE WITH TYPED CHAR IN "CHAR"
0423    0454    1023            TAD     LINE        /LINE CURSOR IS ON
0424    0455    1070            TAD     RBASE       /+OFFSET OF WINDOW
0425    0456    1064            TAD     BASE        /+BASE OF BLOCK
0426    0457    3012            DCA     GETPNT      /=POINTER TO WORD CURSOR IS ON
0427    0460    6141            LINC
0430                            LMODE
0431    0461    2024            ADD     LINPOS      /WORD POSITION ON LINE
0432    0462    0017            COM
0433    0463    4010            STC     COUNT1
0434    0464    2046            ADD     P7
0435    0465    0303            ROR 3
0436    0466    4512            STC     BITC
0437    0467    2063            ADD     CHAR
0440    0470    1560            BCL I
0441    0471    7770            7770
0442    0472    0303            ROR 3
0443    0473    4514            STC     BITS
0444    0474    0210            XSK     COUNT1  /OK THERE?
0445    0475    0456            SKP
0446    0476    6507            JMP     BITSET  /YES
0447    0477    2514    SHIFT,  ADD     BITS
0450    0500    0303            ROR 3                   /TRY NEXT
0451    0501    4514            STC     BITS
0452    0502    2512            ADD     BITC
0453    0503    0303            ROR 3
0454    0504    4512            STC     BITC
0455    0505    0230            XSK I   COUNT1  /?
0456    0506    6477            JMP     SHIFT   /NOT YET
0457    0507    0641    BITSET, LDF 1
0460    0510    1012            LDA     GETPNT
0461    0511    1560            BCL I                   /REMOVE OLD
0462    0512    0000    BITC,   000
0463    0513    1620            BSE I                   /ADD NEW
0464    0514    0000    BITS,   0
0465    0515    1052            STA     GETPNT  /REPLACE THE NUMBER
0466    0516    0642            LDF 2
0467    0517    0002            PDP
0470                            PMODE
0471    0520    5721            JMP I   .+1
0472    0521    1266            KSPACE                  /NOW DO THIS
0473                            EJECT
```

```
0474                         /COME HERE TO DISPLAY CURSOR
0475                         /
0476      0522   0000   DISCUR,  0
0477      0523   6141            LINC
0500                             LMODE
0501      0524   2024            ADD     LINPOS   /LINE POSITION 0-3
0502      0525   0017            COM
0503      0526   4010            STC     COUNT1   /HOW MANY TIMES TO BUMP X
0504      0527   2023            ADD     LINE     /LINE NO. 0-7
0505      0530   0017            COM
0506      0531   4011            STC     COUNT2   /HOW MANY TIMES TO BUMP Y
0507      0532   2562            ADD     P140     /INITIAL Y
0510      0533   0211   SUBY,    XSK     COUNT2   /DO WE NEED TO BUMP Y?
0511      0534   0456            SKP              /YES
0512      0535   6541            JMP     SAVEY    /Y OK-SAVE & BUMP X
0513      0536   2035            ADD     M40      /ZAP DOWN Y
0514      0537   0231            XSK I   COUNT2   /MORE?
0515      0540   6533            JMP     SUBY     /YES
0516      0541   4062   SAVEY,   STC     CURY     /Y CURSOR POSITION
0517      0542   2563            ADD     P302     /INITIAL X OF CURSOR
0520      0543   0210   SUBX,    XSK COUNT1       /NEED TO BUMP X?
0521      0544   0456            SKP
0522      0545   6551            JMP     SAVEX    /X OK
0523      0546   2061            ADD     P12      /BUMP OVER X
0524      0547   0230            XSK I   COUNT1
0525      0550   6543            JMP     SUBX     /MORE FOR X
0526      0551   4001   SAVEX,   STC     1        /X GOES HERE FOR DSC
0527      0552   2062            ADD     CURY     /Y IN AC
0530      0553   1760            DSC I
0531      0554   7434            7434             /PATTERN
0532      0555   1760            DSC I
0533      0556   3474            3474             /FOR CURSOR
0534      0557   0002            PDP
0535                             PMODE
0536      0560   7200            CLA
0537      0561   5722            JMP I   DISCUR   /GET OUT OF HERE
0540      0562   0140   P140,    140
0541      0563   0302   P302,    302
0542                             EJECT
-
```

```
0543                      PAGE
0544                      /DISPLAY LOC AND CONTENTS
0545                      /FOR 10 SUCCESSIVE WORDS
0546                      /
0547    0600  0000  DIS10,  0
0550    0601  7200          CLA
0551    0602  1070          TAD     RBASE   /STARTING WORD NUMBER
0552    0603  3344          DCA     RB
0553    0604  1030          TAD     M10
0554    0605  3020          DCA     WRDCNT  /10 WRDS IN ALL
0555    0606  1345          TAD     P160    /INITIAL Y
0556    0607  3033  BUMPY,  DCA     YCOR
0557    0610  1346          TAD     P204    /INITIAL X
0560    0611  3031          DCA     XCOR
0561    0612  1344          TAD     RB
0562    0613  1064          TAD     BASE
0563    0614  2344          ISZ     RB      /BUMP FOR NEXT TIME
0564    0615  3217          DCA     .+2
0565    0616  4226          JMS     LOCDIS
0566    0617  0000          0               /ADDR. TO DISPLAY
0567    0620  2020          ISZ     WRDCNT  /DONE ALL WORDS?
0570    0621  7410          SKP
0571    0622  5600          JMP  I  DIS10   /YES
0572    0623  1035          TAD     M40
0573    0624  1033          TAD     YCOR    /BUMP DOWN Y
0574    0625  5207          JMP     BUMPY   /DO NEXT LOC & CONTENTS
0575                      /
0576    0626  0000  LOCDIS, 0               /DISPLAY LOCATION & CONTENTS
0577    0627  7040          CMA             /-1
0600    0630  1626          TAD  I  LOCDIS  /GET ADDR TO DISPLAY
0601    0631  3012          DCA     GETPNT
0602    0632  2226          ISZ     LOCDIS
0603    0633  1412          TAD  I  GETPNT  /GET CONTENTS
0604    0634  3042          DCA     WORD
0605    0635  7346          CLA CLL CMA RTL /-3
0606    0636  3010          DCA     COUNT1
0607    0637  7344          CLA CLL CMA RAL /-2
0610    0640  3011          DCA     COUNT2  /2 NOS. TO DO
0611    0641  1012          TAD     GETPNT  /GET ADDR.
0612    0642  0041          AND     P377    /MAKE IT A RELATIVE BLOCK ADDR
0613    0643  7104          CLL RAL
0614    0644  7006          RTL             /LEFT-JUSTIFY
0615    0645  7104  DONUM,  CLL RAL         /ONCE TO LINK
0616    0646  3027          DCA     TEMP
0617    0647  7004          RAL
0620    0650  3347          DCA     LINK    /PRESERVE THE LINK
0621    0651  1347  GETNUM, TAD     LINK
0622    0652  7010          RAR
0623    0653  1027          TAD     TEMP
0624    0654  7004          RAL
0625    0655  7006          RTL
0626    0656  3027          DCA     TEMP
0627    0657  7004          RAL
0630    0660  3347          DCA     LINK    /PRESERVE LINK
0631    0661  1027          TAD     TEMP
0632    0662  0046          AND     P7      /GET DIGIT
0633    0663  7004          RAL             /MULT BY 2
0634    0664  1043          TAD     BNUM    /BASE OF NUMBER PATTERNS
0635    0665  0075          AND     P7776
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```
0636    0666    3015            DCA     PATPNT
0637    0667    4350            JMS     DISCAR  /OUTPUT TO SCOPE
0640    0670    2010            ISZ     COUNT1  /DONE ALL DIGITS?
0641    0671    5251            JMP     GETNUM  /NO
0642    0672    2011            ISZ     COUNT2  /DONE BOTH LOC & CONTENTS?
0643    0673    5316            JMP     DOCON   /GOT TO DO CONTENTS
0644    0674    7344            CLA CLL CMA RAL /-2
0645    0675    3010            DCA     COUNT1  /NOW GIVE ASCII EQUIVALENTS
0646    0676    4336            JMS     BUMPX
0647    0677    1042            TAD     WORD
0650    0700    7012            RTR
0651    0701    7012            RTR
0652    0702    7012            RTR
0653    0703    0034    DISALF, AND     P77
0654    0704    7104            CLL RAL         /MULT BY 2
0655    0705    1315            TAD     BALF    /GET BASE OF ASCII PATTERNS
0656    0706    3015            DCA     PATPNT
0657    0707    4350            JMS     DISCAR  /DISPLAY ASCII
0660    0710    1042            TAD     WORD    /DO 2ND HALF
0661    0711    2010            ISZ     COUNT1  /OR HAVE  E ALREADY DONE IT?
0662    0712    5303            JMP     DISALF  /NOT YET
0663    0713    7200            CLA
0664    0714    5626            JMP I   LOCDIS  /DONE!!
0665    0715    6336    BALF,   QAVI6000
0666    0716    4336    DOCON,  JMS     BUMPX   /SET UP TO DISPLAY CONTENTS
0667    0717    6141            LINC
0670                            LMODE
0671    0720    0041            SET 1
0672    0721    0031            XCOR
0673    0722    1000            LDA
0674    0723    0033            YCOR
0675    0724    1760            DSC I
0676    0725    0402            402             /PATTERN
0677    0726    1760            DSC I
0700    0727    2010            2010            /FOR "/"
0701    0730    0002            PDP
0702                            PMODE
0703    0731    4336            JMS     BUMPX
0704    0732    1047            TAD     M4
0705    0733    3010            DCA     COUNT1  /SET TO 4 DIGITS
0706    0734    1042            TAD     WORD
0707    0735    5245            JMP     DONUM
0710    0736    0000    BUMPX,  0
0711    0737    7200            CLA
0712    0740    1040            TAD     P20
0713    0741    1031            TAD     XCOR
0714    0742    3031            DCA     XCOR
0715    0743    5736            JMP I   BUMPX
0716    0744    0000    RB,     0
0717    0745    0160    P160,   160
0720    0746    0204    P204,   204
0721    0747    0000    LINK,   0
0722                            EJECT
```

```
0723    0750    0000    DISCAR,  0                      /SUBROUTTNE TO DISPLAY CHAR
0724    0751    6141             LINC                   /POINTED TO BY PATPNT
0725                             LMODE
0726    0752    0041             SET  1
0727    0753    0031             XCOR
0730    0754    1000             LDA
0731    0755    0033             YCOR
0732    0756    0643             LDF  3
0733    0757    1755             DSC       PATPNT
0734    0760    1775             DSC  I    PATPNT    /
0735    0761    0642             LDF  2
0736    0762    1020             LDA  I
0737    0763    0012             12
0740    0764    1140             ADM
0741    0765    0031             XCOR                   /SPACE X
0742    0766    0002             PDP
0743                             PMODE
0744    0767    7200             CLA
0745    0770    5750             JMP  I    DISCAR
0746                             PAGE
0747                    /KEY DECODER
0750                    /
0751    1000    1225    KEYDEC,  TAD       LISLEN   /HOW MANY IN LIST
0752    1001    3010             DCA       COUNT1
0753    1002    1223             TAD       BLST     /BLST,KEYLST-1
0754    1003    3012             DCA       GETPNT
0755    1004    1412    G,       TAD  I    GETPNT   /PICK UP LIST
0756    1005    1063             TAD       CHAR
0757    1006    7650             SNA  CLA
0760    1007    5213             JMP       GOT
0761    1010    2010             ISZ       COUNT1
0762    1011    5204             JMP       G
0763    1012    5426             JMP  I    EXIT     /NOT IN LIST
0764    1013    1010    GOT,     TAD       COUNT1
0765    1014    1226             TAD       PLEN     /FORM POINTER
0766    1015    1224             TAD       BROUTE
0767    1016    3027             DCA       TEMP
0770    1017    1427             TAD  I    TEMP     /GET THE ADDR.
0771    1020    3222             DCA       .+2
0772    1021    5622             JMP  I    .+1
0773    1022    0000             0
0774    1023    1026    BLST,    KEYLST-1
0775    1024    1060    BROUTE,  JMPLST
0776    1025    7747    LISLEN,  KEYLST-JMPLST
0777    1026    0031    PLEN,    JMPLST-KEYLST
1000                    /
1001                             EJECT
```

```
1002                     /DISPATCH TABLES FOR KEYS
1003                     /
1004    1027  7576  KEYLST, -202              /CTRL/B
1005    1030  7476          -302              /B
1006    1031  7575          -203              /CTRL/C
1007    1032  7574          -204              /CTRL/D
1010    1033  7572          -206              /CTRL/F
1011    1034  7472          -306              /F
1012    1035  7566          -212              /LINEFEED
1013    1036  7563          -215              /CARR, RET,
1014    1037  7562          -216              /CTRL/N
1015    1040  7560          -220              /CTRL/P
1016    1041  7556          -222              /CTRL/R
1017    1042  7551          -227              /CTRL/W
1020    1043  7545          -233              /ONE FLAVOR OF ALTMODE
1021    1044  7540          -240              /SPACE
1022    1045  7520          -260              /THE DIGITS...
1023    1046  7517          -261
1024    1047  7516          -262
1025    1050  7515          -263
1026    1051  7514          -264
1027    1052  7513          -265
1030    1053  7512          -266
1031    1054  7511          -267
1032    1055  7403          -375              /ANOTHER ALTMODE
1033    1056  7402          -376              /AND ANOTHER
1034    1057  7401          -377              /RUBOUT
1035    1060  1200  JMPLST, KCB               /WHERE TO GO, CTRL/B
1036    1061  1143          KB                /JUST B
1037    1062  1216          KTC               /CTRL/C
1040    1063  1221          KTD               /CTRL/D
1041    1064  1164          KCF               /CTRL/F
1042    1065  1153          KF                /F
1043    1066  0200          KLF               /LINEFEED
1044    1067  1243          KRET              /CAR,RET
1045    1070  1240          KCN               /CTRL/N
1046    1071  1256          KCP               /CTRL/P
1047    1072  1213          KCR               /CTRL/R
1050    1073  1234          KCW               /CTRL/W
1051    1074  1132          KALT              /ALTMODE
1052    1075  1266          KSPACE            /SPACE
1053    1076  0453          KDIGIT            /DIGITS 0-7
1054    1077  0453          KDIGIT
1055    1100  0453          KDIGIT
1056    1101  0453          KDIGIT
1057    1102  0453          KDIGIT
1060    1103  0453          KDIGIT
1061    1104  0453          KDIGIT
1062    1105  0453          KDIGIT
1063    1106  1132          KALT              /ANOTHER ALTMODE
1064    1107  1132          KALT              /...OR 2
1065    1110  1111          KRUB              /RUBOUT
1066                        EJECT
```

```
1067                        /ALL THE POINTER DIDDLERS
1070                        /DEPENDING ON WHAT KEY IS TYPED
1071                        /
1072    1111  7200  KRUB,   CLA                      /COME HERE ON RUBOUT
1073    1112  1024          TAD      LINPOS          /START OF LINE?
1074    1113  7650          SNA CLA
1075    1114  5321          JMP      KRUB2           /YES-SET AT END OF PREVIOUS LINE
1076    1115  7040          CMA                      /-1
1077    1116  1024          TAD      LINPOS
1100    1117  3024          DCA      LINPOS          /BACK UP ON THIS LINE BY 1
1101    1120  5426          JMP  I   EXIT
1102    1121  7325  KRUB2,  CLA CLL STL RAL IAC/+3
1103    1122  3024          DCA      LINPOS          /SET CURSOR AT RIGHT
1104    1123  1023          TAD      LINE
1105    1124  7650          SNA CLA                  /FIRST LINE?
1106    1125  5343          JMP      KB              /YES-DO A "B"
1107    1126  7040          CMA                      /-1
1110    1127  1023          TAD      LINE
1111    1130  3023          DCA      LINE            /BACK UP ONE LINE
1112    1131  5426          JMP  I   EXIT
1113                        /
1114                        /
1115    1132  7200  KALT,   CLA                      /COME HERE FOR ALTMODE
1116    1133  3024          DCA      LINPOS          /SET TO LEFT
1117    1134  1023          TAD      LINE            /LINE 0?
1120    1135  7650          SNA CLA
1121    1136  5343          JMP      KB              /YES-DO A "B"
1122    1137  7040          CMA
1123    1140  1023          TAD      LINE            /JUST BACK UP 1
1124    1141  3023          DCA      LINE
1125    1142  5426          JMP  I   EXIT
1126                        /
1127                        /
1130    1143  7200  KB,     CLA                      /COME HERE ON "B"
1131    1144  1070          TAD      RBASE
1132    1145  7650          SNA CLA                  /CAN WE BACK UP?
1133    1146  5426          JMP  I   EXIT            /NO-WE"RE AT LINE 0 ALREADY
1134    1147  7040          CMA
1135    1150  1070          TAD      RBASE
1136    1151  3070          DCA      RBASE
1137    1152  5426          JMP  I   EXIT
1140                        /
1141                        /
1142    1153  7200  KF,     CLA                      /COME HERE ON "F"
1143    1154  1070          TAD      RBASE
1144    1155  1053          TAD      M370
1145    1156  7700          SMA CLA                  /CAN WE GO AHEAD?
1146    1157  5426          JMP  I   EXIT            /NO-WE"RE AT 377 NOW
1147    1160  7001          IAC
1150    1161  1070          TAD      RBASE
1151    1162  3070          DCA      RBASE
1152    1163  5426          JMP  I   EXIT
1153                        /
1154                        EJECT
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1155    1164    7200    KCF,    CLA                 /COME HERE FOR CTRL/F
1156    1165    1070            TAD     RBASE
1157    1166    1054            TAD     M360
1160    1167    7700            SMA CLA             /CAN WE ADD 10?
1161    1170    5375            JMP     KCF2        /NO
1162    1171    1055            TAD     P10
1163    1172    1070            TAD     RBASE
1164    1173    3070            DCA     RBASE
1165    1174    5426            JMP I   EXIT
1166    1175    1060    KCF2,   TAD     P370        /SO SET TO 370
1167    1176    3070            DCA     RBASE
1170    1177    5426            JMP I   EXIT
1171    1200    7200    KCB,    CLA                 /COME HERE FOR CTRL/B
1172    1201    1070            TAD     RBASE
1173    1202    1030            TAD     M10
1174    1203    7710            SPA CLA             /CAN WE SUBTRACT 10?
1175    1204    5211            JMP     KCB2        /NO
1176    1205    1030            TAD     M10
1177    1206    1070            TAD     RBASE
1200    1207    3070            DCA     RBASE
1201    1210    5426            JMP I   EXIT
1202    1211    3070    KCB2,   DCA     RBASE       /SO SET TO 0
1203    1212    5426            JMP I   EXIT
1204    1213    7200    KCR,    CLA                 /COME HERE FOR CTRL/R
1205    1214    5615            JMP I   .+1
1206    1215    4074            GB
1207                    /
1210    1216    6141    KTC,    LINC                /COME HERE FOR CTRL/C
1211                            LMODE
1212    1217    0602            LIF 2
1213    1220    6047            JMP     DISP1
1214                            PMODE
1215    1221    7200    KTD,    CLA                 /COME HERE FOR CTRL/D
1216    1222    4633            JMS I   MOVE        /MOVE I/O TO FIELD 1
1217    1223    6201            CDF 0
1220    1224    7000            7000
1221    1225    6211            CDF 10
1222    1226    7000            7000
1223    1227    1000            1000
1224    1230    6213            CIF CDF 10
1225    1231    5632            JMP I   .+1         /BOOT DIAL
1226    1232    7777            7777
1227    1233    7200    MOVE,   7200
1230                    /
1231    1234    7200    KCW,    CLA                 /COME HERE FOR CTRL/W
1232    1235    4473            JMS I   WRITE
1233    1236    4147            PARAM
1234    1237    5216            JMP     KTC
1235    1240    2642    KCN,    ISZ I   IBLOCK      /COME HERE FOR CTRL/N
1236    1241    5213            JMP     KCR
1237    1242    4151    IBLOCK, BLOCK
1240                            EJECT
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```

```
1241      1243   7200   KRET,   CLA                     /COME HERE FOR CARR. RET.
1242      1244   3024           DCA        LINPOS       /SET CURSOR TO LEFT
1243      1245   1023           TAD        LINE
1244      1246   1056           TAD        M7
1245      1247   7700           SMA   CLA               /AT LINE 7?
1246      1250   5655           JMP  I     IKF          /YES
1247      1251   7001           IAC
1250      1252   1023           TAD        LINE
1251      1253   3023           DCA        LINE
1252      1254   5426           JMP  I     EXIT
1253      1255   1153   IKF,    KF
1254                    /
1255      1256   7200   KCP,    CLA                     /COME PERE FOR CTRL/P
1256      1257   1642           TAD  I     IBLOCK
1257      1260   7650           SNA  CLA                /0?
1260      1261   5426           JMP  I     EXIT         /YES-DONT BACK UP
1261      1262   7040           CMA
1262      1263   1642           TAD  I     IBLOCK
1263      1264   3642           DCA  I     IBLOCK
1264      1265   5213           JMP        KCR
1265                    /
1266      1266   7346   KSPACE, CLA CLL CMA RTL /-3
1267      1267   1024           TAD        LINPOS
1270      1270   7700           SMA   CLA               /END OF LINE?
1271      1271   5243           JMP        KRET         /YES
1272      1272   7001           IAC
1273      1273   1024           TAD        LINPOS
1274      1274   3024           DCA        LINPOS       /MOVE OVER 1
1275      1275   5426           JMP  I     EXIT
1276                    /
1277                    /
1300                            EJECT
•
```

```
1301                            LMODE
1302                            SEGMNT 2
1303                            *20
1304    0020  0500  XXX,        IOB
1305    0021  6046              6046                /JIGGLE TTY
1306    0022  1020              LDA I
1307    0023  6047              JMP     DISP1
1310    0024  4022              STC     .-2         /MAKE THIS ONCE-ONLY
1311    0025  0002              POP
1312                            PMODE
1313    4026  6213              CIF CDF 10
1314    4027  3473              DCA I   WRITE       /*7775
1315    4030  1074              TAD     P5772
1316    4031  3475              DCA I   P7776
1317    4032  1076              TAD     P5773
1320    4033  3477              DCA I   P7777
1321    4034  6201              CDF 0
1322    4035  4472              JMS I   READ
1323    4036  0101              SYSBLK
1324    4037  6212              CIF 10
1325    4040  4500              JMS I   PMOVE
1326    4041  6211              CDF 10
1327    4042  6000              6000
1330    4043  6201              CDF 0
1331    4044  7000              7000
1332    4045  1000              1000
1333    4046  6141              LINC
1334                            LMODE
1335    0047  0643  DISP1,      LDF 3
1336    0050  1020              LDA I
1337    0051  6555              JMP     GETKBD      /UNZAP KEYBOARD CHECK IN QANDA
1340    0052  1040              STA
1341    0053  2156              QAJ!2000
1342    0054  0603              LIF 3
1343    0055  0642              LDF 2
1344    0056  6720              JMP     Q1          /QANDA AT 6020
1345    0057  0070  GETANS,     SET I   COUNT1
1346    0060  7773              -4                  /HOW MANY DIGITS
1347    0061  0072              SET I   GETPNT      /WHERE ANSWER IS
1350    0062  0372              ANSR1
1351    0063  6153              JMP     GET         /GET THE BLOCK NO.
1352    0064  4151              STC     BLOCK
1353                        /
1354    0065  0070              SET I   COUNT1      /NOW UNIT
1355    0066  7775              -2
1356    0067  0072              SET I   GETPNT
1357    0070  4374              ANSR1+2!4000
1360    0071  6153              JMP     GET         /GET THE UNIT
1361    0072  4147              STC     UNIT
1362    0073  0002              POP
1363                            PMODE
1364    4074  6141  GB,         LINC
1365                            LMODE
1366    0075  1000              LDA
1367    0076  4147              UNIT
1370                        /
1371    0077  0070              SET I   COUNT1      /NOW PUT UNIT IN TEXT FRAME
1372    0100  7775              -2                  /2 DIGITS
1373    0101  0073              SET I   PUTPNT      /WHERE TO STORE
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```
1374    0102    2331            FRAME2+2!2000
1375    0103    6205            JMP     UNPACK
1376                    /
1377    0104    0070            SET I   COUNT1     /PUT BLOCK IN FRAME
1400    0105    7773            -4                 /4 DIGITS
1401    0106    0073            SET I   PUTPNT
1402    0107    6335            FRAME2+6!6000
1403    0110    1000            LDA
1404    0111    4151            BLOCK
1405    0112    6205            JMP     UNPACK
1406    0113    0002            PDP
1407                            PMODE
1410    4114    4472            JMS I   READ       /NOW GET THE BLOCK
1411    4115    4147            PARAM
1412    4116    6141            LINC
1413                            LMODE
1414    0117    1020            LDA I
1415    0120    6024            JMP     QAB
1416    0121    0643            LDF 3
1417    0122    1040            STA
1420    0123    2156            QAJ!2000           /ZAP KEYBOARD CHECK IN QANDA
1421    0124    0642            LDF 2
1422    0125    0002            PDP
1423                            PMODE
1424    4126    7200            CLA
1425    4127    3023            DCA     LINE
1426    4130    3024            DCA     LINPOS    /SET CURSOR TO UPPER LEFT
1427    4131    3070            DCA     RBASE     /AND WINDOW TO BEGINNING
1430    4132    4341    DLOOP,  JMS     DISPLAY   /NOW SHOW THE SCOPE
1431    4133    6031            KSF               /KEY TYPED?
1432    4134    5332            JMP     .-2       /NO
1433    4135    6036            KRB               /GRAB IT!
1434    4136    3063            DCA     CHAR
1435    4137    5740            JMP I   .+1       /WHAT DO WE DO NOW?
1436    4140    1000            KEYDEC            /GO HERE TO FIND OUT
1437    4141    0000    DISPLAY,0
1440    4142    7200            CLA
1441    4143    4451            JMS I   IDIS10    /FLASH LOCATIONS
1442    4144    4452            JMS I   IDISCUR   /FLASH CURSOR
1443    4145    4432            JMS I   IQ2       /FLASH TEXT
1444    4146    5741            JMP I   DISPLAY
1445                    /
1446                            PARAM=,
1447    4147    0000    UNIT,   0                 /PARAMETER LIST FOR MS I/O
1450    4150    0004            4                 /*2000
1451    4151    0000    BLOCK,  0
1452    4152    0001            1
1453                            EJECT
```

```
1454                                    LMODE
1455                            /
1456                            /DECODES A QANDA FRAME
1457        0153    1000    GET,    LDA                 /SAVE RETURN
1460        0154    0000            0
1461        0155    4204            STC     GETOUT
1462        0156    4203            STC     QHOLD
1463        0157    1332    NEXT,   LDH I   GETPNT      /DECODE QANDA FRAME
1464        0160    1460            SAE I               /GETPNT IS POINTER TO ANSWER FRAME
1465        0161    0000            0
1466        0162    0456            SKP
1467        0163    6200            JMP     QHOLD-3
1470        0164    1560            BCL I
1471        0165    7707            7707
1472        0166    1460            SAE I               /IS IT A 60-67?
1473        0167    0060            60
1474        0170    6047            JMP     DISP1       /NO
1475        0171    1312            LDH     GETPNT
1476        0172    1560            BCL I
1477        0173    7770            7770
1500        0174    0303            ROR 3
1501        0175    2203            ADD     QHOLD
1502        0176    0243            ROL 3
1503        0177    4203            STC     QHOLD
1504        0200    0230            XSK I   COUNT1
1505        0201    6157            JMP     NEXT
1506        0202    1020            LDA I
1507        0203    0000    QHOLD,  0
1510        0204    0000    GETOUT, 0
1511                            /
1512                            /
1513                                    EJECT
```

```
1514                            /MAKE 6-BIT ASCII FROM OCTAL NO,
1515    0205  4025    UNPACK,  STC     HOLD       /SAVE AC
1516    0206  2000             ADD     0          /GET RETURN
1517    0207  4244             STC     UNOUT
1520    0210  0051             SET     COUNT2
1521    0211  0010             COUNT1             / - MAX NO, OF DIGITS
1522    0212  1020             LDA  I
1523    0213  0004             4                  /MAX OF 4
1524    0214  2010             ADD     COUNT1     /HOW MANY WE HAVE
1525    0215  0017             COM
1526    0216  1040             STA
1527    0217  0016             XTEMP
1530    0220  0470             AZE  I             /=0?
1531    0221  6230             JMP     GETDIG     /YES-NO NEED TO SHIFT
1532    0222  1000             LDA
1533    0223  0025             HOLD
1534    0224  0243             ROL  3             /LEFT-JUSTIFY
1535    0225  0236             XSK  I  XTEMP
1536    0226  6224             JMP     ,-2
1537    0227  4025             STC     HOLD       /GOT IT
1540    0230  1000    GETDIG,  LDA
1541    0231  0025             HOLD
1542    0232  0243             ROL  3
1543    0233  1040             STA
1544    0234  0025             HOLD
1545    0235  1560             BCL  I
1546    0236  7770             7770
1547    0237  1620             BSE  I
1550    0240  0060             60
1551    0241  1373             STH  I  PUTPNT
1552    0242  0230             XSK  I  COUNT1
1553    0243  6230             JMP     GETDIG
1554    0244  0000    UNOUT,   0
1555                           /
1556                           EJECT
-
```

```
1557                              /QANDA TEXT FRAMES
1560                              FRAME1, TEXT "F
1561        0245    0643
1561                              F
1562        0246    0643
1562        0247    0640
1562        0250    4040
1562        0251    4040
1562        0252    4040
1562        0253    4024
1562                              F         TED
1563        0254    0504
1563        0255    4340
1563        0256    4040
1563        0257    4040
1563        0260    4040
1563        0261    4040
1563        0262    4040
1563        0263    4040
1563        0264    5024
1563        0265    0120
1563        0266    0540
1563        0267    0504
1563        0270    1124
1563        0271    1722
1563                                        (TAPE EDITOR)
1564        0272    5143
1564                              F
1565        0273    0643
1565        0274    4040
1565        0275    4040
1565        0276    4040
1565        0277    4040
1565        0300    4040
1565        0301    4040
1565        0302    2205
1565        0303    0104
1565        0304    4002
1565        0305    1417
1565        0306    0313
1565        0307    4074
1565                                        READ BLOCK <4
1566        0310    6443
1566                              H
1567        0311    1043
1567        0312    4040
1567        0313    4040
1567        0314    4040
1567        0315    4040
1567        0316    4040
1567        0317    4040
1567        0320    0622
1567        0321    1715
1567        0322    4025
1567        0323    1611
1567        0324    2440
1567        0325    7462
1567        0326    3400
1567                                        FROM UNIT <2\"
```

```
1570                              /
1571       0327   2516
1571       0330   1124
1571       0331   4030
1571                    FRAME2, TEXT "UNIT XX
1572       0332   3043
1572       0333   0214
1572       0334   1703
1572       0335   1340
1572       0336   3030
1572                    BLOCK XXXX
1573       0337   3030
1573       0340   4340
1573       0341   4040
1573       0342   4040
1573       0343   4040
1573       0344   4040
1573       0345   4040
1573       0346   4040
1573       0347   1417
1573       0350   0340
1573       0351   4040
1573       0352   0317
1573       0353   1624
1573       0354   0516
1573       0355   2423
1573                              LOC    CONTENTS\
1574       0356   3443
1574                    F
1575       0357   0643
1575                    F
1576       0360   0643
1576                    F
1577       0361   0643
1577                    F
1600       0362   0643
1600                    F
1601       0363   0643
1601                    F
1602       0364   0643
1602                    F
1603       0365   0643
1603       0366   4040
1603       0367   7530
1603       0370   3030
1603       0371   3400
1603                    =XXX\"
1604       0372   0000   ANSR1,   0
1605       0373   0000            0
1606       0374   0000            0
1607       0375   0000            0
1610       0376   0000            0
1611       0377   0000            0       /CAUTION! I THINK THIS ANSWER BUFFER
1612                                      /GOES OVER THE PAGE BOUNDARY WHEN IT"S F
1613                             EJECT
-
```

```
L614                          SEGMNT 3
L615                          *20
L616                      /QANDA SUBROUTINE FOR THE
L617                      /PDP-12
L620                      /
L621                      /TO HERE TO INITIALIZE THE ROUTINE
L622                      /
L623    0020    1020    QAINIT, LDA I           /SAVE JMP RETURN
L624    0021    0002            2
L625    0022    2000            ADD 0
L626    0023    1060            STA I
L627    0024    0000    QAB,    0               /JMP    +3
L630    0025    2220            ADD QAL+3
L631    0026    4001            STC 1           /PTR TO FIRST PARAM
L632    0027    1001            LDA 1           /GET FIRST PARAM
L633    0030    2304            ADD QAQ+1       /PTR TO HALFWORD-1
L634    0031    4077            STC QAG-3
L635    0032    1021            LDA I 1
L636    0033    4072            STC QARFSH-1
L637    0034    4006            STC 6           /XR6 USED AS A SWITCH, =0 IF NO ANSWER FIELD, =177:
L640    0035    0043    QACA,   SET 3    /XR3 TO PTR TO ANSWERS
L641    0036    0072            QARFSH-1                                            IF YES
L642    0037    0044            SET 4           /XR4 TO PTR TO QUESTIONS
L643    0040    0077            QAG-3
L644                                            /TO HERE IF FIRST TIME THROUGH OR FOLLOWING
L645    0041    0041            SET 1
L646    0042    0004            4
L647    0043    6310            JMP QAT
L650    0044    0016            NOP             /F
L651    0045    1324            LDH I 4         /H, BUMP PTR IF H OR F
L652    0046    6251    QAD,    JMP QAO
L653    0047    6055            JMP .+6         /74
L654    0050    6070            JMP QAE         /34
L655    0051    1460            SAE I           /CR?
L656    0052    0043            43
L657    0053    6046            JMP QAD         /NO
L660    0054    6041            JMP QACA+4 /EXAMINE NEXT CHAR
L661                                            /INITIALIZE ANSWER BUFR
L662    0055    1343            STH 3           /74 TO ANSWERS
L663    0056    1324            LDH I 4         /NEXT HALFWORD
L664    0057    1120            ADA I
L665    0060    7717            -60
L666    0061    0017            COM
L667    0062    4006            STC 6
L670    0063    1363            STH I 3         /0 IN AC
L671    0064    0226            XSK I 6
L672    0065    6063            JMP .-2
L673    0066    1323            LDH I 3         /BUMP PTR TO ANSWERS
L674    0067    6046            JMP QAD
L675                                            /ANSWER BUFR IS INITIATED
L676    0070    1343    QAE,    STH 3
L677    0071    0064            SET I 4         /XR4 TO PTR TO LAST TYPED CHAR IN ANSWER BUFR
L700    0072    0000            0
L701                                            /----RE-ENTER HERE TO REFRESH----
L702    0073    1020    QARFSH, LDA I           /INITIAL Y POSITION
L703    0074    0377            377
L704    0075    4133            STC QAH-1
L705    0076    0063            SET I 3         /XR3 TO PTR TO HALFWORD QUESTIONS-1
L706    0077    0000            0
```
■

```
1707    0100    0045            SET 5              /XR5 TO PTR TO LAST DISPLAYED CHAR IN ANSWER BUI
1710    0101    0072            QARFSH-1
1711    0102    0041    QAG,    SET 1
1712    0103    0003            3
1713    0104    6310            JMP QAT
1714    0105    6114            JMP ,+7            /F
1715    0106    1323            LDH I 3            /H, BUMP PTR
1716    0107    1020            LDA I              /NEITHER, ASSUME HALF SIZE
1717    0110    1560            BCL I
1720    0111    4123            STC QAM+2          /SET INSTR TO CLEAR FF FOR HALF SIZE
1721    0112    2542            ADD QAW            /NOP IN AC
1722    0113    6121            JMP QAM
1723    0114    1323            LDH I 3            /BUMP PTR
1724    0115    1020            LDA I
1725    0116    1620            BSE I
1726    0117    4123            STC QAM+2          /SET INSTR TO SET FF FOR FULL SIZE
1727    0120    2543            ADD QAW+1          /ADD 9U IN AC
1730    0121    4265    QAM,    STC QAP+3
1731    0122    0024            MSC I 4            /EAD CONTROL REGISTER
1732    0123    1620            BSE I              /THIS INSTR CHANGES, EITHER BSE & OR BCL &
1733    0124    0200            200
1734    0125    0004            MSC 4              /AC TO CONTROL REGISTER
1735    0126    0061            SET I 1            /XR1 TO INITIAL X POSITION
1736    0127    0000            0
1737    0130    1020            LDA I              /Y COORDINATE MULTIPLE
1740    0131    7737            -40
1741    0132    1160            ADM I              /Y COORDINATE
1742    0133    0000            0
1743    0134    1323    QAH,    LDH I 3
1744    0135    6252            JMP QAO+1
1745    0136    6321            JMP QAZ            /74 BUMP PTR TO NEXT CHAR, PUT 40 IN AC
1746    0137    6156            JMP QAJ            /34
1747    0140    1420            SHD I              /NEITHER
1750    0141    4300            4300
1751    0142    6102            JMP QAG            /CR, MOVE X AND Y COORDINATE
1752    0143    6262            JMP QAP            /ISPLAY CHAR
1753    0144    6134            JMP QAH            /PICK UP NEXT CHAR
1754    0145    6262            JMP QAP            /TO HERE IF DISPLAYING ANSWER BUFR
1755    0146    1520            SRO I    /SWITCH TO DISPLAY CURSOR, EITHER 0000 OR 7777
1756    0147    0000            0                  /IFXR4=XR5, THEN SWITCH=7777
1757    0150    6536            JMP QAF
1760                            /QUESTION MODE
1761    0151    1325    QAI,    LDH I 5
1762    0152    6252            JMP QAO+1
1763    0153    6134            JMP QAH            /74
1764    0154    6134            JMP QAH            /34
1765    0155    6145            JMP QAI-4          /NEITHER, DISPLAY IT
1766    0156    6555    QAJ,    JMP GETKBD         /TO HERE IF DISPLAYED BUFFER
1767    0157    0470            AZE I
1770    0160    6024            JMP QAB /NOTHING TYPED , EXIT
1771    0161    0062            SET I 2
1772    0162    0551            QAY
1773    0163    1402            SHD 2              /LF?
1774    0164    6331            JMP QAK+4          /YES, EXIT
1775    0165    1422            SHD I 2            /CR?
1776    0166    6243            JMP QAN
1777    0167    0206            XSK 6              /IS THERE AN ANSWER FIELD?
2000    0170    6073            JMP QARFSH
2001    0171    1422            SHD I 2            /<?
```

```
!002      0172   6215            JMP  QAL
!003      0173   1422            SHD  I 2            />?
!004      0174   6325            JMP  QAK
!005      0175   1422            SHD  I 2            /ALT?
!006      0176   6035            JMP  QACA /REINITIALIZE
!007      0177   1422            SHD  I 2            /BACK SLASH?
!010      0200   6073            JMP  QARFSH         /IGNORE
!011      0201   1422            SHD  I 2            /RUBOUT?
!012      0202   6215            JMP  QAL            /IGNORE
!013      0203   1422            SHD  I 2            /TAB?
!014      0204   6073            JMP  QARFSH         /IGNORE
!015      0205   4212            STC  .+5            /ACCEPTABLE CHAR
!016      0206   6251            JMP  QAO            /TEST NEXT CHAR
!017      0207   6303            JMP  QAQ            /74 BACK PTR UP BY 1
!020      0210   6303            JMP  QAQ            /34 +
!021      0211   1020            LDA  I              /OK, STORE IT
!022      0212   0000            0
!023      0213   1344            STH  4
!024      0214   6073            JMP  QARFSH         /REDISPLAY
!025      0215   1304   QAL,     LDH  4             /TO HERE IF RUBBOUT OR <
!026      0216   6252            JMP  QAO+1
!027      0217   6073            JMP  QARFSH         /74 IGNORE
!030      0220   1775            -6002
!031      0221   1302            LDH  2             /TEST THE CHAR
!032      0222   1460            SAE  I             /RUBOUT?
!033      0223   0037            37
!034      0224   6303            JMP  QAQ            /NO, BACK PTR UP BY 1
!035      0225   0045            SET  5
!036      0226   0004            4
!037      0227   0043            SET  3
!040      0230   0004            4
!041      0231   6233            JMP  .+2
!042      0232   1325            LDH  I 5           /BUMP PTR
!043      0233   1323            LDH  I 3           /GET NEXT CHAR
!044      0234   6252            JMP  QAO+1
!045      0235   0016            NOP                /IF 74 OR 34, REPLACE CURRENT CHAR WITH 0
!046      0236   0011            CLR
!047      0237   1345            STH  5
!050      0240   0450            AZE                /WAS IT 74 OR 34?
!051      0241   6232            JMP  .-7           /NO, CONTINUE
!052      0242   6303            JMP  QAQ            /BACK PTR UP BY 1
!053                                                /TO HERE IF CR
!054      0243   0206   QAN,     XSK  6
!055      0244   6331            JMP  QAK+4         /EXIT ROUTINE IF NO ANSWER FIELD
!056      0245   6251            JMP  QAO
!057      0246   6073            JMP  QARFSH         /74 MOVE PTR TO NEXT QUESTION FIELD
!060      0247   6071            JMP  QAE+1          /34 END OF BUFR, MOVE PTR TO FIRST QUESTION FIELD
!061      0250   6245            JMP  QAN+2
!062
!063      0251   1324   QAO,     LDH  I 4           /S\R
!064      0252   1420            SHD  I             /          +1 74 BEGIN FIELD
!065      0253   7400            7400               /          +2 34 END BUFR
!066      0254   6000            JMP  0             /          +3 NEITHER 74 NOR 34
!067      0255   1460            SAE  I
!070      0256   0034            34
!071      0257   0220            XSK  I 0
!072      0260   0220            XSK  I 0
!073      0261   6000            JMP  0
!074                                                /S\R TO DISP LINC CHAR IN AC
```

```
2075    0262    0241    QAP,    ROL 1           /MULT BY 2 FOR INDEX TO ADDRESS OF TABLE
2076    0263    2550            ADD QAX+4
2077    0264    4002            STC 2           /ADDRESS OF CHAR TO DISP IN XR2
2100    0265    2541            ADD QAU         /THIS INSTR CHANGES, EITHER OP OR ADD 9U
2101    0266    2541            ADD QAU
2102    0267    2001            ADD 1           /ADD 4 TO XR1 TO SPACE CHAR
2103    0270    4001            STC 1
2104    0271    2005            ADD 5           /GET ADDRESS OF ANSWER BUFR
2105    0272    0017            COM
2106    0273    2004            ADD 4
2107    0274    0450            AZE
2110    0275    0011            CLR
2111    0276    4147            STC QAI-2       /SWITCH=0 OR 7777
2112    0277    2133            ADD QAH-1       /Y COORDINATE IN AC
2113    0300    1742            DSC 2
2114    0301    1762            DSC I 2         /DISPLAY CHAR
2115    0302    6000            JMP 0
2116    0303    1020    QAQ,    LDA I           /BACK UP PTR BY 1
2117    0304    3777            -4000
2120    0305    1140            ADM
2121    0306    0004            4
2122    0307    6073            JMP QARFSH      /REDISPLAY
2123                                            /
2124    0310    1321    QAT,    LDH I 1         /S \R
2125    0311    1420            SHD I           /       +1 F
2126    0312    0600            0600            /       +2 H
2127    0313    6000            JMP 0           /       +3 NEITHER
2130    0314    1460            SAE I
2131    0315    0010            10
2132    0316    0220            XSK I 0
2133    0317    0220            XSK I 0
2134    0320    6000            JMP 0
2135                                            /
2136    0321    1323    QAZ,    LDH I 3
2137    0322    1020            LDA I
2140    0323    0040            40
2141    0324    6145            JMP QAI-4
2142                                            /TO HERE IF >
2143    0325    1324    QAK,    LDH I 4
2144    0326    0470            AZE I           /IS CURRENT CHAR BLANK?
2145    0327    6303            JMP QAQ         /YES, IGNORE
2146    0330    6544            JMP QAX         /MOVE DOT FORWARD
2147                                            /TO HERE TO EXIT WITH SKIP
2150    0331    1020            LDA I
2151    0332    0001            1
2152    0333    1140            ADM
2153    0334    0024            QAB
2154    0335    6024            JMP QAB
2155                                            /CHARACTER PATTERNS
2156    0336    0101    QAV,    0101            /KBD 0, ILLEGAL, USED AS MARKER
2157    0337    0101            0101
2160    0340    4477            4477            /1!A
2161    0341    7744            7744
2162    0342    5177            5177            /2!B
2163    0343    2651            2651
2164    0344    4136            4136            /3!C
2165    0345    2241            2241
2166    0346    4177            4177            /4!D
2167    0347    3641            3641
```

```
2170    0350    4577    4577    /5:E
2171    0351    4145    4145
2172    0352    4477    4477    /6:F
2173    0353    4044    4044
2174    0354    4136    4136    /7:G
2175    0355    2645    2645
2176    0356    1077    1077    /10:H
2177    0357    7710    7710
2200    0360    7741    7741    /11:I
2201    0361    0041    0041
2202    0362    4142    4142    /12:J
2203    0363    4076    4076
2204    0364    1077    1077    /13:K
2205    0365    4324    4324
2206    0366    0177    0177    /14:L
2207    0367    0301    0301
2210    0370    3077    3077    /15:M
2211    0371    7730    7730
2212    0372    3077    3077    /16:N
2213    0373    7706    7706
2214    0374    4177    4177    /17:O
2215    0375    7741    7741
2216    0376    4477    4477    /20:P
2217    0377    3044    3044
2220    0400    4276    4276    /21:Q
2221    0401    0376    0376
2222    0402    4477    4477    /22:R
2223    0403    3146    3146
2224    0404    5121    5121    /23:S
2225    0405    4651    4651
2226    0406    4040    4040    /24:T
2227    0407    4077    4077
2230    0410    0177    0177    /25:U
2231    0411    7701    7701
2232    0412    0176    0176    /26:V
2233    0413    7402    7402
2234    0414    0677    0677    /27:W
2235    0415    7701    7701
2236    0416    1463    1463    /30:X
2237    0417    6314    6314
2240    0420    0770    0770    /31:Y
2241    0421    7007    7007
2242    0422    4543    4543    /32:Z
2243    0423    6151    6151
2244    0424    4177    4177    /33:[
2245    0425    0000    0000
2246                            /34:BACKSLASH IGNORED ON INPUT
2247    0426    1020    1020
2250    0427    0204    204
2251    0430    0000    0000    /35:]
2252    0431    7741    7741
2253                            /CODES 36:ALT, 37:RUBOUT NOT DISPLAYED
2254    0432    2000    2000    /36:<UPARROW>
2255    0433    2077    2077
2256    0434    1604    1604    /<BACKARROW>
2257    0435    0404    0404
2260    0436    0000    0000    /40:SPACE
2261    0437    0000    0000
2262    0440    7500    7500    /41:!
```

```
2263    0441   0000            0000
2264    0442   7000            7000              /42:"
2265    0443   0070            0070
2266                                             /CODES 43:, 44:, 45:LF NOT DISPLAYED
2267    0444   4200            4200              /43:<CARRIAGE RETURN>
2270    0445   0237            0237
2271    0446   5721            5721              /44:$
2272    0447   4671            4671
2273    0450   0423            0423              /45:%
2274    0451   6210            6210
2275    0452   5166            5166              /46: &
2276    0453   0526            0526
2277                                             /CODE 47:TAB NOT DISPLAYED
2300    0454   0404            0404              /47:<TAB>
2301    0455   3704            3704
2302    0456   3600            3600              /50:(
2303    0457   0041            0041
2304    0460   4100            4100              /51:)
2305    0461   0036            0036
2306    0462   2050            2050              /52:*
2307    0463   0050            0050
2310    0464   0404            0404              /53:+
2311    0465   0437            0437
2312    0466   0500            0500              /54:,
2313    0467   0006            0006
2314    0470   0404            0404              /55:-
2315    0471   0404            0404
2316    0472   0001            0001              /56:.
2317    0473   0000            0000
2320    0474   0601            0601              /57:\
2321    0475   4030            4030
2322    0476   4536   NUMPAT,  4536    /60:0
2323    0477   3651            3651
2324    0500   2101            2101              /61:1
2325    0501   0177            0177
2326    0502   4523            4523              /62:2
2327    0503   2151            2151
2330    0504   4122            4122              /63:3
2331    0505   2651            2651
2332    0506   2414            2414              /64:4
2333    0507   0477            0477
2334    0510   5172            5172              /65:5
2335    0511   0651            0651
2336    0512   1506            1506              /66:6
2337    0513   4225            4225
2340    0514   4443            4443              /67:7
2341    0515   6050            6050
2342    0516   5126            5126    /70:8
2343    0517   2651            2651
2344    0520   5122            5122              /71:9
2345    0521   3651            3651
2346    0522   2200            2200              /72::
2347    0523   0000            0000
2350    0524   4601            4601              /73:;
2351    0525   0000            0000
2352                                             /CODE 74:<NOT DISPLAYED
2353    0526   1204            1204
2354    0527   0021            21
2355    0530   1212            1212              /75:=
```

```
2356    0531    1212            1212
2357                                            /CODE 76:> NOT DISPLAYED
2360    0532    2100            2100
2361    0533    0412            412
2362    0534    4020            4020            /77:?
2363    0535    2055            2055
2364    0536    1760    QAF,    DSC I
2365    0537    6000            6000
2366    0540    6151            JMP QAI
2367    0541    0002    QAU,    2               /CONSTANT
2370    0542    0016    QAW,    NOP
2371    0543    2541            ADD QAU
2372    0544    6252    QAX,    JMP QAO+1
2373    0545    6303            JMP QAQ
2374    0546    6303            JMP QAQ
2375    0547    6073            JMP QARFSH
2376    0550    0336            QAV
2377    0551    4543    QAY,    4543            /LF, CR
2400    0552    7476            7476            /<,>
2401    0553    3634            3634            /ALT, BACKSLASH
2402    0554    3747            3747            /RUBOUT, TAB
2403                                            /END Q+A
2404                    /
2405                    /KEYBOARD INPUT ROUTINE
2406                    /
2407                    QAKRB=6036      /PDP-8 IOT KBD
2410                    /
2411    0555    1000    GETKBD, LDA
2412    0556    0000            0
2413    0557    4703            STC QAEXIT+6    /SAVE RETURN
2414    0560    2001            ADD 1           /SAVE XRS 1 AND 2
2415    0561    4700            STC QAEXIT+3
2416    0562    2002            ADD 2
2417    0563    4702            STC QAEXIT+5
2420    0564    4676            STC QAEXIT+1
2421    0565    0415            KST     /WAS SOMETHING TYPED?
2422    0566    6000            JMP 0           /NO: EXIT
2423    0567    0500            IOB
2424    0570    6036            QAKRB   /GET TTY CHAR, CLEAR FLAG
2425    0571    1460            SAE I
2426    0572    0204            204             /CTRL/D?
2427    0573    0456            SKP
2430    0574    6737            JMP     DIAL    /YES
2431    0575    1060            STA I           /SAVE IT
2432    0576    0000    QATY,   0
2433    0577    1120            ADA I
2434    0600    7540            -237
2435    0601    0451            APO             /BETWEEN 200 AND 237?
2436    0602    6644            JMP QACNTR      /CONTROL CHAR, CHECK FOR CR,LF,TAB
2437    0603    0061            SET I 1         /NO
2440    0604    0706            QACHAR-1
2441    0605    0062            SET I 2
2442    0606    7770            -7
2443    0607    1000            LDA
2444    0610    0576            QATY
2445    0611    1461            SAE I 1
2446    0612    6614            JMP .+2
2447    0613    6675            JMP QAEXIT      /ILLEGAL CHAR, DONT ECHO
2450    0614    0222            XSK I 2 /CHECKED THEM ALL?
```

```
2451    0615    6611            JMP .-4
2452    0616    1120            ADA I
2453    0617    7440            -337
2454    0620    0451            APO             /BETWEEN 240 AND 337?
2455    0621    6635            JMP QALEGL      /YES, LEGAL CHAR
2456                    /
2457    0622    1461            SAE I 1         /NO, CHECK FURTHER,
2460    0623    6632            JMP .+7
2461    0624    1020            LDA I           /RUBOUT
2462    0625    0334            334
2463    0626    6704            JMP QATPE       /ECHO BACKSLASH
2464    0627    1020            LDA I
2465    0630    0037            37
2466    0631    6677            JMP QAEXIT+2    /LEGAL EXIT
2467    0632    1461            SAE I 1
2470    0633    6675            JMP QAEXIT      /ILLEGAL
2471                                            /ALT
2472    0634    6677            JMP QAEXIT+2    /EXIT, DONT ECHO
2473    0635    1000    QALEGL, LDA
2474    0636    0576            QATY
2475    0637    6704            JMP QATPE       /ECHO CHAR
2476    0640    2576            ADD QATY
2477    0641    1560            BCL I           /STRIP IT TO 6-BIT
2500    0642    7700            7700
2501    0643    6677            JMP QAEXIT+2
2502                    /TO HERE IF CONTROL CHAR
2503    0644    1460    QACNTR, SAE I
2504    0645    7755            7755
2505    0646    6661            JMP QACKLF
2506    0647    1020            LDA I           /CR
2507    0650    0043            43
2510    0651    4676            STC QAEXIT+1
2511    0652    1020            LDA I
2512    0653    0215            215
2513    0654    6704            JMP QATPE
2514    0655    1020            LDA I
2515    0656    0212            212
2516    0657    6704            JMP QATPE
2517    0660    6675            JMP QAEXIT
2520                    /
2521    0661    1460    QACKLF, SAE I
2522    0662    7752            7752
2523    0663    6667            JMP .+4
2524    0664    1020            LDA I           /LF
2525    0665    0045            45
2526    0666    6651            JMP QACNTR+5
2527    0667    1460            SAE I
2530    0670    7751            7751
2531    0671    6675            JMP QAEXIT      /ILLEGAL
2532    0672    1020            LDA I
2533    0673    0047            47
2534    0674    6677            JMP QAEXIT+2    /EXIT, DONT ECHO
2535                    /
2536    0675    1020    QAEXIT, LDA I   /GET 6-BIT ASCII
2537    0676    0000            0
2540    0677    0061            SET I 1         /RESTORE XRS
2541    0700    0000            0
2542    0701    0062            SET I 2
2543    0702    0000            0
        .
```

```
2544      0703  6000                   JMP                    /EXIR S\R GETKBD
2545                    /S\R TO PRINT C(AC)
2546      0704  0016    QATPE,   NOP/PDP         /DONT ECHO
2547                             /PMODE
2550                             /TSF
2551                             /JMP     ,-1
2552                             /TLS
2553      0705  0011            CLR
2554                             /LINC
2555                             /LMODE
2556      0706  6000            JMP      /EXIT
2557                    /
2560      0707  0243    QACHAR,  243      /HASH
2561      0710  0244             244      /DOLLAR SIGN
2562      0711  0245             245      /PER CENT
2563      0712  0247             247      /APOSTROPHE
2564      0713  0300             300      /AT SIGN
2565      0714  0336             336      /UP ARROW
2566      0715  0337             337      /BACK ARROW
2567      0716  0040             40       /RUBOUT
2570      0717  0036             36       /ALT
2571                    /END OF S\R GETKBD
2572                    EJECT
■
```

```
2573      0720   0642    Q1,     LDF 2
2574      0721   6020            JMP      QAINIT
2575      0722   2245            FRAME1!2000       /TYPE IN BLOCK, UNIT"
2576      0723   2372            ANSR1!2000
2577      0724   6073            JMP      QARFSH
2600      0725   0602            LIF 2
2601      0726   6057            JMP      GETANS
2602                     /
2603                             PMODE
2604      6727   0000    Q2,     0
2605      6730   6141            LINC
2606                             LMODE
2607      0731   0642            LDF 2
2610      0732   6020            JMP      QAINIT
2611      0733   2327            FRAME2!2000
2612      0734   2372            ANSR1!2000
2613      0735   0002            PDP
2614                             PMODE
2615      6736   5727            JMP I    Q2
2616                     /
2617      6737   0002    DIAL,   0002             /PDP
2620      6740   5741            JMP I    .+1
2621      6741   1221            KTD              /DIAL BOOTER
2622                             LISTAPE 12
```

NO ERRORS

0264 SYMBOLS
1011 REFERENCES

SYMBOL   VALUE   DEF   REFERENCE LINE NUMBERS

ANSR1   4372   1604   1350 1357 2576 2612
BALF   0715   0665   0655
BASE   0064   0134   0354 0425 0562
BITC   0512   0462   0436 0452 0454
BITS   0514   0464   0443 0447 0451
BITSET   0507   0457   0446
BLOCK   4151   1451   1237 1352 1404
BLST   1023   0774   0753
BNUM   0043   0113   0634
BROUTE   1024   0775   0766
BUMPX   0736   0710   0646 0666 0703 0715
BUMPY   0607   0556   0574
CHAR   0063   0133   0206 0207 0224 0233 0245 0247 0253 0437 0756 1434
COUNT1   0010   0060   0433 0444 0455 0503 0520 0524 0606 0640 0645 0661 0705 0752 0761 0764 1345 1354 1371 1377 1504 1521 1524 1552
COUNT2   0011   0061   0506 0510 0514 0610 0642 1520
CRGOT   0272   0260   0215 0333 0415
CURY   0062   0132   0516 0527
DIAL   6737   2617   2430
DISALF   0703   0653   0662
DISCAR   0750   0723   0637 0657 0745
DISCUR   0522   0476   0122 0537
DISPLA   4141   1437   0120 1430 1444
DISP1   4047   1335   1213 1307 1474
DIS10   0600   0547   0121 0571
DLOOP   4132   1430   0076
DOCON   0716   0666   0643
DONUM   0645   0615   0707
EXIT   0026   0076   0266 0301 0414 0763 1101 1112 1125 1133 1137 1146 1152 1165 1170 1201 1203 1252 1260 1275
FRAME1   4245   1560   2575
FRAME2   4327   1571   0107 0141 0173 0177 1374 1402 2611
G   1004   0755   0762
GB   4074   1364   1206
GET   4153   1457   1351 1360
GETANS   4057   1345   2601
GETDIG   4230   1540   1531 1553
GETKBD   6555   2411   1337 1766
GETNUM   0651   0621   0641
GETOUT   4204   1510   1461
GETPNT   0012   0062   0355 0356 0426 0460 0465 0601 0603 0611 0754 0755 1347 1356 1463 1475
GOT   1013   0764   0760
GOTS   0400   0341   0334
HOLD   0025   0075   0164 0250 0254 0263 0272 0274 0321 0325 0332 0373 0377 0400 0404 1515 1533 1537 1541 1544
IBLOCK   1242   1237   1235 1256 1262 1263
ICRGOT   0452   0415   0574 0403
IDISCU   0052   0122   1442
IDISPL   0050   0120   0202
IDIS10   0051   0121   1441
IGOTS   0344   0334   0220
IKF   1255   1253   1246
IQ2   0032   0102   1443

```
SYMBOL   VALUE   DEF    REFERENCE LINE NUMBERS

JMPLST   1060    1035   0775 0776 0777
KALT     1132    1115   1051 1063 1064
KB       1143    1130   1036 1106 1121
KCB      1200    1171   1035
KCB2     1211    1202   1175
KCF      1164    1155   1041
KCF2     1175    1166   1161
KCN      1240    1235   1045
KCP      1256    1255   1046
KCR      1213    1204   1047 1236 1264
KCW      1234    1231   1050
KDIGIT   0453    0422   1053 1054 1055 1056 1057 1060 1061 1062
KEYDEC   1000    0751   1436
KEYLST   1027    1004   0774 0776 0777
KF       1153    1142   1042 1253
KLF      0200    0162   1043
KRET     1243    1241   1044 1271
KRUB     1111    1072   1065
KRUB2    1121    1102   1075
KSPACE   1266    1266   0472 1052
KTC      1216    1210   1037 1234
KTD      1221    1215   1040 2621
LINE     0023    0073   0277 0406 0423 0504 1104 1110 1111 1117 1123 1124 1243 1250 1251 1425
LINK     0747    0721   0620 0621 0630
LINPOS   0024    0074   0300 0407 0431 0501 1073 1077 1100 1103 1116 1242 1267 1273 1274 1426
LISLEN   1025    0776   0751
LISN     0216    0202   0223 0227 0232 0257 0330
LNOPUT   0071    0141   0165
LOCDIS   0626    0576   0565 0600 0602 0664
MASK     0021    0071   0344 0350 0357
MATCH    0022    0072   0351 0361
MCRRUB   0065    0135   0213
MOVE     1233    1227   1216
M10      0030    0100   0230 0553 1173 1176
M260     0057    0127   0225
M360     0054    0124   1157
M370     0053    0123   0401 1144
M377     0045    0115   0210 0264 0370
M4       0047    0117   0704
M40      0035    0105   0513 0572
M7       0056    0126   1244
NEXT     4157    1463   1505
NUMPAT   6476    2322   0113
PARAM    4147    1446   1233 1411
PATPNT   0015    0065   0636 0656 0733 0734
PCRMS    0044    0114   0216
PLEN     1026    0777   0765
PMOVE    0100    0151   1325
PUTB     0014    0064   0166 0236 0241 0307 0310 0317
PUTPNT   0013    0063   1373 1401 1551
P10      0055    0125   1162
P12      0061    0131   0523
P140     0562    0540   0507
P160     0745    0717   0555
P20      0040    0110   0712
P204     0746    0720   0557
P302     0563    0541   0517
```

```
SYMBOL  VALUE  DEF  REFERENCE LINE NUMBERS

P34     0067   0137  0175 0240 0316
P3443   0036   0106  0261 0410
P370    0060   0130  0275 0412 1166
P377    0041   0111  0612
P43     0066   0136  0171
P5772   0074   0145  1315
P5773   0076   0147  1317
P7      0046   0116  0246 0267 0405 0434 0632
P77     0034   0104  0653
P7776   0075   0146  0635 1316
P7777   0077   0150  1320
QAB     6024   1627  1415 1770 2153 2154
QACA    6035   1640  1660 2006
QACHAR  6707   2560  2440
QACKLF  6661   2521  2505
QACNTR  6644   2503  2436 2526
QAD     6046   1652  1657 1674
QAE     6070   1676  1654 2060
QAEXIT  6675   2536  2413 2415 2417 2420 2447 2466 2470 2472 2501 2510 2517 2531 2534
QAF     6536   2364  1757
QAG     6102   1711  1634 1643 1751
QAH     6134   1743  1704 1753 1763 1764 2112
QAI     6151   1761  1765 2111 2141 2366
QAINIT  6020   1623  2574 2610
QAJ     6156   1766  1341 1420 1746
QAK     6325   2143  1774 2004 2055
QAKRB   6036   2407  2424
QAL     6215   2025  1630 2002 2012
QALEGL  6635   2473  2455
QAM     6121   1730  1720 1722 1726
QAN     6243   2054  1776 2061
QAO     6251   2063  1652 1744 1762 2016 2026 2044 2056 2372
QAP     6262   2075  1730 1752 1754
QAQ     6303   2116  1633 2017 2020 2034 2052 2145 2373 2374
QARFSH  6073   1702  1636 1641 1710 2000 2010 2014 2024 2027 2057 2122 2375 2577
QAT     6310   2124  1647 1713
QATPE   6704   2546  2463 2475 2513 2516
QATY    6576   2432  2444 2474 2476
QAU     6541   2367  2100 2101 2371
QAV     6336   2156  0665 2376
QAW     6542   2370  1721 1727
QAX     6544   2372  2076 2146
QAY     6551   2377  1772
QAZ     6321   2136  1745
QHOLD   4203   1507  1462 1467 1501 1503
Q1      6720   2573  1344
Q2      6727   2604  0102 2615
RB      0744   0716  0552 0561 0563
RBASE   0070   0140  0276 0353 0364 0366 0367 0375 0413 0424 0551 1131 1135 1136 1143 1150 1151 1156 1163 1164 1167 1172 1177 1200
                     1202 1427
READ    0072   0143  1322 1410
RUBGOT  0314   0302  0212
SAME    0432   0375  0363
SAVEX   0551   0526  0522
SAVEY   0541   0516  0512
SCAN    0407   0352  0372
SHIFT   0477   0447  0456
```

SYMBOL	VALUE	DEF	REFERENCE LINE NUMBERS					
SL	0310	0276	0273					
SLASH1	0037	0107	0262	0411				
SLSHBK	0341	0331	0305					
SUBX	0543	0520	0525					
SUBY	0533	0510	0515					
SYSBLK	0101	0152	1323					
TEMP	0027	0077	0616	0623	0626	0631	0767	0770
UNIT	4147	1447	1361	1367				
UNOUT	4244	1554	1517					
UNPACK	4205	1515	1375	1405				
WORD	0042	0112	0604	0647	0660	0706		
WRDCNT	0020	0070	0554	0567				
WRITE	0273	0144	1232	1314				
XCOR	0031	0101	0560	0672	0713	0714	0727	0741
XTEMP	0016	0066	0163	0221	0255	0303	0312	0313 1527 1535
XXX	4020	1304						
YCOR	0033	0103	0556	0573	0674	0731		

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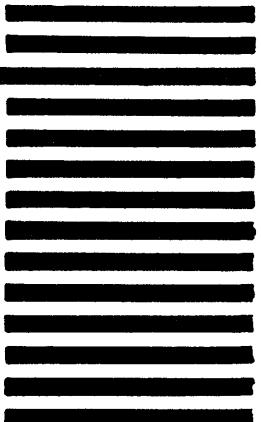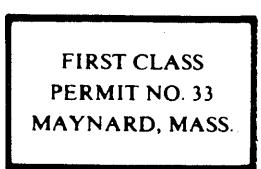
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