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PDP-12
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CONVERT

A PROGRAM TO TRANSLATE LAP6 or LAP6-3L SOURCE TO DIAL

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ABSTRACT

Program CONVERT will perform the major tasks in translating a LAP6 or LAP6-3L source stored on a LINC tape to a suitable source for utilization by the DIAL system on the PDP-12.

REQUIREMENTS

1. The minimum configuration is the PDP-12A.
2. A DIAL system tape containing CONVERT on Unit 0.
3. A LAP6 tape on Unit 1 containing the source program to be translated.

OPERATING PROCEDURE

1. Load a DIAL system tape containing the CONVERT program onto Unit 0.
2. Load the LAP6 tape on Unit 1.
3. Call in DIAL.
4. Clear the DIAL work area with the CL monitor command.
5. Call PROGRAM CONVERT by typing:

   →LO CONVERT,0 ❯

6. Complete the questionnaire seen on the scope by inserting the starting Block Number of the program to be converted. Press the LINEFEED Key upon completion. (See QANDA documentation for more details.)
7. Upon completion of the program, CONVERT rewinds the LAP6 tape on Unit 1, types out a message warning the user to remove the LAP tape from Unit 1 and to type:

   →AP 370,0 ❯

8. The user now has two alternative procedures:

   Choice 1 - if more than one program will be translated, leave the LAP tape on Unit 1, type:

   →SP name,0 ❯

   and file your source program ("name" is an eight-character name selected by the user). Then issue a:

   →LO CONVERT,0 ❯

   to translate another source program.

   Choice 2 - Replace the LAP tape on Unit 1 with a DIAL system tape, check and edit program, then type:

   →LI ❯ to assemble and obtain a listing
   →AS ❯ to assemble only
   →PS ❯ to obtain a quick source listing without assembling.

WARNING

If you issue a LI or AS command without removing your LAP tape, your assembled binary will overlay filed programs on the LAP tape.

PROGRAM RESULTS

1. Converts LAP6 packed LINC code source into packed ASCII source code. (See Table 1.)

2. Removes the LAP tag indicator and reverses the tag to that acceptable by DIAL (i.e., "#2C" becomes "C2,TAB") and follows the user tag with a comma and a TAB.

3. Initiates each line with a TAB unless the line begins with a tag or comment.

4. Inserts a space after all three letter combinations except those in a comment or text environment.

5. Changes each "i" to an "I ␣", each "u" to an "U ␣", and each "p" to a period, "."

6. Reverses all number-letter combinations to letter-number combinations indicating valid references to tags.

7. Inserts an *20 into the new source along with a warning message.

8. Inserts equalities for old mnemonics that can be legally used on the 12. These will be at the start of the new program.

9. Changes ALT MODE/A to TEXT ↵ >and ALT MODE/B to >. (See restriction for this text system when used with the new QANDA.)

10. The LAP terminator code 77 changes to code 00 ($) indicating a source terminator for DIAL source programs.

11. Ignores the first two words of a LAP6 source (2065, 5712).

12. Replaces the square left bracket with a slash to indicate comments in the DIAL system.

13. Replaces the vertical bar with a backslash to indicate the 1000_8 x + y operator.

LIMITATIONS

The CONVERT program only accomplishes the major efforts involved in translation. The user must accept responsibility for solutions to overcome situations caused by a new monitor system (DIAL) and a new computer (PDP-12). These situations are outlined below:

1. KBD - DIAL will issue a US error and the user must insert the correct IOB's or a PDP-8 mode routine. (Also see Limitation 10.)

2. OPR n - DIAL will issue a US error. The user must determine how the LINC-8 PROGOFOP was modified to handle particular OPR situations.

3. TAPE READ/WRITE - The DIAL index format file locations, QANDA size and location, working area, etc. differ from LAP6 and LAP6-3L.

4. EXC - Use of the EXC mnemonic will cause a US error. The user may desire to insert his PDP-8 mode program directly into the program at this point.

5. SAM n - The A-D sampling instruction utilizes one additional bit in the PDP-12.

6. PDP - DIAL will create an instruction (002) which changes the processor from LINC Mode to PDP-8 Mode. The LINC-8 PDP mnemonic (0513) also transferred to PDP-8 mode, but to the location in the LINC accumulator.

7. REARRANGED INSTRUCTION ELEMENTS - LAP6 allowed rearranged field elements (seldom used) which will confuse the translator and will not be accepted by DIAL. DIAL expects (if present) a tag, mnemonic, operand and comment:

Example: "i6LDA" becomes "TABI L6DA ".

8. QANDA - Check all "JMP 1000", "RDC 2403", and "RDE 2403" instructions as these may indicate use of the LINC-8 Q+A Subroutine. The new QANDA Subroutine is contained in two tape blocks and its location may not be Block 403.

9. TEXT META - Check all data between brackets after translation. These indicate a text mode probably used with the LINC-8 Q+A buffer. The new QANDA has a separate text and answer string (see the QANDA documentation for more details).

10. TELETYPE INPUT - The old Q+A and KBD inputs were in LINC code. The new QANDA and most input routines utilize ASCII code. Thus, the routines following an input routine will require changing. (Example - a 1 is 01 in LINC code, 261 in ASCII, and 61 in packed ASCII.) The new QANDA left justifies packed ASCII in an answer buffer, while the Q+A right-justified packed LINC code in the text buffer.

11. ZTA - The retrieval of the Block Number from the Z register after a LAP LO command does not apply to the MQ register in the DIAL system.

Table 1
Character Changes

LAP		DIAL	
Code	Character	Character	Code
00	0	0	60
01	1	1	61
02	2	2	62
03	3	3	63
04	4	4	64
05	5	5	65
06	6	6	66
07	7	7	67
10	8	8	70
11	9	9	71
12	)	)	43
13	Rubout	Rubout	None
14	Space	Space	40
15	¡	I	11

Table 1 (Cont)
Character Changes

LAP		DIAL	
Code	Character	Character	Code
16	p	.	56
17	-	-	55
20	+	+	53
21	Vert Bar	\	34
22	#	≠	32
23	ALT	ALT	none
24	A	A	01
25	B	B	02
26	C	C	03
27	D	D	04
30	E	E	05
31	F	F	06
32	G	G	07
33	H	H	10
34	I	I	11
35	J	J	12
36	K	K	13
37	L	L	14
40	M	M	15
41	N	N	16
42	O	O	17
43	P	P	20
44	Q	Q	21
45	R	R	22
46	S	S	23
47	T	T	24
50	U	U	25
51	V	V	26
52	W	W	27
53	X	X	30
54	Y	Y	31
55	Z	Z	32
56	LINEFEED	LINEFEED	37
57	illegal	?	77
60	?	?	77
61	=	=	75
62	u	U	25
63	'	'	54
64	.	.	56
65	⊟	*	52
66	[	/	57
67	-	?	77
70	"	See Item 9 of Program Results	
71	"	>	76

Table 1 (Cont)
Character Changes

LAP		DIAL	
Code	Character	Character	Code
72	<	<	74
73	>	>	76
74	]	]	35
75	*	*	52
76	:	:	72
77	illegal (eof)	eof	00
100	illegal	TAB	47
		↑	36
		$	44
		%	45

INTERNAL MACRO-FLOW CHART

AC = Reference to Accumulator

IX10 = Reference to the Auto-Index Register used as the input half-word pointer.

IX11 = Reference to the Auto-Index Register used as the output buffer half-word pointer.

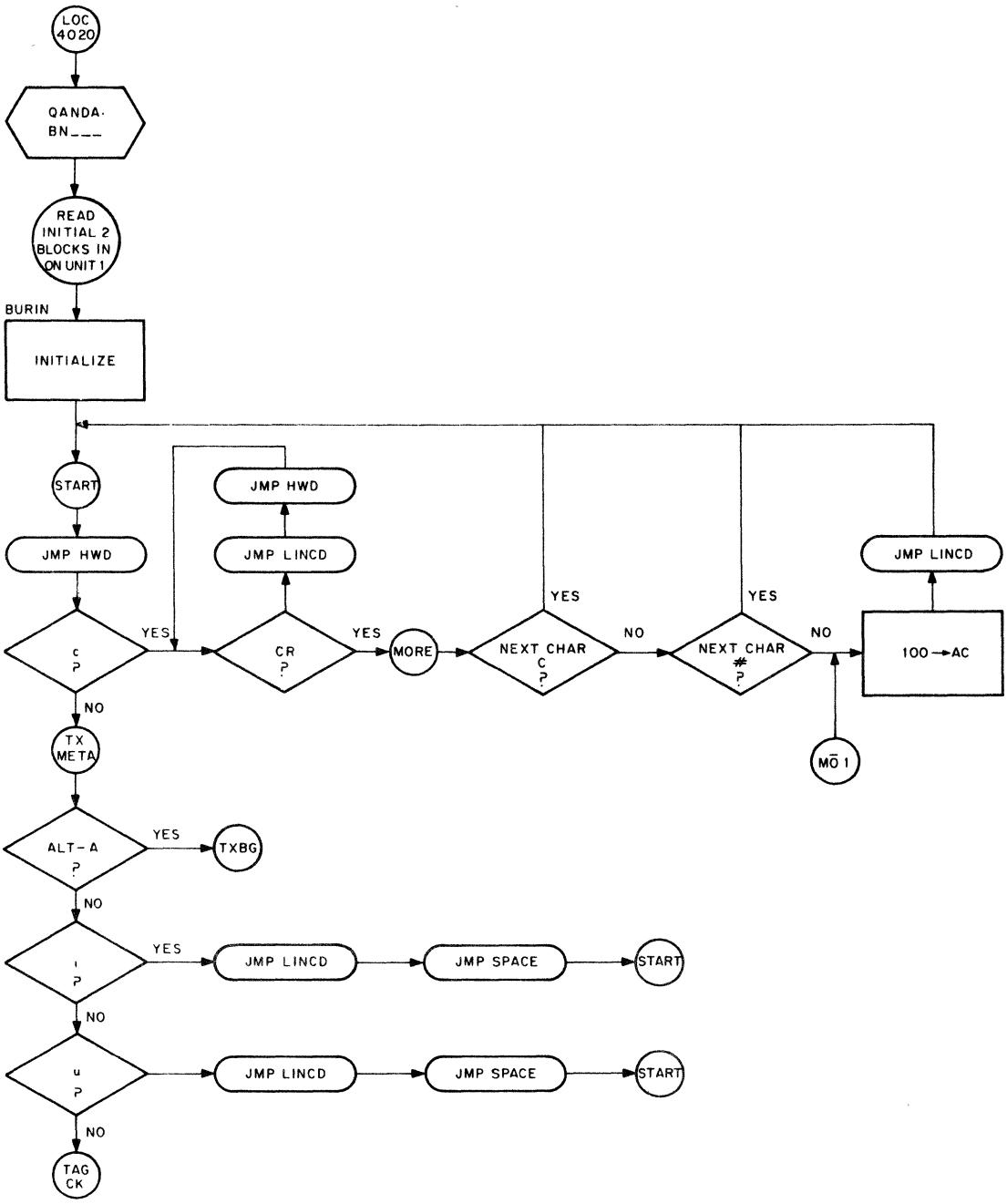
CR = Carriage Return

HWD = Routine that reads in the next character (half-word) from the input buffer and, if necessary, refills the input buffer. Each buffer refill reads in two blocks to eliminate character look-ahead problems.

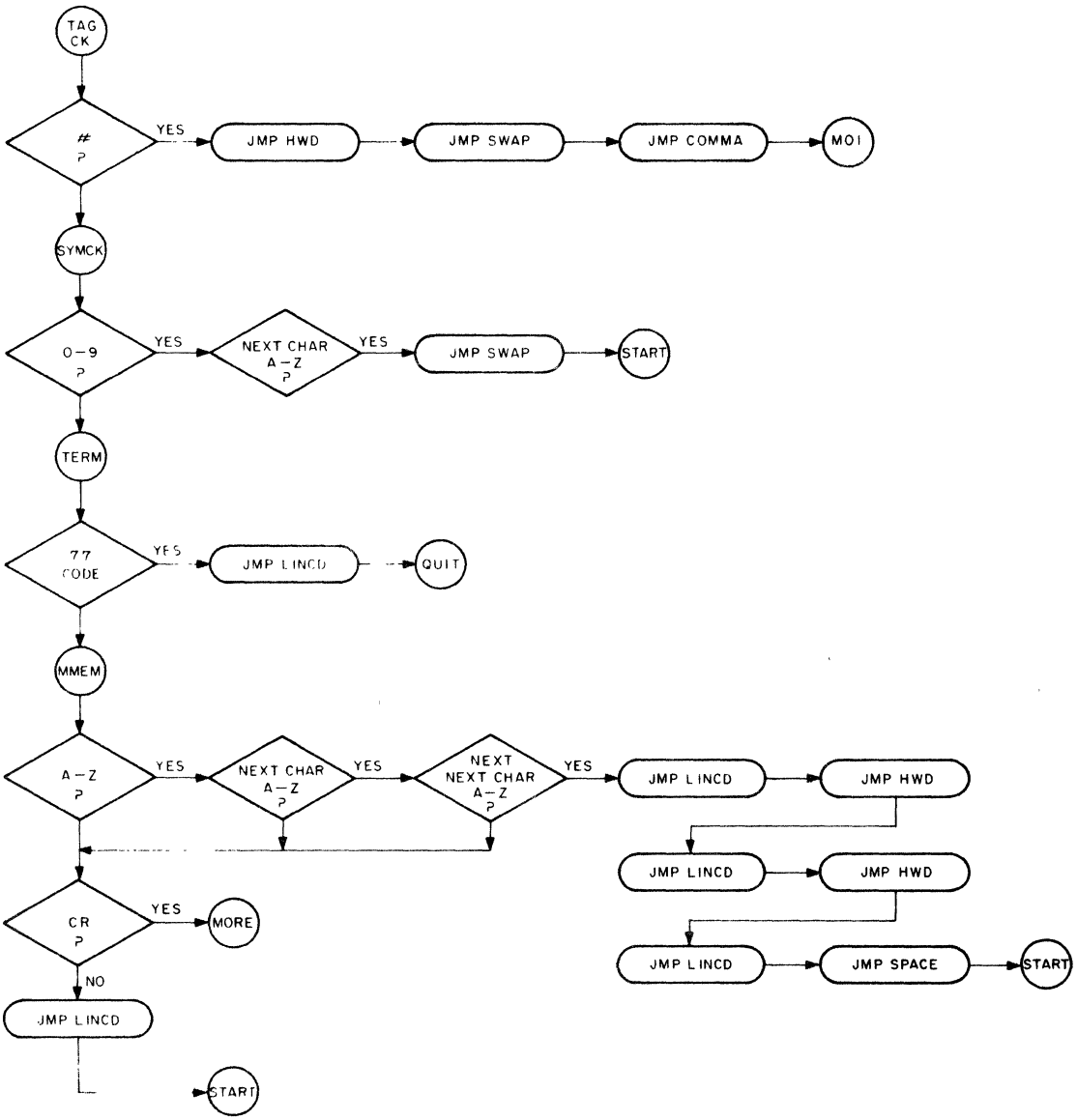
LINCD = Routine that stores a converted character into the output buffer. When filled the output buffer is written into the next block of the DIAL working area.

WA = Working Area on Unit 0.

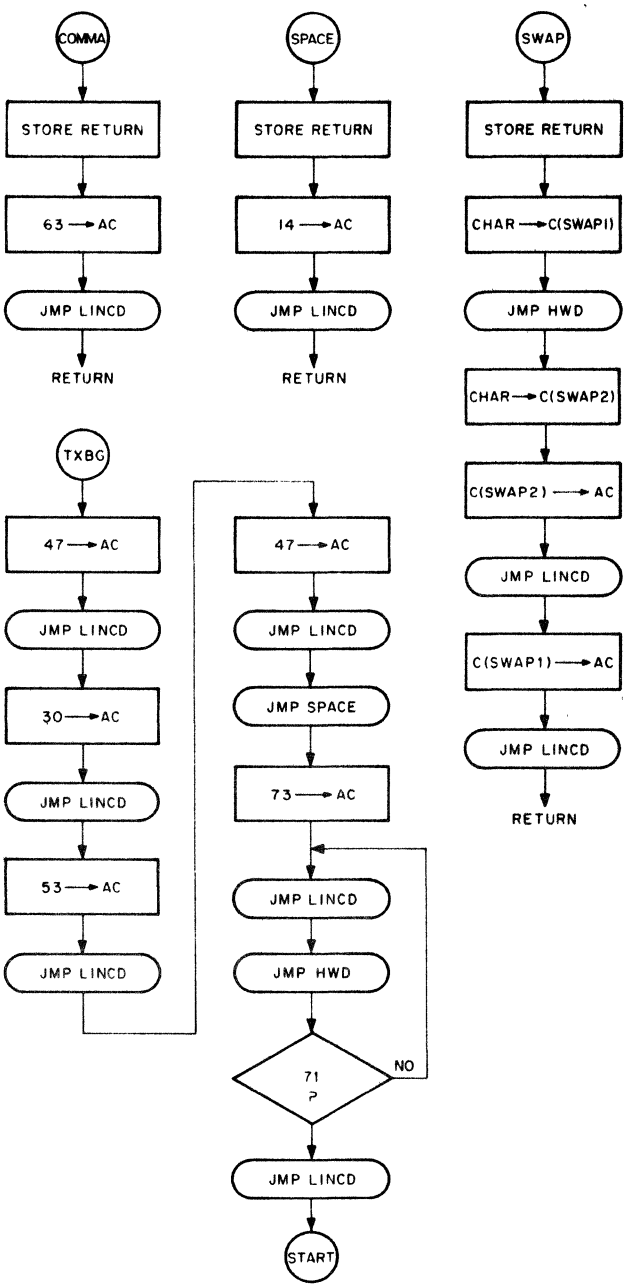
SWAP - Routine that reverses half-word characters to create a legal DIAL tag.



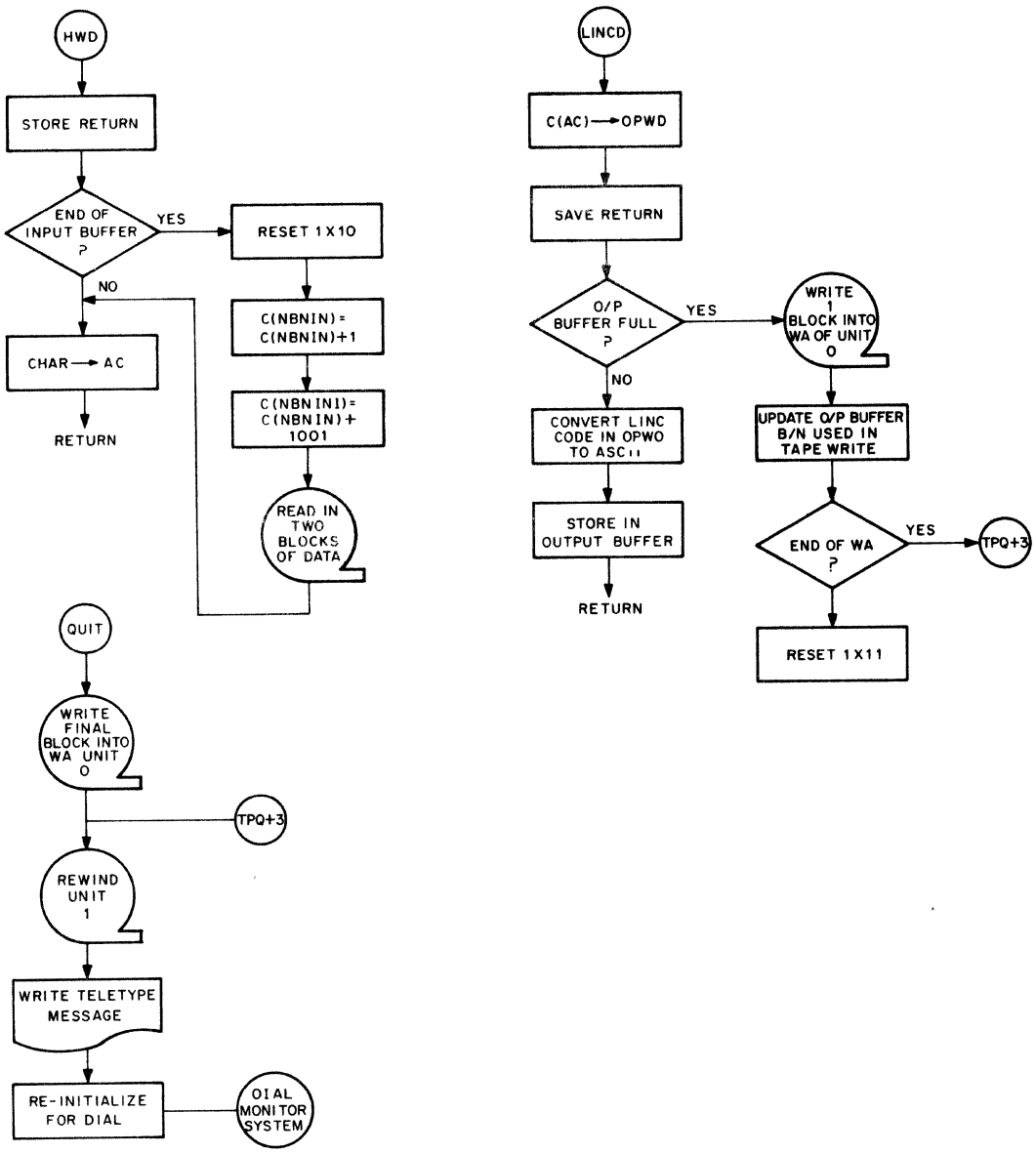
Flow Chart (Part 1 0f 4)



Flow Chart (Part 2 of 4)



Flow Chart (Part 3 of 4)



Flow Chart (Part 4 of 4)

```
0000                    *20
0000                    /PROGRAM        CONVERT
0000                    /PDP-12 PROGRAM
0003                    /INPUT: PACKED LINC SOURCE
0004                    /FILED IN LAP6,LAP6A-3L,OR
0005                    /LAP6-3L SYSTEM ON UNIT 1
0006                    /OUTPUT:        PACKED ASCII SOURCE
0007                    /IN WA OF DIAL ON UNIT 0
0010                    /
0011    0020  6071              JMP QAINIT
0012    0021  0025              TEX1
0013    0022  0066              ANS1
0014    0023  6144              JMP QARFSH
0015    0024  7060              JMP SETUP
0016    0025  0603
0016    0026  1716
0016    0027  2605
0016                    TEX1, TEXT >FCONVERT
0017    0030  2224
0017    0031  4310
0017                    H
0020    0032  4043
0020    0033  1014
0020    0034  0120
0020    0035  6640
0020    0036  2317
0020    0037  2522
0020    0040  0305
0020    0041  4020
0020    0042  2217
0020    0043  0722
0020                    HLAP6 SOURCE PROGRAM
0021    0044  0115
0021    0045  4310
0021    0046  2324
0021    0047  0122
0021    0050  2423
0021    0051  4011
0021    0052  1640
0021    0053  0214
0021    0054  1703
0021    0055  1374
0021                    HSTARTS IN BLOCK<3
0022    0056  6343
0022    0057  1017
0022    0060  1640
0022    0061  2516
0022    0062  1124
0022    0063  4017
0022    0064  1605
0022    0065  3400
0022                    HON UNIT ONE\>
0023    0066  7400  ANS1,    7400
0024    0067  0000            0000
0025    0070  3400            3400
0026                    /PUT QANA HERE
0027                                        /Q*A ROUTINE FOR PDP-12
0030    0071  1020  QAINIT, LDA I           /SAVE JMP RETURN
0031    0072  0002            2
0032    0073  2000            ADD 0
0033    0074  1060            STA I
0034    0075  0000  QAB,     0               /JMP    *3
```

```
0035    0076  2271          ADD QAL+3
0036    0077  4001          STC 1           /PTR TO FIRST PARAM
0037    0100  1001          LDA 1           /GET FIRST PARAM
0040    0101  2355          ADD QAQ+1       /PTR TO HALFWORD-1
0041    0102  4150          STC QAG-3
0042    0103  1021          LDA I 1
0043    0104  4143          STC QARFSH-1
0044    0105  4006          STC 6
0045    0106  0043  QACA,    SET 3
0046    0107  0143          QARFSH-1
0047    0110  0044          SET 4           /XR4 TO PTR TO QUESTIONS
0050    0111  0150          QAG-3
0051                                        /TO HERE IF FIRST TIME THROUGH OR FOLLOWING A CR
0052    0112  0041          SET 1
0053    0113  0004          4
0054    0114  6361          JMP QAT
0055    0115  0016          NOP             /F
0056    0116  1324          LDH I 4         /H, BUMP PTR IF H OR F
0057    0117  6322  QAD,     JMP QAO
0060    0120  6126          JMP ,+6         /74
0061    0121  6141          JMP QAE         /34
0062    0122  1460          SAE I           /CR?
0063    0123  0043          43
0064    0124  6117          JMP QAD         /NO
0065    0125  6112          JMP QACA+4
0066                                        /INITIALIZE ANSWER BUFR
0067    0126  1343          STH 3           /74 TO ANSWERS
0070    0127  1324          LDH I 4         /NEXT HALFWORD
0071    0130  1120          ADA I
0072    0131  7717          -60
0073    0132  0017          COM
0074    0133  4006          STC 6
0075    0134  1363          STH I 3         /0 IN AC
0076    0135  0226          XSK I 6
0077    0136  6134          JMP .-2
0100    0137  1323          LDH I 3         /BUMP PTR TO ANSWERS
0101    0140  6117          JMP QAD
0102                                        /ANSWER BUFR IS INITIATED
0103    0141  1343  QAE,     STH 3
0104    0142  0064          SET I 4         /XR4 TO PTR TO LAST TYPED CHAR IN ANSWER BUFR
0105    0143  0000          0
0106                                        /----RE-ENTER HERE TO REFRESH----
0107    0144  1020  QARFSH, LDA I           /INITIAL Y POSITION
0110    0145  0137          137
0111    0146  4204          STC QAH-1
0112    0147  0063          SET I 3         /XR3 TO PTR TO HALFWORD QUESTIONS-1
0113    0150  0000          0
0114    0151  0045          SET 5           /XR5 TO PTR TO LAST DISPLAYED CHAR IN ANSWER BUFR
0115    0152  0143          QARFSH-1
0116    0153  0041  QAG,     SET 1
0117    0154  0003          3
0120    0155  6361  JMP QAT
0121    0156  6165          JMP .+7         /F
0122    0157  1323          LDH I 3         /H, BUMP PTR
0123    0160  1020          LDA I           /NEITHER, ASSUME HALF SIZE
0124    0161  1560          BCL I
0125    0162  4174          STC QAM+2       /SET INSTR TO CLEAR FF FOR HALF SIZE
0126    0163  2603          ADD QAW         /NOP IN AC
0127    0164  6172          JMP QAM
0130    0165  1323          LDH I 3         /BUMP PTR
0131    0166  1020          LDA I
0132    0167  1620          BSE I
0133    0170  4174          STC QAM+2       /SET INSTR TO SET FF FOR FULL SIZE
```

```
0134    0171  2604          ADD QAW+1       /ADD 9U IN AC
0135    0172  4336  QAM,    STC QAP+3
0136    0173  0024          MSC I 4         /EAD CONTROL REGISTER
0137    0174  1620          BSE I           /THIS INSTR CHANGES, EITHER BSE & OR BCL &
0140    0175  0200          200
0141    0176  0004          MSC 4           /AC TO CONTROL REGISTER
0142    0177  0061          SET I 1         /XR1 TO INITIAL X POSITION
0143    0200  0100          100
0144    0201  1020          LDA I           /Y COORDINATE MULTIPLE
0145    0202  7737          -40
0146    0203  1160          ADM I           /Y COORDINATE
0147    0204  0000          0
0150    0205  1323  QAH,    LDH I 3
0151    0206  6323          JMP QAO+1
0152    0207  6372          JMP QAZ         /74 BUMP PTR TO NEXT CHAR, PUT 40 IN AC
0153    0210  6227          JMP QAJ         /34
0154    0211  1420          SHD I           /NEITHER
0155    0212  4300          4300
0156    0213  6153          JMP QAG         /CR, MOVE X AND Y COORDINATE
0157    0214  6333          JMP QAP         /ISPLAY CHAR
0160    0215  6205          JMP QAH         /PICK UP NEXT CHAR
0161    0216  6333          JMP QAP         /TO HERE IF DISPLAYING ANSWER BUFR
0162    0217  1520          SRO I   /SWITCH TO DISPLAY CURSOR, EITHER 0000 OR 7777
0163    0220  0000          0               /IFXR4=XR5, THEN SWITCH=7777
0164    0221  6607          JMP QAF
0165                        /QUESTION MODE
0166    0222  1325  QAI,    LDH I 5
0167    0223  6323          JMP QAO+1
0170    0224  6205          JMP QAH         /74
0171    0225  6205          JMP QAH         /34
0172    0226  6216          JMP QAI-4       /NEITHER, DISPLAY IT
0173    0227  6612  QAJ,    JMP GETKBD      /TO HERE IF DISPLAYED BUFFER
0174    0230  0470          AZE I
0175    0231  6075          JMP QAB /NOTHING TYPED , EXIT
0176    0232  0062          SET I 2
0177    0233  0503          QAY
0200    0234  1402          SHD 2           /LF?
0201    0235  6402          JMP QAK+4       /YES, EXIT
0202    0236  1422          SHD I 2         /CR?
0203    0237  6314          JMP QAN
0204    0240  0206          XSK 6           /IS THERE AN ANSWER FIELD?
0205    0241  6144          JMP QARFSH
0206    0242  1422          SHD I 2         /<?
0207    0243  6266          JMP QAL
0210    0244  1422          SHD I 2         />?
0211    0245  6376          JMP QAK
0212    0246  1422          SHD I 2         /ALT?
0213    0247  6106          JMP QACA
0214    0250  1422          SHD I 2         /BACK SLASH?
0215    0251  6144          JMP QARFSH      /IGNORE
0216    0252  1422          SHD I 2         /RUBOUT?
0217    0253  6266          JMP QAL         /IGNORE
0220    0254  1422          SHD I 2         /TAB?
0221    0255  6144          JMP QARFSH      /IGNORE
0222    0256  4263          STC .+5         /ACCEPTABLE CHAR
0223    0257  6322          JMP QAO         /TEST NEXT CHAR
0224    0260  6354          JMP QAQ         /74 BACK PTR UP BY 1
0225    0261  6354          JMP QAQ         /34 *
0226    0262  1020          LDA I           /OK, STORE IT
0227    0263  0000          0
0230    0264  1344          STH 4
0231    0265  6144          JMP QARFSH      /REDISPLAY
0232    0266  1304  QAL,    LDH 4           /TO HERE IF RUBBOUT OR <
```

```
0233    0267  6323          JMP QAO+1
0234    0270  6144          JMP QARFSH      /74 IGNORE
0235    0271  1775          -6002
0236    0272  1302          LDH 2           /TEST THE CHAR
0237    0273  1460          SAE I           /RUBOUT?
0240    0274  0037          37
0241    0275  6354          JMP QAQ         /NO, BACK PTR UP BY 1
0242    0276  0045          SET 5
0243    0277  0004          4
0244    0300  0043          SET 3
0245    0301  0004          4
0246    0302  6304          JMP .+2
0247    0303  1325          LDH I 5         /BUMP PTR
0250    0304  1323          LDH I 3         /GET NEXT CHAR
0251    0305  6323          JMP QAO+1
0252    0306  0016          NOP             /IF 74 OR 34, REPLACE CURRENT CHAR WITH 0
0253    0307  0011          CLR
0254    0310  1345          STH 5
0255    0311  0450          AZE             /WAS IT 74 OR 34?
0256    0312  6303          JMP .-7         /NO, CONTINUE
0257    0313  6354          JMP QAQ         /BACK PTR UP BY 1
0260                                        /TO HERE IF CR
0261    0314  0206  QAN,     XSK 6
0262    0315  6402          JMP QAK+4       /EXIT ROUTINE IF NO ANSWER FIELD
0263    0316  6322          JMP QAO
0264    0317  6144          JMP QARFSH      /74 MOVE PTR TO NEXT QUESTION FIELD
0265    0320  6142          JMP QAE+1       /34 END OF BUFR, MOVE PTR TO FIRST QUESTION FIELD
0266    0321  6316          JMP QAN+2
0267
0270    0322  1324  QAO,    LDH I 4         /S/R
0271    0323  1420          SHD I           /       +1 74 BEGIN FIELD
0272    0324  7400          7400            /       +2 34 END BUFR
0273    0325  6000          JMP 0           /       +3 NEITHER 74 NOR 34
0274    0326  1460          SAE I
0275    0327  0034          34
0276    0330  0220          XSK I 0
0277    0331  0220          XSK I 0
0300    0332  6000          JMP 0
0301                                        /S/R TO DISP LINC CHAR IN AC
0302    0333  0241  QAP,     ROL 1           /MULT BY 2 FOR INDEX TO ADDRESS OF TABLE
0303    0334  2521          ADD QAX+4
0304    0335  4002          STC 2           /ADDRESS OF CHAR TO DISP IN XR2
0305    0336  2577          ADD QAU         /THIS INSTR CHANGES, EITHER OP OR ADD 9U
0306    0337  2577          ADD QAU
0307    0340  2001          ADD 1           /ADD 4 TO XR1 TO SPACE CHAR
0310    0341  4001          STC 1
0311    0342  2005          ADD 5           /GET ADDRESS OF ANSWER BUFR
0312    0343  0017          COM
0313    0344  2004          ADD 4
0314    0345  0450          AZE
0315    0346  0011          CLR
0316    0347  4220          STC QAI-2       /SWITCH=0 OR 7777
0317    0350  2204          ADD QAH-1       /Y COORDINATE IN AC
0320    0351  1742          DSC 2
0321    0352  1762          DSC I 2         /DISPLAY CHAR
0322    0353  6000          JMP 0
0323    0354  1020  QAQ,     LDA I           /BACK UP PTR BY 1
0324    0355  3777          -4000
0325    0356  1140          ADM
0326    0357  0004          4
0327    0360  6144          JMP QARFSH      /REDISPLAY
0330                                        /
0331    0361  1321  QAT,     LDH I 1         /S/R
```

```
0332    0362  1420          SHD I           /       +1 F
0333    0363  0600          0600            /       +2
0334    0364  6000          JMP 0           /       +3 EITHER
0335    0365  1460          SAE I
0336    0366  0010          10
0337    0367  0220          XSK I 0
0340    0370  0220          XSK I 0
0341    0371  6000          JMP 0
0342                                        /
0343    0372  1323  QAZ,     LDH I 3
0344    0373  1020          LDA I
0345    0374  0040          40
0346    0375  6216          JMP QAI-4
0347                                        /TO HERE IF >
0350    0376  1324  QAK,     LDH I 4
0351    0377  0470          AZE I           /IS CURRENT CHAR BLANK?
0352    0400  6354          JMP QAQ         /YES, IGNORE
0353    0401  6515          JMP QAX         /MOVE DOT FORWARD
0354                                        /TO HERE TO EXIT WITH SKIP
0355    0402  1020          LDA I
0356    0403  0001          1
0357    0404  1140          ADM
0360    0405  0075          QAB
0361    0406  6075          JMP QAB
0362                                        /CHARACTER PATTERNS
0363    0407  0101  QAV,     0101            /KBD 0, ILLEGAL, USED AS MARKER
0364    0410  0101          0101
0365    0411  4477          4477            /1:A
0366    0412  7744          7744
0367    0413  5177          5177            /2:B
0370    0414  2651          2651
0371    0415  4136          4136            /3:C
0372    0416  2241          2241
0373    0417  4177          4177            /4:D
0374    0420  3641          3641
0375    0421  4577          4577            /5:E
0376    0422  4145          4145
0377    0423  4477          4477            /6:F
0400    0424  4044          4044
0401    0425  4136          4136            /7:G
0402    0426  2645          2645
0403    0427  1077          1077            /10:H
0404    0430  7710          7710
0405    0431  7741          7741            /11:I
0406    0432  0041          0041
0407    0433  4142          4142            /12:J
0410    0434  4076          4076
0411    0435  1077          1077            /13:K
0412    0436  4324          4324
0413    0437  0177          0177            /14:L
0414    0440  0301          0301
0415    0441  3077          3077            /15:M
0416    0442  7730          7730
0417    0443  3077          3077            /16:N
0420    0444  7706          7706
0421    0445  4177          4177            /17:O
0422    0446  7741          7741
0423    0447  4477          4477            /20:P
0424    0450  3044          3044
0425    0451  4276          4276            /21:Q
0426    0452  0376          0376
0427    0453  4477          4477            /22:R
```

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0431    0455  5121          5121            /23:S
0432    0456  4651          4651
0433    0457  4040          4040            /24:T
0434    0460  4077          4077
0435    0461  0177          0177            /25:U
0436    0462  7701          7701
0437    0463  0176          0176            /26:V
0440    0464  7402          7402
0441    0465  0677          0677            /27:W
0442    0466  7701          7701
0443    0467  1463          1463            /30:X
0444    0470  6314          6314
0445    0471  0770          0770            /31:Y
0446    0472  7007          7007
0447    0473  4543          4543            /32:Z
0450    0474  6151          6151
0451    0475  4177          4177            /33:/
0452    0476  0000          0000
0453                                        /34:BACKSLASH IGNORED ON INPUT
0454    0477  0000          0               /NOT USED
0455    0500  0000          0               /NOT USED
0456    0501  0000          0000            /35:]
0457    0502  7741          7741
0460                                        /CODES 36:ALT, 37:RUBOUT NOT DISPLAYED
0461    0503  4543  QAY,    4543            /LF,CR
0462    0504  7476          7476            /<,>
0463    0505  3634          3634            /ALT, BACKSLASH
0464    0506  3747          3747            /RUBOUT, TAB
0465    0507  0000          0000            /40:SPACE
0466    0510  0000          0000
0467    0511  7500          7500            /41:X!
0470    0512  0000          0000
0471    0513  7000          7000            /42:"
0472    0514  0070          0070
0473                                        /CODES 43:, 44:, 45:LF NOT DISPLAYED
0474    0515  6323  QAX,    JMP QAO+1
0475    0516  6354          JMP QAQ
0476    0517  6354          JMP QAQ
0477    0520  6144          JMP QARFSH
0500    0521  0407          QAV
0501    0522  0000          0               /NOT USED
0502    0523  5166          5166            /46: &
0503    0524  0526          0526
0504                                        /CODE 47:TAB NOT DISPLAYED
0505    0525  0000          0               /NOT USED
0506    0526  0000          0               /NOT USED
0507    0527  3600          3600            /50:(
0510    0530  0041          0041
0511    0531  4100          4100            /51:)
0512    0532  0036          0036
0513    0533  2050          2050            /52:*
0514    0534  0050          0050
0515    0535  0404          0404            /53:+
0516    0536  0437          0437
0517    0537  0500          0500            /54:,
0520    0540  0006          0006
0521    0541  0404          0404            /55:-
0522    0542  0404          0404
0523    0543  0001          0001            /56:.
0524    0544  0000          0000
0525    0545  0601          0601            /57:/
0526    0546  4030          4030
0527    0547  4536          4536    /60:0
```

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0530    0550  3651          3651
0531    0551  2101          2101            /61:1
0532    0552  0177          0177
0533    0553  4523          4523            /62:2
0534    0554  2151          2151
0535    0555  4122          4122            /63:3
0536    0556  2651          2651
0537    0557  2414          2414            /64:4
0540    0560  0477          0477
0541    0561  5172          5172            /65:5
0542    0562  0651          0651
0543    0563  1506          1506            /66:6
0544    0564  4225          4225
0545    0565  4443          4443            /67:7
0546    0566  6050          6050
0547    0567  5126          5126    /70:8
0550    0570  2651          2651
0551    0571  5122          5122            /71:9
0552    0572  3651          3651
0553    0573  2200          2200            /72::
0554    0574  0000          0000
0555    0575  4601          4601            /73:;
0556    0576  0000          0000
0557                                        /CODE 74:<NOT DISPLAYED
0560    0577  0002  QAU,     2               /CONSTANT
0561    0600  0000          0       /NOT USED
0562    0601  1212          1212            /75:=
0563    0602  1212          1212
0564                                        /CODE 76:> NOT DISPLAYED
0565    0603  0016  QAW,     NOP
0566    0604  2577          ADD QAU
0567    0605  4020          4020            /77:?
0570    0606  2055          2055
0571                /
0572    0607  1760  QAF,     DSC I
0573    0610  6000          6000
0574    0611  6222          JMP QAI
0575                /
0576                                        /END Q+A
0577                /
0600                /
0601                /
0602                /
0603                /KEYBOARD INPUT ROUTINE
0604                /
0605                LKRB= 6036              /PDP-8 IOT KBD
0606                LTSF= 6041              /TSF
0607                LTLS= 6046              /TLS
0610                /
0611    0612  1000  GETKBD, LDA
0612    0613  0000          0
0613    0614  4734          STC EXIT+6      /SAVE RETURN
0614    0615  2001          ADD 1           /SAVE XRS 1 AND 2
0615    0616  4731          STC EXIT+3
0616    0617  2002          ADD 2
0617    0620  4733          STC EXIT+5
0620    0621  4727          STC EXIT+1
0621    0622  0415          KST             /WAS SOMETHING TYPED?
0622    0623  6000          JMP 0           /NO: EXIT
0623    0624  0500          IOB
0624    0625  6036          LKRB            /GET TTY CHAR, CLEAR FLAG
0625    0626  1060          STA I           /SAVE IT
0626    0627  0000  TY,      0
```

```
0627    0630  1120          ADA I
0630    0631  7540          -237
0631    0632  0451          APO             /BETWEEN 200 AND 237?
0632    0633  6675          JMP CNTRL       /CONTROL CHAR. CHECK FOR CR,LF, TAB
0633                  /
0634    0634  0061          SET I 1         /NO
0635    0635  0745          CHARS-1
0636    0636  0062          SET I 2
0637    0637  7770          -7
0640    0640  1000          LDA
0641    0641  0627          TY
0642    0642  1461          SAE I 1
0643    0643  6645          JMP .+2
0644    0644  6726          JMP EXIT        /ILLEGAL CHAR, DON      T ECHO
0645    0645  0222          XSK I 2         /CHECKED THEM ALL?
0646    0646  6642          JMP .-4
0647                  /
0650    0647  1120          ADA I
0651    0650  7440          -337
0652    0651  0451          APO             /BETWEEN 240 AND 337?
0653    0652  6666          JMP LEGAL       /YES, LEGAL CHAR
0654                  /
0655    0653  1461          SAE I 1         /NO, CHECK FURTHER,
0656    0654  6663          JMP .+7
0657    0655  1020          LDA I           /RUBOUT
0660    0656  0334          334
0661    0657  6735          JMP TPE         /ECHO BACKSLASH
0662    0660  1020          LDA I
0663    0661  0037          37
0664    0662  6730          JMP EXIT+2      /LEGAL EXIT
0665                  /
0666    0663  1461          SAE I 1
0667    0664  6726          JMP EXIT        /ILLEGAL
0670                                        /ALT
0671    0665  6730          JMP EXIT+2      /EXIT, DON      T ECHO
0672                  /
0673    0666  1000  LEGAL,   LDA
0674    0667  0627          TY
0675    0670  6735          JMP TPE         /ECHO CHAR
0676    0671  2627          ADD TY
0677    0672  1560          BCL I           /STRIP IT TO 6-BIT
0700    0673  7700          7700
0701    0674  6730          JMP EXIT+2
0702                  /TO HERE IF CONTROL CHAR
0703    0675  1460  CNTRL,   SAE I
0704    0676  7755          7755
0705    0677  6712          JMP CKLF
0706    0700  1020          LDA I           /CR
0707    0701  0043          43
0710    0702  4727          STC EXIT+1
0711    0703  1020          LDA I
0712    0704  0215          215
0713    0705  6735          JMP TPE
0714    0706  1020          LDA I
0715    0707  0212          212
0716    0710  6735          JMP TPE
0717    0711  6726          JMP EXIT
0720                  /
0721    0712  1460  CKLF,    SAE I
0722    0713  7752          7752
0723    0714  6720          JMP .+4
0724    0715  1020          LDA I           /LF
0725    0716  0045          45
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0726    0717  6702          JMP CNTRL+5
0727    0720  1460          SAE I
0730    0721  7751          7751
0731    0722  6726          JMP EXIT                /ILLEGAL
0732    0723  1020          LDA I
0733    0724  0047          47
0734    0725  6730          JMP EXIT+2        /EXIT, DON      T ECHO
0735                  /
0736    0726  1020  EXIT,     LDA I            /GET 6-BIT ASCII
0737    0727  0000          0
0740    0730  0061          SET I 1          /RESTORE XRS
0741    0731  0000          0
0742    0732  0062          SET I 2
0743    0733  0000          0
0744    0734  6000          JMP              /EXIR S/R GETKBD
0745                  /S/R TO PRINT C(AC)
0746    0735  0500  TPE,     IOB
0747    0736  6046          LTLS             /PRINT IT
0750    0737  1000          LDA
0751    0740  0000          0
0752    0741  4745          STC .+4          /SAVE RETURN
0753    0742  0500          IOB
0754    0743  6041          LTSF
0755    0744  6742          JMP .-2          /WAIT FOR FLAG
0756    0745  6000          JMP              /EXIT
0757    0746  0243  CHARS,   243      /HASH
0760    0747  0244          244      /DOLLAR SIGN
0761    0750  0245          245      /PER CENT
0762    0751  0247          247      /APOSTROPHE
0763    0752  0300          300      /AT SIGN
0764    0753  0336          336      /UP ARROW
0765    0754  0337          337      /BACK ARROW
0766    0755  0040          40       /RUBOUT
0767    0756  0036          36       /ALT
0770                  /END OF S/R GETKBD
0771    0757  0060  CONV,    60       /0-9
0772    0760  0061  61
0773    0761  0062  62
0774    0762  0063  63
0775    0763  0064  64
0776    0764  0065  65
0777    0765  0066  66
1000    0766  0067  67
1001    0767  0070  70
1002    0770  0071  71
1003    0771  0043  43       /CR
1004    0772  0037  37       /RO
1005    0773  0040  40       /SPACE
1006    0774  0011  11       /I
1007    0775  0056  56       /P
1010    0776  0055  55       /-
1011    0777  0053  53       /+
1012    1000  0034  34 /VERT BAR
1013    1001  0032  32       /LB
1014    1002  0036  36       /CASE
1015    1003  0001  01       /A-Z
1016    1004  0002  02
1017    1005  0003  03
1020    1006  0004  04
1021    1007  0005  05
1022    1010  0006  06
1023    1011  0007  07
1024    1012  0010  10
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1025    1013  0011  11
1026    1014  0012  12
1027    1015  0013  13
1030    1016  0014  14
1031    1017  0015  15
1032    1020  0016  16
1033    1021  0017  17
1034    1022  0020  20
1035    1023  0021  21
1036    1024  0022  22
1037    1025  0023  23
1040    1026  0024  24
1041    1027  0025  25
1042    1030  0026  26
1043    1031  0027  27
1044    1032  0030  30
1045    1033  0031  31
1046    1034  0032  32      /Ż
1047    1035  0045  45      /LF
1050    1036  0077  77
1051    1037  0077  77      /?
1052    1040  0075  75      /=
1053    1041  0025  25      /U
1054    1042  0054  54      /COMMA
1055    1043  0056  56      /PERIOD
1056    1044  0052  52      /ORIGIN
1057    1045  0057  57 /LT BRAC TO SLASH
1060    1046  0077  77      /UNDERLINE??
1061    1047  0074  74      /QUOTES
1062    1050  0076  76      /QUOTES
1063    1051  0074  74      /QUOTES
1064    1052  0076  76      /QUOTES
1065    1053  0035  35      /RT BRACKET
1066    1054  0052  52
1067    1055  0072  72      /COLON
1070    1056  0000  00
1071    1057  0047  47 /TAB
1072    1060  1020  SETUP,  LDA I
1073    1061  4000          4000
1074    1062  1040          STA
1075    1063  1152          BNIN
1076    1064  1000          LDA
1077    1065  0067          ANS1+1
1100    1066  0450          AŻE
1101    1067  7077          JMP SETUP1
1102    1070  1300          LDH
1103    1071  4066          ANS1+4000
1104    1072  1560          BCL I
1105    1073  0070          70
1106    1074  1140          ADM
1107    1075  1152          BNIN
1110    1076  7145          JMP SETUP3
1111    1077  1300  SETUP1, LDH
1112    1100  4067          ANS1+4001
1113    1101  0450          AŻE
1114    1102  7121          JMP SETUP2
1115    1103  1300          LDH
1116    1104  0067          ANS1+1
1117    1105  1560          BCL I
1120    1106  0070          70
1121    1107  1140          ADM
1122    1110  1152          BNIN
1123    1111  1300          LDH
```

```
1124    1112  4066          ANS1+4000
1125    1113  1560          BCL I
1126    1114  0070          70
1127    1115  0243          ROL 3
1130    1116  1140          ADM
1131    1117  1152          BNIN
1132    1120  7145          JMP SETUP3
1133    1121  1560  SETUP2, BCL I
1134    1122  0070          70
1135    1123  1140          ADM
1136    1124  1152          BNIN
1137    1125  1300          LDH
1140    1126  0067          ANS1+1
1141    1127  1560          BCL I
1142    1130  0070          70
1143    1131  0243          ROL 3
1144    1132  1140          ADM
1145    1133  1152          BNIN
1146    1134  1300          LDH
1147    1135  4066          ANS1+4000
1150    1136  1560          BCL I
1151    1137  0070          70
1152    1140  0246          ROL 6
1153    1141  1140          ADM
1154    1142  1152          BNIN
1155    1143  1040          STA
1156    1144  1526          NBNIN
1157    1145  1120  SETUP3, ADA I
1160    1146  1001          1001
1161    1147  1040          STA
1162    1150  1154          BNIN1
1163                  /READ INITIAL BLOCKS IN
1164    1151  0710  OVRTEX, RDC U
1165    1152  0000  BNIN,   0       /2000-2377
1166    1153  0710          RDC U
1167    1154  0000  BNIN1,  0       /2400-2777
1170    1155  0070          SET I 10
1171    1156  5166          4\INIT-1
1172    1157  0071          SET I 11        /Q6:3000-3377
1173    1160  6777          6777
1174    1161  1330          LDH I 10
1175    1162  0450          AZE     /NULL?
1176    1163  7165          JMP .+2
1177    1164  7251          JMP OVRIN       /END
1200    1165  1371          STH I 11
1201    1166  7161          JMP .-5
1202    1167  5262
1202                  INIT, TEXT >*20
1203    1170  6043
1203    1171  5724
1203    1172  1011
1203    1173  2340
1203    1174  2022
1203    1175  1707
1203    1176  2201
1203    1177  1540
1203    1200  0417
1203                  /THIS PROGRAM DOES
1204    1201  0523
1204    1202  4357
1204    1203  1617
1204    1204  2440
1204    1205  2422
```

```
1204       1206  0116
1204       1207  2314
1204       1210  0124
1204       1211  0540
1204       1212  0114
1204                     /NOT TRANSLATE ALL
1205       1213  1443
1205       1214  5723
1205       1215  1124
1205       1216  2501
1205       1217  2411
1205       1220  1716
1205                     /SITUATIONS,
1206       1221  2356
1206       1222  4357
1206       1223  0310
1206       1224  0503
1206       1225  1340
1206       1226  1411
1206       1227  2324
1206       1230  1116
1206       1231  0741
1206                     /CHECK LISTING!!
1207       1232  4143
1207       1233  3224
1207       1234  0175
1207                     ZTA=5
1210       1235  6543
1210       1236  1415
1210       1237  0275
1210       1240  6066
1210                     LMB=0600
1211       1241  6060
1211       1242  4325
1211       1243  1502
1211       1244  7560
1211       1245  6664
1211                     UMB=0640
1212       1246  6043
1212       1247  4000
1212                      >
1213       1250  0000           0
1214       1251  0070  OVRIN,  SET I 10
1215       1252  6001           4\2001
1216       1253  1020           LDA I
1217       1254  6370           6370
1220       1255  1040           STA
1221       1256  1601           TPOUT
1222       1257  7476  START,   JMP HWD
1223       1260  1460           SAE I
1224       1261  0066           66
1225       1262  7311           JMP TXMETA
1226                     /COMMENT MODE
1227       1263  1460  COMMT,   SAE I
1230       1264  0012           12
1231       1265  7306           JMP MOCT
1232                     /END OF COMMENT
1233       1266  7570  MORE,    JMP LINCD
1234       1267  0052           SET 12
1235       1270  0010           10
1236       1271  1332           LDH I 12
1237       1272  1460           SAE I
1240       1273  0066           66
```

```
1241    1274  7276          JMP .+2
1242    1275  7257          JMP START
1243    1276  1460          SAE I
1244    1277  0022          22
1245    1300  7302          JMP .+2
1246    1301  7257          JMP START
1247    1302  1020  MO1,     LDA I
1250    1303  0100          100
1251    1304  7570          JMP LINCD
1252    1305  7257          JMP START
1253                  /MORE COMMENTS
1254    1306  7570  MOCT,    JMP LINCD
1255    1307  7476          JMP HWD
1256    1310  7263          JMP COMMT
1257                  /CHECK FOR TEXT META
1260    1311  1460  TXMETA, SAE I
1261    1312  0070          70 /ALT-A
1262    1313  7342          JMP ICK
1263    1314  1020  TXBG,    LDA I
1264    1315  0047          0047
1265    1316  7570          JMP LINCD
1266    1317  1020          LDA I
1267    1320  0030          0030
1270    1321  7570          JMP LINCD
1271    1322  1020          LDA I
1272    1323  0053          53
1273    1324  7570          JMP LINCD
1274    1325  1020          LDA I
1275    1326  0047          47
1276    1327  7570          JMP LINCD
1277    1330  7532          JMP SPACE
1300    1331  1020          LDA I
1301    1332  0071          71
1302    1333  7570  TXAGIN, JMP LINCD
1303    1334  7476          JMP HWD
1304    1335  1460          SAE I
1305    1336  0071          71
1306    1337  7333          JMP TXAGIN
1307                  /END OF TEXT META
1310    1340  7570          JMP LINCD
1311    1341  7257          JMP START
1312                  /SMALL I CHECK
1313    1342  1460  ICK,     SAE I
1314    1343  0015          15
1315    1344  7350          JMP UCK
1316                  /SMALL I
1317    1345  7570          JMP LINCD
1320    1346  7532          JMP SPACE
1321    1347  7257          JMP START
1322                  /SMALL U CHECK
1323    1350  1460  UCK,     SAE I
1324    1351  0062          62
1325    1352  7356          JMP TAGCK
1326                  /SMALL U
1327    1353  7570          JMP LINCD
1330    1354  7532          JMP SPACE
1331    1355  7257          JMP START
1332                  /TAG CHECK
1333    1356  1460  TAGCK,   SAE I
1334    1357  0022          22
1335    1360  7365          JMP SYMCK
1336                  /TAG
1337    1361  7476          JMP HWD
```

```
1340      1362  7550          JMP SWAP
1341      1363  7541          JMP COMMA
1342      1364  7302          JMP M01
1343                    /SYMBOL CHECK
1344      1365  0052  SYMCK,   SET 12
1345      1366  0010          10
1346      1367  1120          ADA I
1347      1370  7766          -11
1350      1371  0471          APO I   /NUMBER?
1351      1372  7412          JMP TERM
1352      1373  0052          SET 12  /YES
1353      1374  0010          10
1354      1375  1332          LDH I 12        /PEEK AT NEXT HWD
1355      1376  1120          ADA I
1356      1377  7722          -55     /Z OR BELOW
1357      1400  0471          APO I
1360      1401  7412          JMP TERM
1361      1402  1312          LDH 12  /YES
1362      1403  1120          ADA I
1363      1404  7754          -23
1364      1405  0451          APO
1365      1406  7412          JMP TERM
1366      1407  1310          LDH 10  /YES,A-Z
1367      1410  7550          JMP SWAP
1370      1411  7257          JMP START
1371      1412  1310  TERM,    LDH 10
1372      1413  1460          SAE I
1373      1414  0077          77
1374      1415  7420          JMP .+3
1375      1416  7570          JMP LINCD
1376      1417  7627          JMP QUIT
1377      1420  0052  MNEM,    SET 12
1400      1421  0010          10
1401      1422  1120          ADA I
1402      1423  7722          -55
1403      1424  0471          APO I
1404      1425  7467          JMP CRMORE
1405      1426  1312          LDH 12
1406      1427  1120          ADA I
1407      1430  7754          -23
1410      1431  0451          APO
1411      1432  7467          JMP CRMORE
1412                    /LETTER, IS NEXT CHAR
1413                    /A LETTER?
1414      1433  1332          LDH I 12
1415      1434  1120          ADA I
1416      1435  7722          -55
1417      1436  0471          APO I
1420      1437  7467          JMP CRMORE
1421      1440  1312          LDH 12
1422      1441  1120          ADA I
1423      1442  7754          -23
1424      1443  0451          APO
1425      1444  7467          JMP CRMORE
1426                    /YES, CHECK LAST CHAR
1427      1445  1332          LDH I 12
1430      1446  1120          ADA I
1431      1447  7722          -55
1432      1450  0471          APO I
1433      1451  7467          JMP CRMORE
1434      1452  1312          LDH 12
1435      1453  1120          ADA I
1436      1454  7754          -23
```

```
1437    1455  0451          APO
1440    1456  7467          JMP CRMORE
1441    1457  1310          LDH 10          /MNEMONIC
1442    1460  7570          JMP LINCD
1443    1461  7476          JMP HWD
1444    1462  7570          JMP LINCD
1445    1463  7476          JMP HWD
1446    1464  7570          JMP LINCD
1447    1465  7532          JMP SPACE
1450    1466  7257          JMP START
1451    1467  1312  CRMORE, LDH 12
1452    1470  1460          SAE I
1453    1471  0012          12
1454    1472  7474          JMP .+2
1455    1473  7266          JMP MORE
1456    1474  7570          JMP LINCD
1457    1475  7257          JMP START
1460                  /HWD MUST CHECK
1461                  /FOR END OF Q4
1462                  /AND BRING-IN NEW
1463                  /HALF WORD
1464    1476  0011  HWD,     CLR
1465    1477  2000          ADD 0
1466    1500  5510          STC BACK
1467    1501  1000          LDA
1470    1502  0010          10
1471    1503  1460          SAE I
1472    1504  6377          6377
1473    1505  7507          JMP .+2
1474    1506  7511          JMP EQ4
1475    1507  1330          LDH I 10
1476    1510  0000  BACK,    0
1477    1511  0070  EQ4,     SET I 10
1500    1512  7777          7777
1501    1513  1000          LDA
1502    1514  1526          NBNIN
1503    1515  1120          ADA I
1504    1516  0001          1
1505    1517  1040          STA
1506    1520  1526          NBNIN
1507    1521  1120          ADA I
1510    1522  1001          1001
1511    1523  1040          STA
1512    1524  1530          NBNIN1
1513    1525  0710          RDC U
1514    1526  0000  NBNIN,   0
1515    1527  0710          RDC U
1516    1530  0000  NBNIN1,  0
1517    1531  7507          JMP BACK-1
1520                  /SPACE CREATES A SPACE
1521    1532  0011  SPACE,   CLR
1522    1533  2000          ADD 0
1523    1534  5540          STC BACK1
1524    1535  1020          LDA I
1525    1536  0014          14
1526    1537  7570          JMP LINCD
1527    1540  0000  BACK1,   0
1530                  /COMMA OUTPUTS A COMMA
1531    1541  0011  COMMA,   CLR
1532    1542  2000          ADD 0
1533    1543  5547          STC BACK2
1534    1544  1020          LDA I
1535    1545  0063          63
```

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1537      1547  0000  BACK2,  0
1540                  /SWAP INTERCHANGES NUMBER
1541                  /AND LETTER COMBINATIONS
1542                  /THEN OUTPUTS BOTH
1543      1550  0011  SWAP,   CLR
1544      1551  2000          ADD 0
1545      1552  5567          STC BACK3
1546      1553  1310          LDH 10
1547      1554  1040          STA
1550      1555  1565          SWAP1
1551      1556  7476          JMP HWD
1552      1557  1040          STA
1553      1560  1562          SWAP2
1554      1561  1020          LDA I
1555      1562  0000  SWAP2,  0
1556      1563  7570          JMP LINCD
1557      1564  1020          LDA I
1560      1565  0000  SWAP1,  0
1561      1566  7570          JMP LINCD
1562      1567  0000  BACK3,  0
1563                  /LINC SETS UP O/P
1564                  /BUFFER IN Q6
1565      1570  5617  LINCD,  STC OPWD
1566      1571  2000          ADD 0
1567      1572  5626          STC BACK4
1570      1573  1000          LDA
1571      1574  0011          11
1572      1575  1460          SAE I
1573      1576  7377          7377
1574      1577  7616          JMP OUTPUT
1575      1600  0704          WRC     /YES, END OF OP BUFFER
1576      1601  0000  TPOUT,  0
1577      1602  1000          LDA
1600      1603  1601          TPOUT
1601      1604  1120          ADA I
1602      1605  0001          1
1603      1606  1460          SAE I
1604      1607  6467          6467
1605      1610  7612          JMP .+2
1606      1611  7637          JMP TPQ+3
1607      1612  1040          STA
1610      1613  1601          TPOUT
1611      1614  0071          SET I 11
1612      1615  6777          6777
1613      1616  1020  OUTPUT, LDA I
1614      1617  0000  OPWD,   0
1615      1620  1120          ADA I
1616      1621  0757          CONV
1617      1622  5624          STC PICKUP
1620      1623  1000          LDA
1621      1624  0000  PICKUP, 0
1622      1625  1371          STH I 11
1623      1626  0000  BACK4,  0
1624      1627  1000  QUIT,  LDA
1625      1630  1601          TPOUT
1626      1631  1040          STA
1627      1632  1634          TPQ
1630      1633  0704          WRC
1631      1634  0000  TPQ,    0
1632      1635  0416          0416
1633      1636  7635          JMP .-1
1634      1637  0717          CHK U
```

```
1635    1640  0000          0000
1636    1641  0416          0416
1637    1642  7641          JMP .-1
1640    1643  0075          SET I 15
1641    1644  0701          RCG
1642    1645  0076          SET I 16
1643    1646  7302          7300
1644    1647  0074          SET I 14
1645    1650  7720          -57
1646    1651  0073          SET I 13
1647    1652  1663          TEXTZ-1
1650    1653  1033          LDA I 13
1651    1654  0500          IOB
1652    1655  6041          6041 /TSF
1653    1656  7654          JMP .-2
1654    1657  0500          IOB
1655    1660  6046          6046 /TLS
1656    1661  0234          XSK I 14
1657    1662  7653          JMP .-7
1660    1663  6015          JMP 15
1661    1664  0215  TEXTZ,   0215
1662    1665  0212          0212
1663    1666  0322          322
1664    1667  0305          305
1665    1670  0315          315
1666    1671  0317          317
1667    1672  0326          326
1670    1673  0305          305
1671    1674  0240          240
1672    1675  0324          324
1673    1676  0301          301
1674    1677  0320          320
1675    1700  0305          305
1676    1701  0240          240
1677    1702  0306          306
1700    1703  0322          322
1701    1704  0317          317
1702    1705  0315          315
1703    1706  0240          240
1704    1707  0325          325
1705    1710  0316          316
1706    1711  0311          311
1707    1712  0324          324
1710    1713  0240          240
1711    1714  0261          261
1712                /REMOVE TAPE FROM UNIT 1
1713    1715  0215          0215
1714    1716  0212          0212
1715    1717  0324          324
1716    1720  0331          331
1717    1721  0320          320
1720    1722  0305          305
1721    1723  0240          240
1722    1724  0314          314
1723    1725  0306          306
1724    1726  0240          240
1725    1727  0301          301
1726    1730  0320          320
1727    1731  0240          240
1730    1732  0263          263
1731    1733  0267          267
1732    1734  0260          260
1733    1735  0254          254
```

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1734    1736  0260          260
1735    1737  0240          240
1736    1740  0303          303
1737    1741  0322          322
1740    1742  0215          215
1741    1743  0212          212
1742                /TYPE LF AP 370,0 CR
1743                /CONVERT
1744                /18 DEC 69
```

0000 ERRORS

```
ANS1    4066
BACK    5510
BACK1   5540
BACK2   5547
BACK3   5567
BACK4   5626
BNIN    5152
BNIN1   5154
CHARS   4746
CKLF    4712
CNTRL   4675
COMMA   5541
COMMT   5263
CONV    4757
CRMORE  5467
EQ4     5511
EXIT    4726
GETKBD  4612
HWD     5476
ICK     5342
INIT    5167
LEGAL   4666
LINCD   5570
LKRB    6036
LTLS    6046
LTSF    6041
MNEM    5420
MOCT    5306
MORE    5266
MO1     5302
NBNIN   5526
NBNIN1  5530
OPWD    5617
OUTPUT  5616
OVRIN   5251
OVRTEX  5151
PICKUP  5624
QAB     4075
QACA    4106
QAD     4117
QAE     4141
QAF     4607
QAG     4153
QAH     4205
QAI     4222
QAINIT  4071
QAJ     4227
QAK     4376
QAL     4266
QAM     4172
QAN     4314
-
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QAO     4322
QAP     4333
QAQ     4354
QARFSH  4144
QAT     4361
QAU     4577
QAV     4407
QAW     4603
QAX     4515
QAY     4503
QAZ     4372
QUIT    5627
SETUP   5060
SETUP1  5077
SETUP2  5121
SETUP3  5145
SPACE   5532
START   5257
SWAP    5550
SWAP1   5565
SWAP2   5562
SYMCK   5365
TAGCK   5356
TERM    5412
TEXTZ   5664
TEX1    4025
TPE     4735
TPOUT   5601
TPQ     5634
TXAGIN  5333
TXBG    5314
TXMETA  5311
TY      4627
UCK     5350
```