IDENTIFICATION

PRODUCT CODE: MAINDEC-08-DKVTA-A-D

PRODUCT NAME: VT78 MOS MEMORY DIAGNOSTIC

DATE: RELEASED: JUNE 1977

MAINTAINER: DIAGNOSTIC GROUP

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1. ABSTRACT

THE VT78 MOS MEMORY TEST IS INTENDED FOR USE ON THE VT78 SYSTEM,
ALTHOUGH IT WILL RUN ON MOST PDP-8 SYSTEMS. ALTHOUGH
DESIGNED TO TEST 16K OF MOS MEMORY, THE PROGRAM WILL TEST
SYSTEMS EQUIPPED WITH FROM 4K TO 32K WORDS OF MOS MEMORY
BY CHANGING BITS 6-11 OF HCW1 (LOC 21).
AUTOMATIC PROGRAM RELOCATION IS PROVIDED IN ORDER TO TEST ALL
MEMORY FIELDS FROM EACH MEMORY FIELD.

SINCE THE VT78 HAS NO HARDWARE SWITCH REGISTER, THE STANDARD
CONSOLE PACKAGE HAS BEEN INCLUDED IN THE PROGRAM. THIS PROVIDES
AN INTERFACE BETWEEN THE OPERATOR AND THE DIAGNOSTIC VIA
THE VT78 VIDEO DISPLAY-KEYBOARD TERMINAL.

THIS DIAGNOSTIC WILL RUN UNDER APT CONTROL.

2. REQUIREMENTS

2.1 EQUIPMENT

A VT78 VIDEO-KEYBOARD TERMINAL

2.2 STORAGE

THE PROGRAM OCCUPIES CORE LOCATIONS 0000 TO 3177, WITH
LOCATIONS 5600 TO 7777 USED AS A BUFFER AREA.

2.3 PRELIMINARY PROGRAMS

THE VT78 RESIDENT CONTROL PANEL PROGRAM AND THE
VT78 CPU DIAGNOSTIC MUST HAVE BEEN SUCESSFULLY RUN.

3. LOADING PROCEDURE

THE PROGRAM IS NORMALLY LOADED FROM THE FLOPPY DISKETTE
WHICH IS PROVIDED WITH THE RELEASE PACKAGE. THE PROGRAM
MAY BE LOADED INTO ANY DESIRED CORE STACK BY HAVING BIN
IN THAT CORE STACK.

4.   ERRORS

        THE CONTENTS OF A GIVEN MEMORY TEST LOCATION SHOULD ALWAYS BE
        EQUAL TO ITS ADDRESS OR THE COMPLEMENT OF ITS ADDRESS. IF IT
        IS NOT, A TEST ERROR WILL RESULT. A RELOCATION ERROR WILL
        OCCUR IF THE RELOCATION COMPARISON CHECK FAILS. FOR THE
        DYNAMIC TESTS THE MESSAGE "A DYNAMIC ERROR HAS OCCURED
        IN FIELD X" WILL BE DISPLAYED, WHERE X IS THE FIELD
        UNDER TEST WHEN THE ERROR OCCURED.
NOTE: THE PURPOSE OF THE DYNAMIC TESTS IS JUST TO
        DETECT DYNAMIC PROBLEMS IN MOS MEMORY. DUE
        TO THE NATURE OF THESE TESTS, PROGRAM DIAGNOSIS
        DOWN TO A CHIP LEVEL IS IMPOSSIBLE. THE ONLY
        INFORMATION WHICH MAY BE OF USE IN DEBUGGING
        IS LOCATION 100 OF THE FAILING FIELD. IT MAY
        CONTAIN THE ADDRESS +1 FROM WHICH THE PROGRAM
        ENTERED THE ERROR ROUTINE.

4.1   MARCH TEST ERROR TYPEOUTS

        FOR THE FIRST ERROR ENCOUNTERED A HEADER WILL BE TYPED OUT
        FOLLOWED BY THE PERTINENT DATA. FOR ALL SUBSEQUENT ERRORS,
        ONLY THE PERTINENT DATA WILL BE TYPED. THE FORMAT IS AS
        FOLLOWS:

        PR LOC ADDR   GOOD BAD

        PR LOC = THE PROGRAM ADDRESS WHERE THE ERROR JMS OCCURRED.
                (INCLUDES FIELD)
        ADDR = THE ADDRESS OF THE LOCATION IN ERROR. (INCLUDES
                FIELD)

        GOOD = WHAT THE DATA SHOULD BE.

        BAD = WHAT THE DATA IS.

4.2   RELOCATION ERROR TYPEOUTS

        ALL RELOCATION ERRORS ARE IN THE FOLLOWING FORMAT:

        XXXXX RELOCATION ERROR AT LOCATION YYYYY

        XXXXX = THE PROGRAM ADDRESS WHERE THE ERROR JMS OCCURRED.
                (INCLUDES FIELD)

        YYYYY = THE ADDRESS OF THE LOCATION IN ERROR (INCLUDES FIELD)

        NOTE: AFTER EACH ERROR PRINT-OUT THE PROGRAM CONTINUES
                ON WITH THE NEXT SEQUENTIAL MEMORY LOCATION.

5. RESTRICTIONS

5.1 STARTING RESTRICTIONS

THE PROGRAM MAY BE RESTARTED AT ANY TIME FROM LOCAION 0200
OF THE STACK THE PROGRAM IS PRESENTLY IN.

5.2 OPERATING RESTRICTIONS

NONE

6. EXECUTION TIME

THE TIME FOR ONE COMPLETE PASS IS APPROXIMATELY 1 MIN 15 SEC.

7. PROGRAM DESCRIPTION

7.1 GENERAL

THE VT78 MOS MEMORY TEST IS DESIGNED TO DETECT ANY LOCATION THAT
CANNOT BE UNIQUELY ADDRESSED. FUNCTIONAL AND DYNAMIC TEST
ARE PERFORMED BY THE DIAGNOSTIC(SEE 7.2 AND 7.3).
ALL OPERATOR INTERACTION IS DONE USING THE
CONSOLE PACKAGE (SEE SECTION 8).

THE PROGRAM AUTOMATICALLY RELOCATES ITSELF TO EACH MEMORY
FIELD UNDER TEST TO ENSURE THAT ALL FIELDS MAY BE CORRECTLY
REFERENCED FROM ANY FIELD. THE PROGRAM WILL NOT RELOCATE
INTO A KNOWN BAD FIELD.

CONTROL OF THE PROGRAM IS GIVEN TO THE OPERATOR BY MEANS OF THE
PSEUDO SWITCH REGISTER(PSR). THE OPERATOR MAY HALT AFTER ERROR,
INHIBIT ERROR PRINTOUTS, LOOP ON ERROR OR TESTS,
HALT AFTER PASS, SELECT ALL OR ANY OF THE TESTS,
AND AT ANY TIME RESTART THE PROGRAM USING THE CONSOLE PACKAGE.

7.2 FUNCTIONAL TEST

THE TEST USED TO TEST THE FUNCTIONALITY OF
THE MEMORY IS THE MARCH TEST. THE TEST RUNS ALL FIELDS IN THE

SYSTEM REGARDLESS OF OPERATOR SPECIFICATIONS.
THIS TEST ENSURES THAT A ONE AND A ZERO CAN BE WRITTEN
INTO EACH MEMORY CELL.

7.3   DYNAMIC TEST

THE PROGRAM CONTAINS THREE DYNAMIC TESTS WHICH CHECK
FOR MULTIPLE SELECTION OF ADDRESS DECODERS,
SLOW RECOVERY OF SENSE AMPLIFIERS, AND READ ACCESS TIME.

7.4   PROGRAM RELOCATION

PROGRAM RELOCATION IS CONTROLLED BY THE PROGRAM.
THE PROGRAM INITIALLY TESTS ALL STACKS EXCEPT FOR THE ONE
IT WAS LOADED IN. IT THEN RELOCATES TO THE NEXT HIGHEST
ERROR FREE STACK, AND TEST ALL OTHER STACKS AGAIN.
THIS IS REPEATED UNTIL THE PROGRAM HAS BEEN
RELOCATED INTO EVERY ERROR FREE STACK. ONCE
RESIDING IN THE HIGHEST STACK IN THE SYSTEM
THE PROGRAM RELOCATES TO THE LOWEST ERROR FREE STACK.

THE PROGRAM PROVIDES A DEGREE OF PROTECTION FOR ITSELF BY
REMEMBERING ALL STACKS WHERE ERRORS OCCUR. WHEN A FAULTY
STACK IS NEXT IN SEQUENCE TO CONTAIN THE PROGRAM, THE PROGRM
WILL SKIP THE FAULTY STACK AND RELOCATE TO THE NEXT HIGHEST
ORDER STACK WHICH IS ERROR FREE. IF ALL OTHER SELECTED
STACKS ARE FAULTY, PROGRAM RELOCATION WILL NOT TAKE PLACE.

DURING RELOCATION A COMPARISON CHECK IS MADE TO INSURE
NO PROGRAM LOSS

FOR FURTHER UNDERSTANDING OF HOW THE TESTS ARE PERFORMED,
REFER TO THE LISTING.

8.0 CONSOLE PACKAGE ADDENDUM

8.1 DESCRIPTION

A CONSOLE PACKAGE HAS BEEN ADDED TO THIS DIAGNOSTIC TO ALLOW
THE PROGRAM TO RUN WITH NO HARDWARE SWITCH REGISTER AND TO
HAVE COMMUNICATIONS WITH THE DIAGNOSTIC VIA A TERMINAL.
THE CONSOLE PACKAGE ALLOWS THE OPERATOR CONTROL OF
THE DIAGNOSTIC THROUGH THE TERMINAL. THE DIAGNOSTIC
WILL ASK FOR THE VALUE OF THE PSEUDO SWITCH REGISTER
BEFORE CONTINUING WITH THE EXECUTION OF THE DIAGNOSTIC. ALL
ERRORS AND PASS COMPLETES WILL BE PRINTED AT THE TERMINAL.
NO HALTS WILL BE EXECUTED.

8.2 PROGRAM START

THE PROGRAM WILL TYPEOUT A HEADING AND THEN PRINT
SR=XXXX. XXXX IS THE VALUE OF THE SWITCH REGISTER
USED. SELECT A VALUE TO USE FOR THE SWITCH REGISTER
FROM THE SWITCH REGISTER TABLE BELOW
AND INPUT THE NUMBER USING THE CONSOLE
KEYBOARD. TYPING IN FOUR DIGITS WILL CAUSE THE
PROGRAM TO ECHO THE NEW VALUE OF THE SWITCH REGISTER
AND START THE PROGRAM. TYPING A CARRIAGE RETURN
AFTER INPUTTING A DIGIT WILL ALSO CAUSE THE PROGRAM
TO ECHO THE NEW VALUE OF THE SWITCH REGISTER AND
START THE PROGRAM. IF IT IS NOT DESIRED TO CHANGE
THE SWITCH REGISTER VALUE, A CARRIAGE RETURN CAN
BE TYPED AND THE PROGRAM WILL BE STARTED WITHOUT
ECHOING THE SWITCH REGISTER VALUE.

PSEUDO SWITCH REGISTER

4000	BIT 0=1	INHIBIT ERROR HALT
2000	BIT 1=1	LOOP ON ERROR
1000	BIT 2=1	LOOP ON TEST
0400	BIT 3=1	HALT ON COMPLETION OF PROGRAM PASS
0200	BIT 4=1	INHIBIT ERROR TYPEOUT
0100	BIT 5=1	DON'T RUN MARCH TEST
0040	BIT 6=1	DON'T RUN DYNAMIC TESTS
0020	BIT 7=1	RING BELL ON ERROR

8.3   CONTROL CHARACTERS

8.3.1   CONTROL G

TO GAIN CONTROL OF THE CONSOLE SWITCH REGISTER PACKAGE
WHILE RUNNING THE PROGRAM, A CONTROL G MUST BE TYPED IN
ON THE CONSOLE TERMINAL. WHEN CONTROL G IS TYPED THE PROGRAM
WILL RESPOND BY TYPING AN UP ARROW THEN G FOLLOWED BY
SR=XXXX. XXXX IS THE PRESENT CONTENTS OF THE PSEUDO SWITCH
REGISTER. THE OPERATOR CAN NOW CHANGE THE SETTING OF THE
SWITCH REGISTER BY TYPING IN A NEW NUMBER OR NOT
CHANGE IT BY TYPING IN A CARRIAGE RETURN. TYPING IN
FOUR DIGITS WILL CAUSE THE PROGRAM TO ECHO THE SWITCH
REGISTER VALUE TYPED AND CONTINUE THE PROGRAM USING THE
VALUE TYPED AS THE NEW SWITCH REGISTER. TYPING IN ONE
TO THREE DIGITS FOLLOWED BY A CARRIAGE RETURN WILL ALSO
CAUSE THE PROGRAM TO ECHO THE NEW VALUE OF THE SWITCH REGISTER
TYPED AND CONTINUE THE PROGRAM. TYPING ONLY A CARRIAGE RETURN
WILL CAUSE THE PROGRAM TO CONTINUE WITHOUT CHANGING THE SWITCH
REGISTER, AND THE PROGRAM WILL NOT ECHO THE SWITCH REGISTER
VALUE. BY TYPING A LINE FEED, THE PROGRAM WILL BE RELOCATED
BACK TO THE ORIGINAL PROGRAM FIELD AND RESTARTED.
  TYPING A CONTROL C WILL CAUSE THE PROGRAM TO
RETURN TO THE OPERATING SYSTEM (OS/8) AT 7600 IN FIELD 0.
ILLEGAL CHARACTERS TYPED WILL RESULT IN THE CHARACTER BEING
ECHOED FOLLOWED BY A QUESTION MARK AND THE SWITCH REGISTER
MESSAGE BEING RETYPED.

8.3.2 CONTROL S

THIS IS A CONTROL CHARACTER TO STOP SENDING DATA TO A TERMINAL.
IT IS USUALLY A FUNCTION OF THE TERMINAL AND IS AUTOMATICALLY
SENT WHEN THE TERMINAL BUFFER IS FULL. THE BUFFER IS EMPTIED
AS THE DATA IS PRINTED. AFTER ALL THE DATA IN THE TERMINAL
BUFFER IS PRINTED THE TERMINAL SENDS A CONTROL Q (START SENDING
DATA TO TERMINAL). THE CONTROL S IS NOT ECHOED.

BY TYPING A CONTROL S WHILE RUNNING THE DIAGNOSTIC, THE PROGRAM,
WHEN THE CONTROL S IS RECOGNIZED, WILL WAIT FOR A CONTROL Q
TO CONTINUE THE PROGRAM, A LINE FEED TO RESTART THE PROGRAM,
OR A CONTROL C TO RETURN TO THE OPERATING SYSTEM.

8.3.3 CONTROL Q

THIS CONTROL CHARACTER IS TO RESUME SENDING DATA TO THE
TERMINAL. IT IS USUALLY SENT AUTOMATICALLY BY A TERMINAL
WHEN IT IS READY TO ACCEPT MORE DATA. THIS CONTROL CHARACTER
IS NOT ECHOED.

BY TYPING A CONTROL Q AFTER A CONTROL S HAS BEEN TYPED, THE
PROGRAM WILL CONTINUE FROM WHERE IT WAS INTERRUPTED FROM.

8.3.4 CONTROL C

THIS CONTROL CHARACTER IS USED TO RETURN CONTROL BACK TO
AN OPERATING SYSTEM KEYBOARD MONITOR. THE OPERATING SYSTEM
SELECTED FOR THE PDP-8 IS THE OS/8 SYSTEM WITH ITS BOOTSTRAP
LOCATED IN THE LAST PAGES OF FIELD 0 AND 1. WHEN THIS
CONTROL CHARACTER IS RECOGNIZED, THE PROGRAM WILL ECHO THE
CONTROL CHARACTER AS AN UP ARROW THEN C, RESTORE THE LAST
PAGE OF FIELD 0 AND 1, AND JUMP TO LOCATION 7600 IN FIELD 0.

8.3.5 ILLEGAL CHARACTERS

A CHARACTER TYPED ON THE KEYBOARD, OTHER THAN A CONTROL G,
CONTROL S, OR A CONTROL C, WILL RESULT IN THE CHARACTER BEING
ECHOED FOLLOWED BY A QUESTION MARK AND THE PROGRAM WILL BE
CONTINUED.

8.4   END OF PASS REPORTING

        THERE WILL BE AN END OF PASS MESSAGE CONTAINING THE DIAGNOSTIC
        NAME, THE END OF PASS MESSAGE AND AN OCTAL NUMBER OF PASSES.

9.   APT NOTES

ALL OF THE FOLLOWING NOTES APPLY ONLY WHEN THE PROGRAM IS
BEING RUN ON AN APT SYSTEM.

1.   FOR MORE INFORMATION SEE THE FOLLOWING DOCUMENTS.

   A.   STANDARD APT SYSTEM TO PDP8 DIAGNOSTIC INTERFACE.

   B.   APT SYSTEM MANAGERS GUIDE.

2.   IF BIT 0 OF HCW1(LOC 21) IS A '1' THEN THE PROGRAM
        WILL BE RUN UNDER APT CONTROL. ALL OUTPUT
         FROM THE PROGRAM WILL BE SUPPRESSED.

3.   APT IS NOTIFIED THAT THE PROGRAM IS RUNNING WITHOUT
        ERRORS BETWEEN EVERY .2 SECONDS AND 4.0 SECONDS.

4.   ERRORS:

        ALL ERRORS CALL APT.
        ONLY THE ERROR PC IS REPORTED TO APT-8.
        THE TYPE OF ERROR CAN BE DETERMINED
        FROM THE CORRESPONDING ADDRESS IN THE
        PROGRAM LISTING.

LISTING

```
        1                           /DKVTAA MOS MEMORY DIAGNOSTIC  MAINDEC-08-DKVTA-A-D
        2                           /16K MOS MEMORY TEST FOR VT78 (VER A)
        3                           /COPYRIGHT 1977 DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS 01754
        4                           /PROGRAMMER:  ROBERT J LECOQ
        5                           /
        6                           /
        7                           /
        8                           /
        9                           /
       10                           /
       11                           /
       12                           /
       13                           /IOT COMMANDS
       14           6201            CDF0=6201           /CHANGE TO DATA FIELD 0
       15           6211            CDF1=6211           /CHANGE TO DATA FIELD 1
       16           6221            CDF2=6221           /CHANGE TO DATA FIELD 2
       17           6231            CDF3=6231           /CHANGE TO DATA FIELD 3
       18           6203            CBF0=6203           /CHANGE TO DATA AND INSTRUCTION FIELD 0
       19           6213            CBF1=6213           /CHANGE TO DATA AND INSTRUCTION FIELD 1
       20           6223            CBF2=6223           /CHANGE TO DATA AND INSTRUCTION FIELD 2
       21           6233            CBF3=6233           /CHANGE TO DATA AND INSTRUCTION FIELD 3
       22           6214            RDF=6214            /READ DATA FIELD INTO AC BITS 6-8
       23           6224            RIF=6224            /READ INSTRUCTION FIELD INTO AC BITS 6-8
       24
       25
       26
       27
       28
       29           0000            *0
       30   0000    0301                    301
       31   0001    5001                    JMP .
       32
       33
       34           0020            *20
       35
       36   0020    0000            PSR,    0                   /PSEUDO SWITCH REGISTER
       37                                                       /4000 BIT 0=1 INHIBIT ERROR HALT
       38                                                       /2000 BIT 1=1 LOOP ON ERROR
       39                                                       /1000 BIT 2=1 LOOP ON TEST
       40                                                       /0400 BIT 3=1 HALT ON COMPLETION OF PROGRAM PASSES
       41                                                       /0200 BIT 4=1 INHIBIT ERROR TYPEOUT
       42                                                       /0100 BIT 5=1 DON'T RUN MARCH TEST
       43                                                       /0040 BIT 6=1 DON'T RUN DYNAMIC TEST
       44                                                       /0020 BIT 7=1 BELL ON ERROR
       45   0021    4017            HCW1,   4017        /APT/ LAST TWO DIGITS INDICATE MEMORY SIZE
       46   0022    0000            HCW2,   0           /APT/
       47   0023    7000                    NOP
       48
       49           4424            LISN=JMS I .
       50   0024    2675                    XLISN
       51           4425            PRNTMS=JMS I .
       52   0025    3000                    MESAGX
       53           4426            ONEOCT=JMS I .
       54   0026    2601                    ONEOCK
       55           4427            TWOOCT=JMS I .
```

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       56   0027    2611                    TWOOCK
       57           4430            PRNT1=JMS I .
       58   0030    3066                    XPRNT1
       59           4431            FOROCT=JMS I .
       60   0031    3037                    FOROCK
       61           4432            PRNT2=JMS I .
       62   0032    2624                    XPRNT2
       63           4433            PRNT4=JMS I .
       64   0033    3053                    XPRNT4
       65           4434            SPACE2=JMS I .
       66   0034    2667                    SPACX2
       67           4435            TYPE=JMS I .
       68   0035    2635                    XTYPE
       69           4436            CRLF=JMS I .
       70   0036    2652                    XCRLF
       71
       72
       73
       74                           /
       75                           /CONSTANTS AND POINTERS
       76   0037    7777            HEAD1,  7777                /ERROR HEADING CONTROL
       77   0040    0000            TESTAD, 0                   /TEST ADDRESS COUNTER
       78   0041    0000            TOPSTK, 0                   /HIGHEST ACTUAL STACK IN SYSTEM
       79   0042    0000            STKPIN, 0                   /STACK PROG IS IN 00X0
       80   0043    0000            STKTST, 0                   /STACK SEL FOR TEST 00X0
       81   0044    0000            BDATA,  0                   /BAD DATA
       82   0045    0000            GDATA,  0                   /GOOD DATA
       83   0046    0000            MOVE,   0                   /RELOCATION ADDRESS
       84   0047    0000            COUNT,  0                   /ERROR COUNTER
       85   0050    0000            COLCNT, 0                   /COLUMN COUNTER - DYNAMIC TEST
       86   0051    0200            CONST,  200                 /EITHER + OR - 200   DYNAMIC TESTS
       87
       88
       89   0052    7741            M37,    -37
       90   0053    7703            M75,    -75
       91   0054    0002            K2,     2
       92   0055    0003            K3,     3
       93   0056    0007            K7,     7
       94   0057    0010            K10,    10
       95   0060    0020            K20,    20
       96   0061    0030            K30,    30
       97   0062    0077            K77,    77
       98   0063    0100            K100,   100
       99   0064    0200            K200,   200
      100   0065    0207            K207,   207
      101   0066    0212            K212,   212
      102   0067    0215            K215,   215
      103   0070    0240            K240,   240
      104   0071    0260            K260,   260
      105   0072    0261            K261,   261
      106   0073    1000            K1000,  1000
      107   0074    4000            K4000,  4000
      108   0075    4060            K4060,  4060
      109   0076    6201            K6201,  6201        /CDF 0
      110   0077    6203            K6203,  6203
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111   0100  7577   K7577,  7577
112   0101  7600   K7600,  7600          /DYNAMIC TEST
113   0102  7700   K7700,  7700          /DYNAMIC TEST
114   0103  1713   XSTOP,  STOP          /STOP ROUTINE POINTER
115
116
117   0104  2523   KSFCHK, CHKKSF
118   0105  2255   IAPTER, APTER         /APT/
119   0106  2234   IAPTOK, APTOK         /APT/
120
121         0200           *200
122                /
123                /VT78 MOS MEMORY TEST
124                /
125
126   0200  7300   START,  CLA CLL
127   0201  6002           IOF              /TURN INTERRUPT OFF
128   0202  1022           TAD HCW2
129   0203  7710           SPA CLA          /RUN UNDER APT CONTROL?
130   0204  5777'          JMP XAPT         /YES - SET UP FOR APT
131   0205  4776'          JMS SAVOS8       /NO - SAVE OS8 HANDLER
132   0206  6224   XSTRT,  RIF
133   0207  1076           TAD K6201
134   0210  3216           DCA PRGSTK       /MAKE INSTR FIELD = DATA FIELD
135   0211  4425           PRNTMS
136   0212  0314           TITLE            /TYPEOUT PROGRAM TITLE
137                /APT/   IF UNDER APT CONTROL NEXT LOC WILL = NOP,
138
139                APTN00,                  /APT/
140
141   0213  4775'          JMS     PSEUDO /TYPEOUT PSEUDO SWITCH REGISTER
142   0214  7300   BEGIN,  CLA CLL
143   0215  4504           JMS I KSFCHK     /CHECK IF CONSOLE ACTIVE
144   0216  6201   PRGSTK, CDF0
145   0217  1021           TAD HCW1
146   0220  0257           AND K34          /SELECT TOP STACK=USUALLY 16K
147   0221  7012           RTR
148   0222  3041           DCA TOPSTK
149                /APT/   IF UNDER APT CONTROL NEXT LOC WILL = NOP,
150                APTN01,
151   0223  4774'          JMS TSTSYS       /TYPE NUMBER OF STACKS IN SYSTEM
152   0224  4425           PRNTMS
153   0225  0331           PREL             /TYPE PROGRAM WILL RELOCATE
154   0226  3276           DCA PASCNT
155   0227  4277           JMS INIT         /CLEAR FIELD STATUS LIST
156   0230  1041   NXTPAS, TAD TOPSTK
157   0231  7040           CMA

158   0232  3256           DCA KOUNT
159   0233  7240           STA
160   0234  3037           DCA HEAD1        /RESET ERROR HEADING
161   0235  6224   TEST,   RIF
162   0236  3042           DCA STKPIN       /SET UP CURRENT PROGRAM FIELD
163   0237  4425           PRNTMS
164   0240  0546           PRFLD            /TYPE PROGRAM FIELD MESSAGE
165   0241  6224           RIF
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166   0242  7112           RTR CLL
167   0243  7010           RAR
168   0244  1071           TAD K260         /FIELD PROGRAM IN
169   0245  4435           TYPE
170   0246  4436           CRLF
171   0247  4773'          JMS MOSTST       /GO EXECUTE MARCH TEST
172   0250  4772'          JMS DYNTST       /GO EXECUTE DYNTESTS
173   0251  4771'          JMS RELO         /GO RELOCATE PROGRAM
174   0252  2256           ISZ KOUNT        /HAVE WE RELOCATED TO ALL FIELDS YET?
175   0253  5235           JMP TEST         /NO
176   0254  4260           JMS PCOUNT       /YES - DONE ONE PASS
177   0255  5230           JMP NXTPAS
178   0256  0000   KOUNT,  0
179   0257  0034   K34,    34
180
181
182                /
183   0260  0000   PCOUNT, 0
184                /APT/   IF UNDER APT CONROL NEXT LOC WILL = JMS I IAPTOK,
185
186   0261  4504   APTOK0, JMS  I   KSFCHK       /THIS LOC OVERLAID IF APT
187   0262  7000           NOP                   /
188   0263  4425           PRNTMS                /PRINT END OF PASS MESSAGE
189   0264  0345           PASMES                /POINTER TO MESSAGE
190   0265  2276           ISZ     PASCNT        /ADD 1 TO THE PASS COUNTER
191   0266  1276           TAD     PASCNT        /GET THE COUNTER
192   0267  4433           PRNT4                 /PRINT THE 4 OCTAL DIGITS
193   0270  4436           CRLF
194   0271  1020           TAD PSR
195   0272  0371           AND (400     /HALT ON PASS COMPLETION?
196   0273  7640           SZA CLA
197   0274  4775'          JMS PSEUDO   /YES - GO ASK SWITCH REGISTER
198   0275  5660           JMP I   PCOUNT /NO - RETURN
199
200   0276  0000   PASCNT, 0
201
202                /ROUTINE TO CLEAR FIELD STATUS LIST (FLDLST)
203                /
204   0277  0000   INIT,   0
205   0300  1313           TAD M7
206   0301  3312           DCA CLRCNT       /SETUP COUNTER TO MINUS 7
207   0302  1370           TAD (FLDLST      /GET ADDRESS OF LIST
208   0303  3311           DCA CLRLST       /SAVE IT
209   0304  3711           DCA I CLRLST     /CLEAR CONTENTS OF ADDRESS
210   0305  2311           ISZ CLRLST       /NEXT ADDRESS
211   0306  2312           ISZ CLRCNT       /ARE WE DONE?
212   0307  5304           JMP .-3          /NO - DO NEXT ADDRESS
213   0310  5677           JMP I INIT       /YES - RETURN
214
215   0311  0000   CLRLST, 0
216   0312  0000   CLRCNT, 0        /MINUS NUMBER OF POSSIBLE STACKS
217   0313  7771   M7,     -7
218
219   0314  4343   TITLE,  TEXT             "**DKVTAA MOS MEMORY TEST#"
      0315  0413
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```
         0316  2624
         0317  0101
         0320  4015
         0321  1723
         0322  4015
         0323  0515
         0324  1722
         0325  3140
         0326  2405
         0327  2324
         0330  4300
220      0331  2022     PREL,   TEXT                    "PROGRAM WILL RELOCATE##"
         0332  1707
         0333  2201
         0334  1540
         0335  2711
         0336  1414
         0337  4022
         0340  0514
         0341  1703
         0342  0124
         0343  0543
         0344  4300
221      0345  4304     PASMES, TEXT                    "#DKVTAA = END OF PASS "
         0346  1326
         0347  2401
         0350  0140
         0351  5540
         0352  0516
         0353  0440
         0354  1706
         0355  4020
         0356  0123
         0357  2340
         0360  0000
222
223      0370  1725
224      0371  0400
225      0372  1010
226      0373  0600
227      0374  0523
228      0375  2440
229      0376  2267
230      0377  2277
         0400              PAGE
231
232                   /


233                   /
234                   /
235                   /RELOCATE THE PROGRAM
236                   /
237      0400  0000   RELO,   0
238      0401  7300           CLA CLL
239      0402  3047           DCA     COUNT           /CLEAR ERROR COUNTER
240      0403  4243           JMS BADSTK              /GO CHECK IF STACK IS GOOD
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241      0404  1300           TAD NXSTK               /SETUP STACK TO MOVE INTO
242      0405  7106           RTL CLL
243      0406  7004           RAL
244      0407  1076           TAD K6201
245      0410  3224           DCA RELO2               /MODIFY CDF INSTRUCTION AT LOC RELO2
246      0411  1042           TAD STKPIN              /SETUP STACK MOVING FROM
247      0412  1076           TAD K6201
248      0413  3222           DCA RELO1
249      0414  1222           TAD RELO1
250      0415  3227           DCA RELO3
251      0416  1224           TAD     RELO2
252      0417  1054           TAD     K2
253      0420  3241           DCA     RELO4
254      0421  3046           DCA     MOVE
255      0422  6201   RELO1,  CDFO                    /MOVE FROM DATA FIELD
256      0423  1446           TAD I   MOVE            /GET WORD
257      0424  6201   RELO2,  CDFO                    /MOVE TO DATA FIELD
258      0425  3446           DCA I   MOVE            /SAVE IT
259      0426  1446           TAD I   MOVE
260      0427  6201   RELO3,  CDFO                    /MOVE FROM DATA FIELD
261      0430  7041           CIA
262      0431  1446           TAD I   MOVE            /WAS TRANSFER OK?
263      0432  7640           SZA CLA                 /YES = SKIP
264      0433  4777*          JMS     ERRM            /NO = MOVE ERROR
265      0434  2046           ISZ     MOVE            /DONE 4096 TIMES?
266      0435  5222           JMP     RELO1           /NO = GET NEXT WORD
267      0436  1047           TAD     COUNT
268      0437  7640           SZA CLA                 /SKIP IF NO MOVE ERROR
269      0440  5600           JMP I RELO      /RETURN =WITHOUT CHANGING TO NEW DATA FIELD
270      0441  6203   RELO4,  CBFO                    /CHANGE TO NEW PROG FIELD
271      0442  5600           JMP   I RELO
272                   /
273
274
275                   /ROUTINE TO INHIBIT RELOCATION INTO BAD STACK
276                   /
277
278      0443  0000   BADSTK, 0
279      0444  1042           TAD STKPIN              /STACK PROGRAM IS IN
280      0445  7012           RTR
281      0446  7010           RAR
282      0447  3300           DCA NXSTK
283      0450  1041           TAD TOPSTK              /GET HIGHEST STACK IN SYSTEM
284      0451  7041           CIA
285      0452  3301           DCA BADCNT              /SET UP BAD FIELD COUNTER
286      0453  1041   X,      TAD TOPSTK              /TOP STACK
287      0454  7041           CIA
288      0455  1300           TAD NXSTK
289      0456  7650           SNA CLA                 /ARE WE AT HIGHEST STACK
290      0457  5275           JMP ATTOP               /YES
291      0460  2300           ISZ NXSTK               /NO
292      0461  1300           TAD NXSTK
293      0462  1376   CHECK,  TAD (FLDLST             /LIST CONTAINING STATUS OF FIELDS TESTED
294      0463  3277           DCA BADPTR              /SAVE POINTER
295      0464  1677           TAD I BADPTR
```

```
296   0465  7650            SNA CLA          /IS FIELD SELECTED GOOD?
297   0466  5643            JMP I BADSTK     /YES = RETURN
298
299   0467  2301            ISZ BADCNT       /NO= SKIP IF ALL FIELDS TEST BAD
300   0470  5253            JMP X            /= TRY NEXT STACK
301   0471  4425            PRNTMS
302   0472  0502            ALLBAD
303   0473  4775'           JMS PSEUDO       /GO ASK SW REG QUESTION.
304   0474  5201            JMP RELO+1       /TRY AGAIN
305
306   0475  3300    ATTOP,  DCA NXSTK        /SET FOR FIELD 0
307   0476  5262            JMP CHECK
308
309   0477  0000    BADPTR, 0
310   0500  0000    NXSTK,  0
311   0501  0000    BADCNT, 0
312
313   0502  0301    ALLBAD, TEXT             "CANNOT RELOCATE INTO ANY FIELD!!#"
      0503  1616
      0504  1724
      0505  4022
      0506  0514
      0507  1703
      0510  0124
      0511  0540
      0512  1116
      0513  2417
      0514  4001
      0515  1631
      0516  4006
      0517  1105
      0520  1404
      0521  4141
      0522  4300
314           /
315           /
316           /TYPEOUT NUMBER OF STACKS IN SYSTEM
317           /
318   0523  0000    TSTSYS, 0
319   0524  1041            TAD     TOPSTK
320   0525  1072            TAD K261
321   0526  4435            TYPE                     /TYPEOUT NUMBER
322   0527  4425            PRNTMS
323   0530  0532            STACKS
324   0531  5723            JMP I   TSTSYS
325
326   0532  4023    STACKS, TEXT         " STACKS IN THIS SYSTEM#"

      0533  2401
      0534  0313
      0535  2340
      0536  1116
      0537  4024
      0540  1011
      0541  2340
      0542  2331
```

```
      0543  2324
      0544  0515
      0545  4300
327
328   0546  2022    PRFLD,  TEXT             "PROG FIELD = "
      0547  1707
      0550  4006
      0551  1105
      0552  1404
      0553  4075
      0554  4000
329
330   0575  2440
331   0576  1725
332   0577  2000
      0600            PAGE
333           /
334           /THE FOLLOWING TEST IS A MARCH PATTERN DEVELOPED FOR TESTING
335           /THE MS8=C MOS MEMORY. THE TEST RUN ALL FIELDS IN THE SYSTEM.
336           /
337           /       THE TEST SELECTED FOR THE MOS MEMORY TESTING IS A TYPICAL MARCH
338           /       PATTERN. THE TEST BEGINS BY LOADING THE ENTIRE MEMORY WITH
339           /       A 2525 PATTERN. THEN STARTING AT ADDRESS ZERO OF LOWEST POSSIBLE
340           /       FIELD THE TEST READS THE CONTENTS, COMPARES IT, AND THEN WRITES BACK
341           /       THE COMPLIMENT VALUE. THE PROCESS IS REPEATED THROUGHOUT THE ENTIRE
342           /       MEMORY.
343           /
344           /       NEXT THE PROCESS REPEATS FROM MAXIMUN TO MINIMUM, COMPLIMENTING
345           /       AS IT IS BEING DONE.
346           /
347           /       THE ENTIRE SEQUENCE IS THEN REPEATED USING A BACKGROUND OF
348           /       5252. THIS INSURES THAT A ONE AND A ZERO CAN BE WRITTEN INTO
349           /       EACH MEMORY CELL.
350           /
351           /
352   0600  0000    MOSTST, 0
353   0601  1020            TAD     PSR          /SEE IF MOSTST TO BE RUN
354   0602  0063            AND     K100
355   0603  7640            SZA CLA              /MOSTST TO BE RUN
356   0604  5600            JMP I   MOSTST       /NO. EXIT
357   0605  4425            PRNTMS
358   0606  1600            MARCH                /PRINT MARCH TEST MESSAGE
359   0607  7344            CLL CLA CMA\RAL      /=2
360   0610  3372            DCA     PATCNT       /SET UP LOOP COUNTER FOR BACK GROUND PATTERN
361   0611  4777'           JMS     SETPAT       /GO SETUP INITIAL VALUE OF PAT1 & PAT2
362   0612  3040    MOSLOD, DCA     TESTAD       /START WITH ADDRESS ZERO
363   0613  1041            TAD     TOPSTK       /GET MAX VALUE IN SYSTEM.
364   0614  7040            CMA
365   0615  3365            DCA     FLDCNT       /SAVE FOR LOOP COUNTER.
366   0616  7344            CLL CLA CMA RAL      /=2
367   0617  3370            DCA     TSTCNT
368   0620  3043            DCA     STKTST       /START WITH FIELD ZERO
369   0621  1042            TAD     STKPIN
370   0622  1076            TAD     K6201        /SET UP RETURN DATA FIELD
371   0623  3234            DCA     MOSFLD
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372   0624  4776'   MOSLUP, JMS     SAME        /SEE IF STACK SELECTED IS SAME AS
373                                              /PROGRAM FIELD.
374   0625  5243            JMP     STKUPD       /SAME STACK AS PROGRAM, JUST UPDATE THE
375                                              /FIELD TO NEXT ONE SELECTED.
376   0626  1043            TAD     STKTST       /SET UP STACK TO LOAD.
377   0627  1076            TAD     K6201
378   0630  3232            DCA     .+2          /LOAD BACKGROUND PATTERN INTO
379   0631  1373    MEMLOD, TAD     PAT1         /STACK SELECTED.
380                                              /THIS IS CHANGED TO LOAD STACK.
381   0632  6201            CDF
382   0633  3440            DCA I   TESTAD       /CHANGED BACK TO STACK OF PROGRAM.
383   0634  6201    MOSFLD, CDF
384   0635  1040            TAD     TESTAD       /UPDATE TEST ADDRESS
385   0636  7001            IAC
386   0637  3040            DCA     TESTAD
387   0640  1040            TAD     TESTAD       /HAS IT GONE BACK TO ZERO YET?
388   0641  7640            SZA CLA              /NO, GO BACK AND DO NEXT ADDRESS
389   0642  5231            JMP     MEMLOD
390                 /NOW UPDATE THE FIELD TO TEST.
391                 /
392   0643  1043    STKUPD, TAD     STKTST
393   0644  1057            TAD     K10
394   0645  3043            DCA     STKTST       /SAVE NEW OFFSET
395   0646  2365            ISZ     FLDCNT       /ALL FIELDS AVAILABLE DONE?
396   0647  5224            JMP     MOSLUP       /NO, GO DO NEXT.
397                 /AT THIS POINT ALL AVAILABLE MEMORY IS FILLED
398                 /WITH THE BACKGROUND PATTERN.
399                 /
400                 /START READING MEMORY.
401   0650  1057            TAD     K10
402   0651  3367            DCA     FLDINC       /SET UP INITIAL VALUE
403   0652  7301            CLL CLA IAC
404   0653  3366            DCA     ADDINC       /INITIAL ADDRESS VALUE
405   0654  3043            DCA     STKTST       /START WITH FIELD ZERO
406   0655  1042            TAD     STKPIN
407   0656  1076            TAD     K6201        /SET UP PROGRAM RETURN VALUE
408   0657  3300            DCA     REDFLD
409   0660  1041            TAD     TOPSTK       /SET UP LOOP COUNTER
410   0661  7040            CMA
411   0662  3365            DCA     FLDCNT
412   0663  4776'   REDLUP, JMS     SAME         /PROGRAM FIELD = TEST FIELD?
413   0664  5313            JMP     REDUPD       /YES UPDATE TO NEW FIELD
414   0665  4504            JMS I   KSFCHK       /CHECK IF CONSOLE ACTIVE
415   0666  1373            TAD     PAT1         /SET UP COMPARE VALUE
416   0667  3045            DCA     GDATA
417   0670  1043            TAD     STKTST       /SET UP FIELD TO TEST
418   0671  1076            TAD     K6201
419   0672  3273            DCA     .+1          /CHANGED TO TEST FIELD
420   0673  6201            CDF                  /GET VALUE STORED
421   0674  1440            TAD I   TESTAD
422   0675  3044            DCA     BDATA        /CHANGE VALUE IN SELECTED ADDRESS
423   0676  1374            TAD     PAT2
424   0677  3440            DCA I   TESTAD       /RESTORE TO PROGRAM FIELD
425   0700  6201    REDFLD, CDF
426   0701  1045            TAD     GDATA
```

```
427   0702  7041            CIA                  /DO COMPARE
428   0703  1044            TAD     BDATA        /ACTUAL = EXPECTED
429   0704  7640            SZA CLA              /NO REPORT AN ERROR
430   0705  4775'           JMS     MOSERR
431   0706  1040            TAD     TESTAD       /UPDATE ADDRESS TO DO
432   0707  1366            TAD     ADDINC
433   0710  3040            DCA     TESTAD       /4096 LOOPS DONE
434   0711  2371            ISZ     ADDCNT       /NO GO BACK AND REPEAT FOR ALL FIELDS
435   0712  5265            JMP     REDLUP+2
436   0713  1043    REDUPD, TAD     STKTST       /UPDATE TEST FIELD
437   0714  1367            TAD     FLDINC       /SAVE THE NEW VALUE
438   0715  3043            DCA     STKTST       /ALL FIELDS DONE YET
439   0716  2365            ISZ     FLDCNT       /NO, THEN CONTINUE
440   0717  5263            JMP     REDLUP
441   0720  1367            TAD     FLDINC       /UPDATE OFFSET
442   0721  7041            CIA
443   0722  3367            DCA     FLDINC
444   0723  1366            TAD     ADDINC
445   0724  7041            CIA                  /UPDATE ADDRESS OFFSET
446   0725  3366            DCA     ADDINC
447   0726  1366            TAD     ADDINC       /READING BACKWARDS
448   0727  7700            SMA CLA              /NO.
449   0730  5334            JMP     .+4
450   0731  1040            TAD     TESTAD       /START AT ADDRESS 7777
451   0732  1366            TAD     ADDINC
452   0733  3040            DCA     TESTAD
453   0734  1367            TAD     FLDINC       /GET TO STARTING FIELD
454   0735  1043            TAD     STKTST
455   0736  3043            DCA     STKTST       /UPDATE PATTERN
456   0737  1373            TAD     PAT1
457   0740  7040            CMA
458   0741  3373            DCA     PAT1
459   0742  1374            TAD     PAT2
460   0743  7040            CMA
461   0744  3374            DCA     PAT2
462   0745  7000    APTOK1, NOP                  /APT/
463   0746  2370            ISZ     TSTCNT       /ALL DONE THIS TEST
464   0747  5260            JMP     REDLUP-3
465   0750  1373            TAD     PAT1
466   0751  7040            CMA
467   0752  3373            DCA     PAT1
468   0753  1374            TAD     PAT2
469   0754  7040            CMA                  /SET UP NEXT PATTERN
470   0755  3374            DCA     PAT2         /SEE IF ALL DONE?
471   0756  2372            ISZ     PATCNT       /NO, GO DO NEXT PATTERN
472   0757  5212            JMP     MOSLOD       /YES
473   0760  1020            TAD     PSR          /TEST BIT 2
474   0761  0073            AND     K1000        /LOOP ON TEST?
475   0762  7640            SZA CLA              /YES - GO BACK TO START OF TEST
476   0763  5207            JMP     MOSLOD-3     /NO - RETURN TO PROGRAM.
477   0764  5600            JMP I   MOSTST
478                 /
479   0765  0000    FLDCNT, 0
480   0766  0000    ADDINC, 0
481   0767  0000    FLDINC, 0
```

```
482    0770  0000      TSTCNT,  0
483    0771  0000      ADDCNT,  0
484    0772  0000      PATCNT,  0
485    0773  2525      PAT1,    2525
486    0774  5252      PAT2,    5252
487
488    0775  1636
489    0776  1144
490    0777  1000
             1000      PAGE
491                    /SETUP INITIAL VALUE OF PAT1 AND PAT2
492                    /
493    1000  0000      SETPAT,  0
494    1001  1377               TAD      (2525           /CHECKERBOARD PATTERN
495    1002  3776'              DCA      PAT1            /SAVE IT
496    1003  1776'              TAD      PAT1
497    1004  7040               CMA                      /COMPLEMENT IT
498    1005  3775'              DCA      PAT2            /SAVE INVERTED CHECKERBOARD PATTERN
499    1006  3774'              DCA      ADDCNT
500    1007  5600               JMP I    SETPAT          /RETURN TO PROGRAM
501                    /
502                    /THE FOLLOWING TESTS ARE DYNAMIC TEST WHICH CHECK FOR
503                    /MULTIPLE SELECTION OF ADDRESS DECODERS, SLOW
504                    /RECOVERY OF SENSE AMPLIFIERS, AND READ ACCESS TIME.
505                    /
506                    /
507                    /
508                    /DYNTST 1
509                    /     1) LOAD BACKGROUND PATTERN OF 4100 (JMS 100) IN ENTIRE MEMORY
510                    /     2) LOAD 5700 (JMP I 100) IN FIRST ADDRESS OF EACH PAGE,
511                    /        EXCEPT PAGE ZERO.
512                    /     3) LOAD INDIRECT ADDRESSING DATA IN LOC 100 OF EACH PAGE.
513                    /     4) LOAD RETURN AND ERROR RETURN CODE INTO EACH FIELD UNDER TEST
514                    /     5) AFTER CHECKING IF STACK SELECTED TO BE TESTED IS GOOD,
515                    /        NO HARD ERRORS, THE CODE IS EXECUTED IN EACH TEST FIELD.
516                    /     6) THIS PROCESS IS REPEATED 63 TIMES, INCREMENTING THE COLUMN
517                    /        BITS EACH TIME.
518                    /     7) THIS TEST IS ESPECIALLY GOOD FOR CHECKING SLOW RECOVERY
519                    /           TIME IN SENSE AMPS OF BITS 6=11.
520                    /
521                    /DYNTST 2
522                    /     1) THIS TEST DOES THE SAME THING AS DYNTST 1 EXCEPT INSTEAD
523                    /        OF JUMPING IN A FORWARD DIRECTION, IT JUMPS BACK AND
524                    /        FORTH FROM BOTTOM TO TOP OF MEMORY TOWARDS THE MIDDLE.
525                    /     2) THIS TEST IS ESPECIALLY GOOD FOR CHECKING ADDRESS
526                    /        DECODER OF BITS 0=5.
527                    /
528                    /DYNTST 3
529                    /     1) LOADS ALL MEMORY UNDER TEST WITH 4100 (JMS 100).
530                    /     2) LOADS LOC'S 0=76 WITH JMP INSTRUCTIONS.
531                    /     3) LOADS RETURN AND ERROR RETURN CODE, THEN EXECUTES IT.
532                    /     4) DOES ONLY 1 PASS.
533                    /     5) THIS TEST IS ESPECIALLY GOOD FOR CHECKING ADDRESS
534                    /        DECODER OF BITS 6=11.
535                    /
```

```
536                    /
537    1010  0000      DYNTST,  0
538    1011  7300               CLA CLL
539    1012  6224               RIF
540    1013  1076               TAD      K6201
541    1014  3215               DCA      .+1
542    1015  6201               CDF                      /MAKE IF FLD= DF FLD
543    1016  1020               TAD      PSR             /SEE IF DYNTST TO BE RUN
544    1017  0373               AND      (40
545    1020  7640               SZA CLA                  /DYNTST TO BE RUN
546    1021  5610               JMP I    DYNTST          /NO. EXIT
547    1022  4425               PRNTMS
548    1023  1606               PRDYN                    /PRINT DYNAMIC TEST MESSAGE
549    1024  1072               TAD      K261            /#1
550    1025  4435               TYPE
551    1026  4436               CRLF
552    1027  1372               TAD      (NXTTST         /SETUP TEST POINTER
553    1030  3357               DCA      TSTPTR
554    1031  1101               TAD      K7600
555    1032  3353               DCA      STRTAD          /SETUP START ADDRESS FOR RETURN
556    1033  1064               TAD      K200
557    1034  3051               DCA      CONST           /SETUP CONSTANT
558    1035  1064               TAD      K200
559    1036  3360               DCA      TSTORG          /START POINT OF CODE IN TEST FIELD
560    1037  3040      XDYN1,   DCA      TESTAD          /START WITH ADDRESS ZERO
561    1040  7000      APTOK2,  NOP                      /OVERWRITTEN WHEN RUNNING UNDER APT
562    1041  3050               DCA      COLCNT          /CLEAR COLUMN COUNTER
563    1042  1371               TAD      (5700           /DYNTST 1 AND 2
564    1043  3354               DCA      INST            /SETUP INITIAL JMP I INSTRUCTION
565    1044  1042               TAD      STKPIN
566    1045  1076               TAD      K6201           /SET UP RETURN DATA FIELD
567    1046  3770'              DCA      PSTK1
568    1047  1041      XDYN2,   TAD      TOPSTK          /GET MAX VALUE IN SYSTEM.
569    1050  7040               CMA
570    1051  3355               DCA      STKKNT          /SAVE FOR LOOP COUNTER.
571    1052  1355               TAD      STKKNT
572    1053  3356               DCA      STKKT1
573    1054  3043               DCA      STKTST          /START WITH FIELD ZERO
574    1055  4344      XDYN3,   JMS      SAME            /SEE IF STACK SELECTED IS SAME AS
575                                                      /PROGRAM FIELD.
576    1056  5267               JMP      UPSTK           /SAME STACK AS PROGRAM, JUST UPDATE THE
577                                                      /FIELD TO NEXT ONE SELECTED.
578    1057  1043               TAD      STKTST
579    1060  1076               TAD      K6201           /SET UP STACK TO LOAD.
580    1061  3767'              DCA      TSTK1
581    1062  1360               TAD      TSTORG
582    1063  7650               SNA CLA                  /DONE TESTS 1 & 2?
583    1064  4766'              JMS      LODFLD          /YES = LOAD PATTERN FOR DYN TEST 3
584    1065  4765'              JMS      LODSTK          /GO LOAD PATTERN FOR DYN TEST 1 OR 2
585    1066  4764'              JMS      RETCOD          /GO SET UP CODE FOR RETURN
586                                                      /FROM TEST FIELD.
587
588                    /NOW UPDATE THE FIELD TO TEST.
589                    /
590    1067  4504      UPSTK,   JMS I    KSFCHK          /CHECK IF CONSOLE ACTIVE
```

```
591    1070  1043          TAD    STKTST
592    1071  1057          TAD    K10
593    1072  3043          DCA    STKTST       /SAVE NEW OFFSET
594    1073  2355          ISZ    STKKNT       /ALL FIELDS AVAILABLE DONE?
595    1074  5255          JMP    XDYN3        /NO, GO DO NEXT.
596
597                 /AT THIS POINT ALL AVAILABLE MEMORY IS FILLED
598                 /WITH THE TEST PATTERN.
599    1075  5763'         JMP    PART2
600
601
602                 /INCREMENT COLUMN COUNTER AND INST
603    1076  2354   NXCOL, ISZ    INST         /DYN TEST 1 AND 2
604    1077  2050          ISZ    COLCNT       /INCREMENT COLUMN COUNTER
605    1100  1050          TAD    COLCNT
606    1101  0062          AND    K77          /DONE ALL COLUMNS?
607    1102  7640          SZA CLA
608    1103  5247          JMP    XDYN2        /NO
609    1104  1020   DONE3, TAD    PSR          /GET SWITCH REGISTER
610    1105  0073          AND    K1000        /TEST BIT 2
611    1106  7640          SZA CLA             /LOOP ON TEST?
612    1107  5237          JMP    XDYN1        /YES
613    1110  2357          ISZ    TSTPTR       /SETUP TO DO NEXT TEST
614    1111  5757   NXTTST, JMP I  TSTPTR      /JUMP TO NEXT TEST
615    1112  5315          JMP    DYNTS2       /- DO DYNAMIC TEST #2
616    1113  5331          JMP    DYNTS3       /- DO DYNAMIC TEST #3
617    1114  5610          JMP I  DYNTST       /-RETURN TO PROGRAM
618                 /DONE DYNAMIC TEST #1
619                 /CHANGE CONST FOR DYNTST 2
620    1115  1051   DYNTS2, TAD    CONST        /200
621    1116  7041          CIA
622    1117  3051          DCA    CONST        /-200
623    1120  1074          TAD    K4000
624    1121  3353          DCA    STRTAD       /START OF RETURN CODE
625    1122  4425          PRNTMS
626    1123  1606          PRDYN               /PRINT DYN TEST MESSAGE
627    1124  1072          TAD    K261
628    1125  7001          IAC                 /#2
629    1126  4435          TYPE
630    1127  4436          CRLF
631    1130  5237          JMP    XDYN1        /
632    1131  7300   DYNTS3, CLA CLL
633    1132  3360          DCA    TSTORG       /SETUP START POINT
634    1133  1362          TAD    (110
635    1134  3353          DCA    STRTAD       /START OF RETURN CODE
636    1135  4425          PRNTMS
637    1136  1606          PRDYN

638    1137  1071          TAD    K260
639    1140  1055          TAD    K3           /#3
640    1141  4435          TYPE
641    1142  4436          CRLF
642    1143  5237          JMP    XDYN1
643
644
645                 /RETURN IF PROGRAM IS IN SELECTED STACK
```

```
646                 /RETURN +1 IF PROGRAM IS NOT IN SELECTED FIELD
647                 /
648                 /
649    1144  0000   SAME,  0
650    1145  1042          TAD STKPIN
651    1146  7041          CIA
652    1147  1043          TAD STKTST
653    1150  7640          SZA CLA
654    1151  2344          ISZ SAME            /PROG NOT IN SELECTED STACK
655    1152  5744          JMP I SAME
656
657    1153  0000   STRTAD, 0
658    1154  0000   INST,   0
659    1155  0000   STKKNT, 0
660    1156  0000   STKKT1, 0
661    1157  0000   TSTPTR, 0
662    1160  0000   TSTORG, 0
663
664
665
666    1162  0110
667    1163  1455
668    1164  1400
669    1165  1200
670    1166  1274
671    1167  1341
672    1170  1343
673    1171  5700
674    1172  1111
675    1173  0040
676    1174  0771
677    1175  0774
678    1176  0773
679    1177  2525
       1200          PAGE
680                 /LOAD BACKGROUN PATTERN AND JMP INSTRUCTIONS
681                 /FOR DYNTST 1 OR 2.
682    1200  0000   LODSTK, 0
683    1201  1050          TAD    COLCNT       /-HAVE ALL TEST FIELDS BEEN
684    1202  7740          SZA CLA CLL         /- LOADED WITH BACKGROUND PATTERN?
685    1203  5212          JMP    LODJMS       /YES
686                 /LOAD ALL LOCATIONS OF TEST FIELD WITH JMS TO LOC. 100
687    1204  3040          DCA    TESTAD
688    1205  1377   JMSLOD, TAD    (4100        /LOAD BACKGROUND PATTERN INTO
689                                             /STACK SELECTED.
690    1206  4340          JMS    CHGFLD       /CHANGE DATA FIELD AND DEPOSIT AC
691    1207  2040          ISZ    TESTAD       /DONE 4096 TIMES?
692    1210  5205          JMP    JMSLOD       /NO, GO BACK AND DO NEXT ADDRESS
693    1211  5227          JMP    LDJMP
694
695                 /REWRITE JMS'S IN ALL LOC THAT WERE CHANGED IN TEST FIELDS
696    1212  7340   LODJMS, CLA CLL CMA
697    1213  1050          TAD    COLCNT
698    1214  1064          TAD    K200
699    1215  3040          DCA    TESTAD       /START INITIALLY WITH ADDRESS 200
```

```
700   1216  1053              TAD     M75
701   1217  3346              DCA     XM75            /SETUP COUNTER
702   1220  1377      LDJMS1, TAD     (4100           /GET JMS 100 INST
703   1221  4340              JMS     CHGFLD          /DEPOSIT IT IN TEST FIELD
704   1222  1040              TAD     TESTAD
705   1223  1063              TAD     K100
706   1224  3040              DCA     TESTAD          /ADDED 100 TO ADDRESS
707   1225  2346              ISZ     XM75            /ARE WE DONE?
708   1226  5220              JMP     LDJMS1          /NO
709                   /LOAD FIRST LOC OF EACH PAGE,EXCEPT PAGE 0, WITH 5700 - JMP I (XX00
710                   /LOC INCREMEMTED BY ONE AFTER EACH COMPLETE PASS BY COLCNT
711   1227  7300      LDJMP,  CLA CLL
712   1230  1052              TAD     M37
713   1231  3350              DCA     XN37            /SETUP COUNTER
714   1232  1050              TAD     COLCNT
715   1233  1064              TAD     K200
716   1234  3040              DCA     TESTAD          /START INITIALLY AT ADDRESS 200
717   1235  1776      LDJMP1, TAD     INST            /INITIALLY 5700
718   1236  4340              JMS     CHGFLD          /DEPOSIT IT IN TEST FIELD
719   1237  1040              TAD     TESTAD
720   1240  1064              TAD     K200
721   1241  3040              DCA     TESTAD          /ADDED 200 TO ADDRESS
722   1242  2350              ISZ     XN37            /DONE?
723   1243  5235              JMP LDJMP1              /NO
724                   /LOAD LOC 100 OF EACH PAGE, EXCEPT 0, WITH DATA FOR INDIRECT ADDRESSING
725                   /LOC INCREMENTED AFTER EACH COMPLETE PASS BY COLCNT
726   1244  1063              TAD     K100
727   1245  1050              TAD     COLCNT
728   1246  3040              DCA     TESTAD          /START INITIALLY AT ADDRESS 200
729   1247  1052              TAD     M37
730   1250  3347              DCA     XM37            /SETUP COUNTER
731   1251  1051              TAD     CONST           /200 FOR DYNTST 1- -200 FOR DYNTST 2
732   1252  3345              DCA     DATA            /SETUP DATA
733   1253  1050              TAD     COLCNT          /GET COLUMN #
734   1254  1051      LDDATA, TAD     CONST           /200
735   1255  1345              TAD     DATA
736   1256  3345              DCA     DATA            /UPDATE DATA
737   1257  1040              TAD     TESTAD          /300 TO 7500 IN INC'S OF 200
738   1260  1064              TAD     K200
739   1261  3040              DCA     TESTAD          /UPDATED ADDRESS
740   1262  1345              TAD     DATA            /DATA IN INCREMENTS OF 200
741   1263  4340              JMS     CHGFLD          /DEPOSIT IN TEST FIELD
742   1264  1345              TAD     DATA
743   1265  0102              AND     K7700
744   1266  1074              TAD     K4000           /CHECK IF HALF DONE LOADING FIELD
745   1267  7650              SNA CLA                 /HALF DONE?
746   1270  4330              JMS     HAFDON          /YES - GO CHECK WHICH TEST IS RUNNING

747
748   1271  2347              ISZ     XM37            /DONE WHOLE FIELD YET?
749   1272  5254              JMP     LDDATA          /NO
750   1273  5600              JMP I   LODSTK          /RETURN
751
752                   /LOAD BACKGROUND PATTERN AND JUMP INSTRUCTIONS
753                   /FOR DYN TST #3
754   1274  0000      LODFLD, 0
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```
755   1275  7300              CLA CLL
756   1276  3040              DCA     TESTAD          /CLEAR TESTAD
757   1277  7001              IAC
758   1300  3345              DCA     DATA            /SETUP DATA
759   1301  1377      LOAD,   TAD     (4100
760   1302  4340              JMS     CHGFLD          /STORE IT
761   1303  2040              ISZ     TESTAD          /NEXT ADDRESS - DONE 4096 TIMES?
762   1304  5301              JMP     LOAD            /NO - DO NEXT ADDRESS
763                   /LOAD PAGE ZERO LOC'S 0 TO 76 WITH JUMP INSTRUCTIONS
764   1305  1345      AGAIN,  TAD     DATA            /GET JUMP-TO LOCATION DATA
765   1306  1351              TAD     M40
766   1307  7640              SZA CLA                 /ARE WE AT HALFWAY POINT?
767   1310  5314              JMP     .+4             /NO - CONTINUE
768   1311  1375              TAD     (5110           /MAKE A JUMP TO 110 INST
769   1312  4340              JMS     CHGFLD          /STORE IT
770   1313  2040              ISZ     TESTAD          /UP THE ADDRESS
771   1314  1345              TAD     DATA            /GET DATA
772   1315  7040              CMA                     /COMPLEMENT IT
773   1316  0374              AND     (5077           /MAKE JUMP INST
774   1317  4340              JMS     CHGFLD          /STORE IT
775   1320  2345              ISZ     DATA
776   1321  2040              ISZ     TESTAD
777   1322  1040              TAD     TESTAD          /CHECK IF DONE
778   1323  0062              AND     K77             /ISOLATE BITS 6 TO 11
779   1324  7640              SZA CLA                 /DONE?
780   1325  5305              JMP     AGAIN           /NO - STORE NEXT INST
781   1326  2274              ISZ     LODFLD          /INCREMENT RETURN
782   1327  5674              JMP I   LODFLD          /YES - RETURN +1
783
784                   /CHECKS TO SEE IF DYN TEST #2 IS RUNNING
785                   /IF IT IS 200 IS ADDED TO TESTAD TO SET UP PATTERN PROPERLY
786   1330  0000      HAFDON, 0
787   1331  1051              TAD     CONST
788   1332  7700              SMA CLA                 /RUNNING DYN TEST #2?
789   1333  5730              JMP I   HAFDON          /NO - RETURN
790   1334  1064              TAD     K200            /YES - ADD 200 TO TESTAD
791   1335  1040              TAD     TESTAD
792   1336  3040              DCA     TESTAD
793   1337  5730              JMP I   HAFDON          /RETURN
794
795
796   1340  0000      CHGFLD, 0
797   1341  6201      TSTK1,  CDF                     /TEST FIELD
798   1342  3440              DCA I   TESTAD
799   1343  6201      PSTK1,  CDF
800   1344  5740              JMP I   CHGFLD
801
802   1345  0000      DATA,   0
803   1346  0000      XM75,   0
804   1347  0000      XM37,   0
805   1350  0000      XN37,   0
806   1351  7740      M40,    -40
807
808
809   1374  5077
```

```
810    1375  5110
811    1376  1154
812    1377  4100
              1400              PAGE
813                     /ROUTINE TO SETUP RETURN FROM TEST FIELD
814                     /
815    1400  0000       RETCOD, 0
816    1401  1777*              TAD     STRTAD          /7600 OR 4000 OR 110
817    1402  1050               TAD     COLCNT
818    1403  3040               DCA     TESTAD
819    1404  4232               JMS     XAND            /SETUP AND INSTRUCTION
820    1405  2040               ISZ     TESTAD          /NEXT ADDRESS
821    1406  4242               JMS     XCDF            /SETUP CDF INSTRUCTION
822    1407  2040               ISZ     TESTAD          /NEXT ADDRESS
823    1410  4247               JMS     XJMPI           /SETUP JMP I .+1 INSTRUCTION
824    1411  2040               ISZ     TESTAD          /NEXT ADDRESS
825    1412  1376               TAD     (RETURN         /GET RETURN ADDRESS
826    1413  4775*              JMS     CHGFLD
827
828    1414  1355               TAD     ADRCHK          /LOCATION EQUAL TO COMPLEMENT OF BITS 6-11
829    1415  3040               DCA     TESTAD          /SETUP ADDRESS
830    1416  1102               TAD     K7700           /MASKING DATA
831    1417  4775*              JMS     CHGFLD          /DEPOSIT IN TEST FIELD
832
833                     /SETUP ERROR RETURN FROM TEST FIELD
834    1420  1063               TAD     K100
835    1421  7001               IAC
836    1422  3040               DCA     TESTAD          /START AT ADDRESS 101
837    1423  4242               JMS     XCDF            /SETUP CDF INSTRUCTION
838    1424  2040               ISZ     TESTAD          /NEXT ADDRESS
839    1425  4247               JMS     XJMPI           /SETUP JMP I .+1 INSTRUCTION
840    1426  2040               ISZ     TESTAD          /NEXT ADDRESS
841    1427  1374               TAD     (REPERR         /GET ADDRESS OF CALL TO ERROR ROUTINE
842    1430  4775*              JMS     CHGFLD
843    1431  5600               JMP I   RETCOD
844
845
846                     /ROUTINE TO MAKE AN AND INST, WITH ADDRESS EQUAL
847                     /TO THE COMPLEMENT OF COLUMN COUNTER.
848    1432  0000       XAND,   0
849    1433  1050               TAD     COLCNT          /GET COLUMN COUNTER
850    1434  7040               CMA                     /COMPLEMENT IT
851    1435  0062               AND     K77             /
852    1436  3355               DCA     ADRCHK          /SAVE FOR LATER USE
853    1437  1355               TAD     ADRCHK
854    1440  4775*              JMS     CHGFLD
855    1441  5632               JMP I   XAND
856
857                     /MAKE A CDF INST OF CURRENT PROGRAM FIELD
858    1442  0000       XCDF,   0
859    1443  1042               TAD     STKPIN
860    1444  1077               TAD     K6203
861    1445  4775*              JMS     CHGFLD
862    1446  5642               JMP I   XCDF
863
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864                     /MAKE A JMP I .+1 INST
865    1447  0000       XJMPI,  0
866    1450  1040               TAD     TESTAD
867    1451  0373               AND     (177
868    1452  1372*              TAD     (5601
869    1453  4775*              JMS     CHGFLD
870    1454  5647               JMP I   XJMPI
871
872                     /CHECK IF STACK SELECTED IS OK TO EXECUTE IN,
873                     /THEN EXECUTE CODE STORED THERE.
874
875    1455  7300       PART2,  CLA CLL
876    1456  1050               TAD     COLCNT
877    1457  1771*              TAD     TSTORG          /START POINT OF CODE IN TEST FIELD
878    1460  3356               DCA     XSTART
879    1461  3043               DCA     STKTST          /START WITH FIELD ZERO
880    1462  4770*      TOP,    JMS     SAME            /CHECK IF PROG FLD EQUAL DATA FLD
881    1463  1057               TAD     K10             /SAME
882    1464  1043               TAD     STKTST          /NOT SAME
883    1465  3043               DCA     STKTST
884    1466  1043               TAD     STKTST
885    1467  7112               RTR CLL
886    1470  7010               RAR
887    1471  3357               DCA     NWFLD           /SAVE TEST FIELD
888    1472  2767*              ISZ     STKKT1          /ARE WE DONE?
889    1473  5275               JMP     .+2             /NO - CONT
890    1474  5323               JMP     CHKTST          /DONE PASS -GO CHECK WHICH TEST IS RUNNING
891    1475  1357               TAD     NWFLD
892    1476  1366               TAD     (FLDLST         /LIST OF STATUS OF FIELDS
893    1477  3360               DCA     PTR
894    1500  1760               TAD I   PTR
895    1501  7640               SZA CLA                 /IS FIELD SELECTED GOOD?
896    1502  5317               JMP     ADD1            /NO - TRY NEXT ONE
897    1503  1357               TAD     NWFLD           /YES
898    1504  7106               RTL CLL
899    1505  7004               RAL
900    1506  1077               TAD     K6203           /MAKE CDF INST
901    1507  3310               DCA     .+1
902    1510  6201               CDF
903    1511  1101               TAD     K7600           /STORE IN AC
904    1512  5756               JMP I   XSTART          /GO EXECUTE CODE IN TEST FIELD
905                     /IF NO ERRORS OCCURRED PROGRAM CONTROL WILL RETURN HERE
906
907    1513  7041       RETURN, CIA                     /COMPLEMENT DATA PREVIOUSLY STORED IN AC
908    1514  1101               TAD     K7600
909    1515  7740               SZA CLA CLL             /WAS DYN TEST GOOD?
910    1516  4327       REPERR, JMS     DYNERR          /NO - REPORT AN ERROR
911
912                     /SETUP TO EXECUTE IN NEXT FIELD
913
914    1517  1043       ADD1,   TAD     STKTST
915    1520  1057               TAD     K10
916    1521  3043               DCA     STKTST
917    1522  5262               JMP     TOP
918                     /IF DYNTST 3 IS RUNNING JUMP OUT (DOES ONLY ONE PASS)
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919                          /IF DYNTST 1 OR 2 IS RUNNING GO INCREMENT TO NEXT COLUMN
920
921    1523  1771'   CHKTST, TAD     TSTORG        /0 IF DYNTST 3
922    1524  7640            SZA CLA               /DYNTST 3 RUNNING?
923    1525  5765'           JMP     NXCOL         /NO - DO NEXT COLUMN
924    1526  5764'           JMP     DONE3         /YES - DONE DYNTST 3
925
926
927
928    1527  0000   DYNERR, 0
929    1530  7000   APTE03, NOP                    /OVERWRITTEN IF UNDER APT
930    1531  4763'           JMS     BELL          /CHECK FOR BELL- RETURN +1 IF NOBELL
931    1532  5727            JMP I   DYNERR        /BELL - RETURN TO PROGRAM
932    1533  1020            TAD     PSR           /CHECK FOR INHIBIT TYPEOUT
933    1534  0064            AND     K200          /TEST BIT 4
934    1535  7640            SZA CLA               /INHIBIT TYPEOUT?
935    1536  5345            JMP     OVER          /YES -BYPASS TYPEOUT ROUTINE
936    1537  4425            PRNTMS                /PRINT ERROR MESSAGE
937    1540  1613            DYNER1
938    1541  1357            TAD     NWFLD         /FIELD UNDER TEST
939    1542  1071            TAD     K260          /   AT TIME OF ERROR
940    1543  4435            TYPE
941    1544  4436            CRLF
942    1545  1020   OVER,    TAD     PSR           /INHIBIT ERROR HALT?
943    1546  7700            SMA CLA               /TEST BIT 0
944    1547  4762'           JMS     PSEUDO        /NO
945    1550  1020            TAD     PSR           /GET SWITCH REGISTER
946    1551  7004            RAL                   /TEST BIT 1
947    1552  7710            SPA CLA               /LOOP ON ERROR?
948    1553  5761'           JMP     XDYN1         /YES
949    1554  5727            JMP I   DYNERR        /RETURN TO PROGRAM
950
951
952    1555  0000   ADRCHK, 0
953    1556  0000   XSTART, 0             /STARTING ADDRESS=1 OF PROGRAM IN TEST FIELD
954    1557  0000   NWFLD,  0
955    1560  0000   PTR,    0
956
957
958
959
960    1561  1037
961    1562  2440
962    1563  2056
963    1564  1104
964    1565  1076
965    1566  1725

966    1567  1156
967    1570  1144
968    1571  1160
969    1572  5601
970    1573  0177
971    1574  1516
972    1575  1340
973    1576  1513
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974    1577  1153
       1600           PAGE
975    1600  1501   MARCH,   TEXT          "MARCH TEST#"
       1601  2203
       1602  1040
       1603  2405
       1604  2324
       1605  4300
976
977    1606  0431   PRDYN,   TEXT          "DYN TEST "
       1607  1640
       1610  2405
       1611  2324
       1612  4000
978    1613  0140   DYNER1,  TEXT          "A DYNAMIC ERROR HAS OCCURED IN FIELD "
       1614  0431
       1615  1601
       1616  1511
       1617  0340
       1620  0522
       1621  2217
       1622  2240
       1623  1001
       1624  2340
       1625  1703
       1626  0325
       1627  2205
       1630  0440
       1631  1116
       1632  4006
       1633  1105
       1634  1404
       1635  4000
979
980                     /
981                     /MOSTST ERROR ROUTINE
982                     /
983    1636  0000   MOSERR, 0
984    1637  7300            CLL CLA
985    1640  7000   APTE01, NOP
986    1641  2047            ISZ     COUNT
987    1642  7410            SKP
988    1643  5241            JMP     .-2
989    1644  4777'           JMS     BELL          /CHECK FOR BELL - RETURN +1 IF NOBELL
990    1645  5636            JMP I   MOSERR        /BELL - RETURN TO PROGRAM
991    1646  1020            TAD     PSR           /NO BELL - CHECK FOR INHIBIT TYPEOUT
992    1647  0064            AND     K200
993    1650  7640            SZA CLA
994    1651  5313            JMP     STOP          /BYPASS ERROR TYPEOUT ROUTINE
995    1652  2037            ISZ     HEAD1
996    1653  5256            JMP     PERR1
997    1654  4425            PRNTMS
998    1655  1735            HEAD                  /TYPEOUT ERROR HEADING
999    1656  1042   PERR1,   TAD     STKPIN        /PROGRAM FIELD
1000   1657  7012            RTR
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1001   1660  7010           RAR
1002   1661  1071           TAD K260
1003   1662  4435           TYPE
1004   1663  7040           CMA
1005   1664  1236           TAD MOSERR        /PROGRAM LOCATION OF CALL TO SUB
1006   1665  4433           PRNT4
1007   1666  4434           SPACE2
1008   1667  1043           TAD STKTST        /FIELD OF ERROR
1009   1670  7012           RTR
1010   1671  7010           RAR
1011   1672  3323           DCA XFLD          /SAVE # OF FIELD OF ERROR
1012   1673  1323           TAD XFLD
1013   1674  1071           TAD K260
1014   1675  4435           TYPE
1015   1676  1040           TAD TESTAD        /FAILING ADDRESS
1016   1677  4433           PRNT4
1017   1700  1045           TAD GDATA         /GOOD DATA
1018   1701  4433           PRNT4
1019   1702  1044           TAD BDATA         /BAD DATA
1020   1703  4433           PRNT4
1021   1704  4425           PRNTMS
1022   1705  1600           MARCH             /PRINT MARCH TEST
1023   1706  1323           TAD XFLD          /FIELD OF ERROR
1024   1707  1376           TAD (FLDLST
1025   1710  3324           DCA BADFLD
1026   1711  7240           STA
1027   1712  3724           DCA I BADFLD      /LOAD ADDRESS OF BAD FIELD WITH ONES
1028   1713  1020    STOP,  TAD PSR           /INHIBIT ERROR HALT
1029   1714  7700           SMA CLA           /TEST BIT 0
1030   1715  4775'          JMS PSEUDO        /NO
1031   1716  1020           TAD PSR           /LOOP ON ERROR?
1032   1717  7004           RAL               /TEST BIT 1
1033   1720  7710           SPA CLA
1034   1721  5774'          JMP MOSLOD-3      /YES
1035   1722  5636           JMP I MOSERR      /NO - RETURN TO PROGRAM
1036
1037   1723  0000    XFLD,    0
1038   1724  0000    BADFLD,  0
1039
1040   1725  0000    FLDLST,  0       /F0 - ZEROS FOR GOOD STACK, ONES FOR BAD
1041   1726  0000             0       /F1
1042   1727  0000             0       /F2
1043   1730  0000             0       /F3
1044   1731  0000             0       /F4
1045   1732  0000             0       /F5
1046   1733  0000             0       /F6
1047   1734  0000             0       /F7

1048   1735  2022    HEAD,   TEXT          "PR LOC    ADDR    GOOD  BAD#"
       1736  4014
       1737  1703
       1740  4040
       1741  4001
       1742  0404
       1743  2240
       1744  4040
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       1745  0717
       1746  1704
       1747  4040
       1750  0201
       1751  0443
       1752  0000
1049
1050
1051   1774  0607
1052   1775  2440
1053   1776  1725
1054   1777  2056
       2000           PAGE
1055                /
1056                /RELOCATION ERROR ROUTINE
1057                /
1058   2000  0000    ERRM,   0
1059   2001  7200            CLA
1060   2002  7000    APTE02, NOP
1061   2003  2047            ISZ COUNT        /RELO ERROR OCCURED
1062   2004  7410            SKP
1063   2005  5203            JMP .-2
1064   2006  4256            JMS BELL         /CHECK FOR BELL - RETURN +1 IF NO BELL
1065   2007  4600            JMS I ERRM       /BELL - RETURN TO PROGRAM
1066   2010  1020            TAD PSR          /NO BELL - CHECK FOR INHIBIT TYPEOUT
1067   2011  0064            AND K200
1068   2012  7640            SZA CLA
1069   2013  5230            JMP STOP1        /BYPASS TYPEOUT ROUTINE
1070   2014  4425    PERRM,  PRNTMS
1071   2015  2040            RELERR
1072   2016  1043            TAD     STKTST
1073   2017  7112            CLL RTR
1074   2020  7010            RAR
1075   2021  1071            TAD     K260     /FIELD OF ERROR
1076   2022  4435            TYPE
1077   2023  1046            TAD MOVE         /ADDRESS OF ERROR
1078   2024  4433            PRNT4
1079   2025  4436            CRLF
1080   2026  7240            STA
1081   2027  3037            DCA     HEAD1
1082   2030  1020    STOP1,  TAD PSR          /INHIBIT ERROR HALT?
1083   2031  7700            SMA CLA          /TEST BIT 0
1084   2032  4777'           JMS PSEUDO       /NO
1085   2033  1020            TAD PSR          /LOOP ON ERROR?
1086   2034  7004            RAL
1087   2035  7710            SPA CLA
1088   2036  5776'           JMP RELO1-1      /YES
1089   2037  5600            JMP I ERRM       /RETURN TO PROGRAM
1090
1091   2040  5252    RELERR, TEXT              "***WARNING*** RELO ERR AT "
       2041  5227
       2042  0122
       2043  1611
       2044  1607
       2045  5252
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              2046   5240
              2047   2205
              2050   1417
              2051   4005
              2052   2222
              2053   4001
              2054   2440
              2055   0000
1092
1093          2056   0000    BELL,    0
1094          2057   7300             CLA CLL
1095          2060   1020             TAD PSR         /CHECK FOR BELL ON ERROR
1096          2061   0060             AND K20         /BIT 7
1097          2062   7650             SNA CLA
1098          2063   5270             JMP NOBELL
1099          2064   1065    RBELL,   TAD K207        /BELL CODE
1100          2065   4435             TYPE
1101          2066   4504             JMS I KSFCHK    /CHECK FOR CONSOLE RECEIVE FLAG
1102          2067   5656             JMP I BELL
1103          2070   2256    NOBELL,  ISZ BELL        /RETURN +1
1104          2071   5656             JMP I BELL
1105          2176   0421
1106          2177   2440
              2200    PAGE                            /APT/
1107          2200   0000    APTMOD,  0
1108          2201   1377             TAD     (JMS I IAPTOK   /SETUP FOR APT CONTROL
1109          2202   3776'            DCA     APTOK0          /
1110          2203   1377             TAD     (JMS I IAPTOK   /SETUP FOR APT CONTROL
1111          2204   3775'            DCA     APTOK1          /
1112          2205   1377             TAD     (JMS I IAPTOK   /SETUP FOR APT CONTROL
1113          2206   3774'            DCA     APTOK2          /
1114          2207   1373             TAD     (7000           /MODIFY SOME LOCS TO: NOP.
1115          2210   3772'            DCA     APTN00          /
1116          2211   1373             TAD     (7000           /
1117          2212   3771'            DCA     APTN01          /
1118          2213   1373             TAD     (7000
1119          2214   3770'            DCA     APTN02
1120          2215   1373             TAD     (7000           /
1121          2216   3767'            DCA     6505            /OVERWRITES APT CODE
1122          2217   1373             TAD     (7000
1123          2220   3766'            DCA     6523            /OVERWRITES APT CODE
1124          2221   1365             TAD     (JMS I IAPTER   /MODIFY SOME LOCS TO: JMS I IAPTER.
1125          2222   3764'            DCA     APTE01
1126          2223   1365             TAD     (JMS I IAPTER
1127          2224   3763'            DCA     APTE02
1128          2225   1365             TAD     (JMS I IAPTER
1129          2226   3762'            DCA     APTE03

1130          2227   1361             TAD     (INHMES         /INHIBIT USE OF MESAGX ROUTINE
1131          2230   3760'            DCA     APTMES
1132          2231   1357             TAD     (INHTYP         /INHIBIT USE OF TYPE ROUTINE
1133          2232   3756'            DCA     APTNTP
1134          2233   5600             JMP I APTMOD
1135
1136
1137
```

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1138
1139                          /APT/   ROUTINE TO 'NOTIFY' APT THAT THE PROGRAM IS RUNNING OK.
1140                          /PROGRAM JUMPS TO APT CODE THAT WAS SAVED IN PROGRAM FIELD
1141
1142          2234   0000    APTOK,   0                       /APT/
1143          2235   6002             IOF                     /APT/
1144          2236   7200             CLA                     /APT/
1145          2237   1251             TAD     APTIMX          /APT/DELAY 100MS.
1146          2240   3253             DCA     APTCTX          /APT/
1147          2241   1252             TAD     APTIMY          /APT/
1148          2242   3254             DCA     APTCTY          /APT/
1149          2243   2254             ISZ     APTCTY          /APT/
1150          2244   5243             JMP     .-1             /APT/
1151          2245   2253             ISZ     APTCTX          /APT/
1152          2246   5241'            JMP     .-5             /APT/
1153          2247   4755'            JMS     6500            /APT/CALL APT - 'PROG OK'.
1154          2250   5634             JMP I   APTOK           /APT/RTN FROM APT - RTN TO CALL+1.
1155
1156          2251   7776    APTIMX,  -2                      /APT/
1157          2252   0000    APTIMY,  0                       /APT/
1158          2253   0000    APTCTX,  0                       /APT/
1159          2254   0000    APTCTY,  0                       /APT/
1160
1161
1162
1163                          /APT/   ROUTINE TO HANDLE ERRORS UNDER APT CONTROL.
1164                          /PROGRAM JUMPS TO APT CODE THAT WAS SAVED IN PROGRAM FIELD
1165
1166          2255   0000    APTER,   0                       /APT/
1167          2256   6002             IOF                     /APT/
1168          2257   7200             CLA                     /APT/
1169          2260   6224             RIF                     /APT/AC=IF.
1170          2261   1076             TAD     K6201           /APT/CREATE A CDF INST.
1171          2262   3265             DCA     .+3             /APT/MODIFY NEXT CDF INST.
1172          2263   7240             CLA CMA                 /APT/
1173          2264   1255             TAD     APTER           /APT/AC=ERROR PC.
1174          2265   6201             CDF                     /APT/(MODIFIED CDF) DF=IF.
1175          2266   5754'            JMP     6520            /APT/CALL APT - 'ERROR'.
1176
1177
1178                          /C8/    ROUTINE  TO SAVE PAGE 37 OF FIELD 0 & 1 OR SAVE APT HANDLER
1179
1180                          /SAVE EITHER APT OR OS8 CODE
1181          2267   0000    SAVOS8,  0
1182          2270   1100             TAD K7577       /SETUP OS8 HANDLER POINTER -1
1183          2271   3010             DCA 10  /SAVE IN AUTO INDEX 10
1184          2272   1076             TAD K6201
1185          2273   1057             TAD K10         /FIELD 1
1186          2274   3314             DCA FLD         /SAVE OS8 FIELD 1
1187          2275   4307             JMS SAVFLD      /DO IT
1188          2276   5667             JMP I SAVOS8    /RETURN TO PROGRAM
1189          2277   1353    XAPT,    TAD (5577       /SETUP APT HANDLER POINTER -1
1190
1191          2300   3010             DCA 10          /SAVE IN AUTO INDEX 10
1192          2301   1076             TAD K6201
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1193   2302  1061           TAD K30        /FIELD 3
1194   2303  3314           DCA FLD        /MODIFY CDF INSTRUCTION IN LOC FLD
1195   2304  4307           JMS SAVFLD     /GO SAVE APT HANDLER
1196   2305  4200           JMS APTMOD     /GO MODIFY LOCATIONS FOR APT
1197   2306  5752'          JMP BEGIN
1198
1199   2307  0000   SAVFLD, 0
1200   2310  1751'          TAD PRGSTK     /INSTRUCTION FIELD
1201   2311  3316           DCA PRGFLD     /MODIFY INSTRUCTION AT LOC PRGFLD
1202   2312  1325           TAD STOADD     /GET ADDRESS OF STORAGE ADDRESS
1203   2313  3011           DCA 11 /SAVE IN AUTO INDEX 11
1204   2314  6201   FLD,    CDF0           /CHANGE DATA FIELD
1205   2315  1410           TAD I 10       /GET WORD
1206   2316  6201   PRGFLD, CDF0    /CHANGE DATA FIELD TO PROGRAM FIELD
1207   2317  3411           DCA I 11       /SAVE IN STORE AREA
1208   2320  1010           TAD 10
1209   2321  7040           CMA
1210   2322  7640           SZA CLA        /CHECK TO SEE IF DONE
1211   2323  5314           JMP FLD        /NO - DO NEXT WORD
1212   2324  5707           JMP I SAVFLD   /YES - RETURN
1213
1214   2325  5577   STOADD, 5577
1215   2326  4323   SRMESG, TEXT                   "#SR="
       2327  2275
       2330  0000
1216   2331  7743   QESTMK, TEXT                   "?#"
       2332  0000
1217   2333  3603   UPARRC, TEXT                   "=C#"
       2334  4300
1218   2335  3607   UPARRG, TEXT                   "=G#"
       2336  4300
1219
1220   2351  0216
1221   2352  0214
1222   2353  5577
1223   2354  6520
1224   2355  6500
1225   2356  2637
1226   2357  5635
1227   2360  3002
1228   2361  5600
1229   2362  1530
1230   2363  2002
1231   2364  1640
1232   2365  4505
1233   2366  6523
1234   2367  6505

1235   2370  2524
1236   2371  0223
1237   2372  0213
1238   2373  7000
1239   2374  1040
1240   2375  0745
1241   2376  0261
1242   2377  4506
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```
                2400  PAGE                      /APT/
1243
1244
1245                   /C8/    ROUTINE TO RESTORE PAGES 37 OF FIELD 0 AND 1
1246
1247   2400  7200   C8RM,   CLA
1248   2401  4425           PRNTMS                 /GO PRINT UPARROW C
1249   2402  2333           UPARRC                 /POINTER TO MESSAGE
1250   2403  6224           RIF                    /GET THE PRESENT DATA  FIELD
1251   2404  1076           TAD      K6201         /GET THE CDF INSTRUCTION
1252   2405  3216           DCA      C8RM0         /SAVE THE NEW CDF INSTRUCTION
1253   2406  1100           TAD      K7577         /SET UP AUTO INDEX FOR RESTORE OF 0
1254   2407  3010           DCA      10            /SAVE IN AUTO INDEX 10
1255   2410  1377           TAD      (5577         /SETUP STORAGE  POINTER
1256   2411  3011           DCA      11            /SAVE IN AUTO INDEX 11
1257   2412  1100           TAD      K7577         /SEUP AUTO INDEX OF RESTORE OF FILD 1
1258   2413  3012           DCA      12            /SAVE IN AUTO INDEX 12
1259   2414  1100           TAD      K7577         /SETUP NEXT POINTER
1260   2415  3013           DCA      13            /SAVE IN AUTO INDEX 13
1261   2416  6201   C8RM0,  CDF                    /MODIFIED CDF INSTRUCTION TO PRG FIELD
1262   2417  1010           TAD      10            /RESTORATION DONE
1263   2420  7040           CMA
1264   2421  7450           SNA                    /SKIP IF NO
1265   2422  5235           JMP      C8RM1         /DONE=GO TO MONITOR AT 7600
1266   2423  7621           7621                   /CLEAR AC AND MQ
1267   2424  1410           TAD I 10               /GET DATA FROM PROGRAM FIELD
1268   2425  7421           7421                   /PUT IT IN THE MQ
1269   2426  1411           TAD I 11               /GET DATA TO BE PUT IN FIELD 1
1270   2427  6211           CDF      10            /CHANGE DATA FIELD TO 1
1271   2430  3413           DCA I 13               /PUT IT IN FIELD 1
1272   2431  7521           7521                   /SWAP AC AND MQ
1273   2432  6201           CDF      00            /CHANGE DATA FIELD TO 0
1274   2433  3412           DCA I 12               /RESTORE FIELD 0 PAGE 37
1275   2434  5216           JMP      C8RM0         /GO DO NEXT WORD
1276   2435  6203   C8RM1,  CDF      CIF           /CHANGE DATA AND INSTR FIELD TO 0
1277   2436  5637           JMP I    .+1           /GO TO 7600 OF THAT FIELD
1278   2437  7600           7600                   /MONITOR STARTING ADDRESS
1279
1280
1281                   /ROUTINE USED FOR CONSOLE SWITCH REGISTER CHANGES
1282
1283   2440  0000   PSEUDO, 0
1284   2441  7200           CLA
1285   2442  4425   SRQEST, PRNTMS                 /PRINT SR QUESTION
1286   2443  2326           SRMESG                 /POINTER TO MESSAGE
1287   2444  1020           TAD PSR                /GET THE VALUE OF THE SWITCH REGISTER
1288   2445  4433           PRNT4                  /PRINT THE 4 DIGITS
1289   2446  7346           CLA CLL CMA RTL        /SETUP A COUNTER TO ACCEPT 4 DIGITS
1290   2447  3322           DCA      TTYCNT        /SAVE THE COUNTER
1291   2450  1376           TAD      (CHARR0       /GET POINTER FOR FIRST CHARACTER
1292   2451  3254           DCA      CHGCHR        /SAVE THE POINTER FOR DIGITS
1293   2452  4424           LISN                   /WAIT FOR KEYBOARD INPUT
1294   2453  0001           1                      /CHECK FOR A OCTAL DIGIT
1295   2454  2472   CHGCHR, CHARR0                 /THIS LOCATION WILL GET MODIFIED
1296   2455  7566           =212                   /CHECK FOR LINE FEED
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1297    2456  3124          RESTRT              /LINE FEED - RETURN TO START VIA RESTRT
1298    2457  7563          -215                /CHECK FOR CARRAIGE RETURN
1299    2460  2506          RETYPE              /RETYPE SR AND CONT IF DIGITS TYPED
1300    2461  7575          -203                /CHECK FOR A CONTROL C
1301    2462  2400          C8RM                /CONTROL C TYPED -RETURN TO MONITOR
1302    2463  7555          -223                /CHECK FOR A CONTROL S
1303    2464  2553          CNTRS               /WAS CONTROL S WAIT FOR "Q OR "C
1304    2465  0000          0                   /NONE OF ABOVE CHARACTERS-ILLEGAL CHAR
1305    2466  2467          .+1                 /GO TO NEXT ADDRESS TO PRINT ?
1306    2467  4425          PRNTMS              /GO PRINT ?
1307    2470  2331          QESTMK   SRQEST     /POINTER TO ? MESSAGE
1308    2471  5242          JMP      SRQEST     /RETURN AND ASK QUESTION AGAIN
1309    2472  3020   CHARRO, DCA      PSR       /SAVE THE LEAST SIGNIFICANT BIT
1310    2473  1375          TAD      (CHARR1    /UPDATA POINTER FOR CHARACTERS 2 3 4
1311    2474  3254          DCA      CHGCHR     /SAVE THE POINTER ADDRESS
1312    2475  5252          JMP      CHGCHR-2   /RETURN FOR NEXT CHARACTER INPUT
1313    2476  3321   CHARR1, DCA      SAVCHR    /SAVE THE CHARACTER TYPED
1314    2477  1020          TAD      PSR        /GET THE VALUE OF SR
1315    2500  7106          CLL      RTL        /MOVE IT INTO NEXT POSITION
1316    2501  7004          RAL
1317    2502  1321          TAD      SAVCHR     /ADD NEW CHARACTER TO IT
1318    2503  3020          DCA      PSR        /SAVE THE NEW VALUE
1319    2504  2322          ISZ      TTYCNT     /DONE ALL 4 CHARACTERS
1320    2505  5252          JMP      CHGCHR-2   /NO GET NEXT INPUT FROM KEYBOARD
1321    2506  1376   RETYPE, TAD      (CHARR0   /GET POINTER TO SEE IF SR ECHOED
1322    2507  7041          CIA                 /NEGATE THE POINTER
1323    2510  1254          TAD      CHGCHR     /GET THE POINTER STORED
1324    2511  7650          SNA      CLA        /ECHO VALUE OF SR?
1325    2512  5640          JMP  I   PSEUDO     /NO-ONLY CR WAS TYPED-USE ORIGINAL VALUE
1326    2513  4425          PRNTMS              /RE-ECHO VALUE TYPED
1327    2514  2326          SRMESG              /POINTER TO SR MESSAGE
1328    2515  1020          TAD PSR             /GET VALUE OF SR
1329    2516  4433          PRNT4               /PRINT THE 4 OCTAL DIGITS
1330    2517  4436          CRLF                /ISSUE A CR AND LF
1331    2520  5640          JMP  I   PSEUDO     /RETURN TO PROGRAM
1332
1333    2521  0000   SAVCHR, 0
1334    2522  0000   TTYCNT, 0
1335
1336
1337
1338                        /ROUTINE TO CHECK FOR CONSOLE RECEIVE FLAG
1339
1340    2523  0000   CHKKSF, 0
1341    2524  6031   APTN02, KSF                 /SKIP  ON CONSOLE RECEIVE FLAG
1342    2525  5723          JMP  I   CHKKSF      /RECEIVE FLAG NOT SET RETURN TO PROGRAM
1343    2526  1022          TAD HCW2             /CHECK TO SEE IF RUNNING UNDER APT?

1344    2527  7700          SMA CLA             /YES - CLEAR FLAG AND RETURN
1345    2530  5333          JMP      .+3        /NO -CHECK FOR "C OR "G
1346    2531  6032          KCC                 /CLEAR CONSOLE RECEIVE FLAG
1347    2532  5723          JMP  I   CHKKSF     /RETURN TO PROGRAM
1348    2533  4424          LISN                /CHECK THE KEYBOARD CHARACTER
1349    2534  7575          -203                /CODE FOR "C
1350    2535  2400          C8RM                /WAS A CONTROL C-EXIT TO MONITOR
1351    2536  7571          -207                /CODE FOR "G
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1352    2537  2547          CNTRLG              /WAS  "G ECHO CHAR-ENTER SR QUESTION
1353    2540  7555          -223                /CHECK FOR A CONTROL S
1354    2541  2555          CNTRS1              /WAS A CONTROL S WAIT FOR "Q OR "C
1355    2542  0000          0                   /CHAR WAS NOT "C OR " G
1356    2543  2544          .+1                 /ECHO CHAR AND QUESTION MARK
1357    2544  4425          PRNTMS              /PRINT ? AND CR  LF
1358    2545  2331          QESTMK              /POINTER TO MESSAGE
1359    2546  5723          JMP  I   CHKKSF     /RETURN TO PROGRAM
1360
1361    2547  4425   CNTRLG, PRNTMS             /PRINT "G AND CR LF
1362    2550  2335          UPARRG              /POINTER  TO MESSAGE
1363    2551  4240          JMS      PSEUDO     /GO ASK THE SR QUESTION
1364    2552  5723          JMP  I   CHKKSF     /RETURN TO THE PROGRAM
1365
1366    2553  4774'  CNTRS,  JMS      WAITQC     /GO WAIT FOR A CONTROL Q OR C
1367    2554  5252          JMP      CHGCHR-2   /GO WAIT FOR NEXT CHAR
1368
1369    2555  4774'  CNTRS1, JMS      WAITQC     /WAIT FOR A CONTROL Q OR C
1370    2556  5723          JMP  I   CHKKSF     /RETURN TO PROGRAM
1371
1372
1373    2574  3106
1374    2575  2476
1375    2576  2472
1376    2577  5577
        2600          PAGE
1377
1378
1379
1380    2600  0000   FILLER, 0                   /SET TO NUMBER OF FILLERS REQUIRED
1381
1382                        /INPUT ONE OCTAL NUMBER TO AC 9 THRU 11
1383                        /GOOD RETURN IS JMS+2
1384
1385    2601  0000   ONEOCK, 0                   /CALL BY "ONEOCT"
1386    2602  4424          LISN
1387    2603  0001          1
1388    2604  2607          .+3
1389    2605  0000          0
1390    2606  2610          .+2
1391    2607  2201          ISZ      ONEOCK
1392    2610  5601          JMP I    ONEOCK
1393
1394                        /INPUT TWO OCTAL NUMBERS TO AC 6 THRU 11
1395                        /GOOD RETURN IS JMS+2
1396
1397    2611  0000   TWOOCK, 0                   /CALL BY "TWOOCT"
1398    2612  4201          JMS      ONEOCK
1399    2613  5611          JMP I    TWOOCK
1400    2614  7104          CLL RAL
1401    2615  7006          RTL
1402    2616  3224          DCA      XPRNT2
1403    2617  4201          JMS      ONEOCK
1404    2620  5611          JMP I    TWOOCK
1405    2621  1224          TAD      XPRNT2
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1406    2622  2211            ISZ     TWOOCK
1407    2623  5611            JMP I   TWOOCK
1408
1409                  /PRINT THE TWO OCTAL NUMBERS IN THE AC 6 THRU 11
1410
1411    2624  0000    XPRNT2, 0                       /CALL BY "PRNT2"
1412    2625  3211            DCA     TWOOCK
1413    2626  1211            TAD     TWOOCK
1414    2627  7012            RTR
1415    2630  7010            RAR
1416    2631  4430            PRNT1
1417    2632  1211            TAD     TWOOCK
1418    2633  4430            PRNT1
1419    2634  5624            JMP I   XPRNT2
1420
1421                  /TYPE THE ASCII CHARACTER IN THE AC
1422
1423    2635  0000    XTYPE,  0                       /CALL BY "TYPE"
1424    2636  3251            DCA     CHAR            /SAVE THE CHARACTER
1425    2637  7000    APTNTP, NOP                     /APT
1426    2640  7610            SKP     CLA             /CONSOLE INACTIVE=TYPE THE CHARACTER
1427    2641  4777*           JMS     CNTRLS          /CONSOLE ACTIVE=CHECK FOR CONTROL S
1428    2642  1251            TAD     CHAR            /GET THE CHARACTER SAVED AND PRINT
1429    2643  6046            TLS
1430    2644  7200            CLA
1431    2645  6041            TSF
1432    2646  5245            JMP     .=1
1433    2647  6042            TCF
1434    2650  5635            JMP I   XTYPE
1435
1436    2651  0000    CHAR,   0
1437          5635    INHTYP=JMP I XTYPE
1438
1439
1440
1441                  /TYPE A CR AND LF WITH NUMBER OF FILLERS
1442                  /AS DETERMINED BY LOCATION "FILLER"
1443
1444    2652  0000    XCRLF,  0                       /CALL BY "CRLF"
1445    2653  7200            CLA
1446    2654  1067            TAD     K215
1447    2655  4435            TYPE
1448    2656  1200            TAD     FILLER
1449    2657  7040            CMA
1450    2660  3266            DCA     XORS
1451    2661  1066            TAD     K212
1452    2662  4435            TYPE

1453    2663  2266            ISZ     XORS
1454    2664  5262            JMP     .=2
1455    2665  5652            JMP I   XCRLF
1456
1457    2666  0000    XORS,   0
1458
1459                  /PRINT 2 SPACES
1460
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1461    2667  0000    SPACX2, 0           /CALL BY "SPACE2"
1462    2670  4425            PRNTMS
1463    2671  2673            .+2
1464    2672  5667            JMP I SPACX2
1465    2673  4040            4040
1466    2674  0010            0010    /USED BY LISN
1467
1468
1469                  /COMPARE INPUT TO LIST FOLLOWING CALL
1470                  /INPUT ONE CHARACTER IF AC=0
1471                  /USE TAD PSRT INPUT IF AC NON ZERO
1472
1473    2675  0000    XLISN,  0                       /CALL BY "LISN"
1474    2676  7640            SZA CLA
1475    2677  5325            JMP     LISN1           /USE TAD PSRT INPUT SINCE AC NOT ZERO
1476    2700  6031            KSF
1477    2701  5300            JMP     .=1
1478    2702  6036            KPB
1479    2703  0357            AND     K177
1480    2704  1064            TAD     K200
1481    2705  3267            DCA     SPACX2
1482    2706  1267            TAD     SPACX2
1483    2707  1361            TAD     M212
1484    2710  7450            SNA
1485    2711  5315            JMP     .+4             /IS IT A LF?
1486    2712  1360            TAD     M3              /YES
1487    2713  7640            SZA CLA
1488    2714  5317            JMP     .+3             /IS IT A CR?
1489    2715  4436            CRLF                    /NO
1490    2716  5325            JMP     LISN1
1491    2717  1267            TAD     SPACX2          /GET THE CHAR
1492    2720  1376            TAD     (=223           /CHECK FOR A CONTROL S
1493    2721  7650            SNA     CLA             /WAS IT A CONTROL S
1494    2722  5325            JMP     LISN1           /YES=DO NOT ECHO CHARACTER
1495    2723  1267            TAD     SPACX2
1496    2724  4435            TYPE                    /PRINT THE CHARACTER
1497    2725  1675    LISN1,  TAD I   XLISN           /GET COMPARE VALUE
1498    2726  2275            ISZ     XLISN
1499    2727  7450            SNA                     /EXIT?
1500    2730  5336            JMP     LISN3           /YES
1501    2731  7500            SMA
1502    2732  5346            JMP     LISNUM          /LOOK FOR OCTAL NUMBER
1503    2733  1267            TAD     SPACX2          /COMPARE
1504    2734  7640            SZA CLA                 /EQUAL?
1505    2735  5343            JMP     LISN2           /NO
1506    2736  3266    LISN3,  DCA     XORS
1507    2737  1675            TAD I   XLISN
1508    2740  3275            DCA     XLISN
1509    2741  1266            TAD     XORS
1510    2742  5675            JMP I   XLISN           /AC IS ZERO UNLESS OCTAL NUMBER
1511    2743  7200            CLA
1512    2744  2275            ISZ     XLISN
1513    2745  5325            JMP     LISN1
1514    2746  7200    LISNUM, CLA                     /LOOK FOR OCTAL NUMBER
1515    2747  1267            TAD     SPACX2
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1516   2750  1354              TAD     M270
1517   2751  7500              SMA                         /IS IT LESS THAN 8?
1518   2752  5343              JMP     LISN2               /NO, SO NOT AN OCTAL NUMBER
1519   2753  1057              TAD     K10
1520   2754  7510    M270,     SPA                         /IS IT GREATER THAN ZERO?
1521   2755  5343              JMP     LISN2               /NO, SO NOT A NUMBER
1522   2756  5336              JMP     LISN3
1523   2757  0177    K177,     0177
1524   2760  7775    M3,       7775
1525   2761  7566    M212,     7566
1526
1527
1528
1529
1530   2776  7555
1531   2777  3073
       3000              PAGE
1532
1533
1534
1535                            /PRINT PACKED ASCII TEXT TERMINATED BY
1536                            /SIX=BIT 00
1537
1538   3000  0000    MESAGX,  0                           /CALL BY "MESAGE"
1539   3001  7200              CLA
1540   3002  7000    APTMES,  NOP                          /APT
1541   3003  1600              TAD I   MESAGX
1542   3004  3237              DCA     FOROCK
1543   3005  2200              ISZ     MESAGX              /SET UP RETURN
1544   3006  1637              TAD I FOROCK
1545   3007  7012              RTR
1546   3010  7012              RTR
1547   3011  7012              RTR
1548   3012  4217              JMS     MESAGF
1549   3013  1637              TAD I FOROCK
1550   3014  4217              JMS     MESAGF
1551   3015  2237              ISZ     FOROCK
1552   3016  5206              JMP     .=10
1553   3017  0000    MESAGF,  0
1554   3020  0062              AND     K77
1555   3021  7450              SNA                         /TERMINATOR (00)?
1556   3022  5600              JMP I   MESAGX              /YES
1557   3023  1236              TAD     M43
1558   3024  7450              SNA                         /CRLF?
1559   3025  5234              JMP     .+7                 /YES
1560   3026  1055              TAD     K3
1561   3027  7510              SPA                         /200 OR 300

1562   3030  1063              TAD     K100                /300
1563   3031  1070              TAD     K240                /200
1564   3032  4435              TYPE
1565   3033  5617              JMP I MESAGF
1566   3034  4436              CRLF
1567   3035  5617              JMP I   MESAGF
1568   3036  7735    M43,      7735
1569         5600    INHMES=JMP I MESAGX
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1570
1571
1572                            /INPUT 4 OCTAL NUMBERS TO AC
1573                            /GOOD RETURN IS CALL+2
1574
1575   3037  0000    FOROCK,  0                           /CALL BY "FOROCT"
1576   3040  4427              TWOOCT
1577   3041  5637              JMP I   FOROCK
1578   3042  7106              CLL RTL
1579   3043  7006              RTL
1580   3044  7006              RTL
1581   3045  3253              DCA     XPRNT4
1582   3046  4427              TWOOCT
1583   3047  5637              JMP I   FOROCK
1584   3050  1253              TAD     XPRNT4
1585   3051  2237              ISZ     FOROCK
1586   3052  5637              JMP I   FOROCK
1587
1588                            /PRINT FOUR OCTAL NUMBERS IN AC 11 THRU 0 FOLLOWED
1589                            /BY TWO SPACES
1590
1591   3053  0000    XPRNT4,  0                           /CALL BY "PRNT4"
1592   3054  3237              DCA     FOROCK
1593   3055  1237              TAD     FOROCK
1594   3056  7012              RTR
1595   3057  7012              RTR
1596   3060  7012              RTR
1597   3061  4432              PRNT2
1598   3062  1237              TAD     FOROCK
1599   3063  4432              PRNT2
1600   3064  4434              SPACE2
1601   3065  5653              JMP I   XPRNT4
1602         /
1603                            /PRINT THE OCTAL NUMBER IN AC 9 THRU 11
1604   3066  0000    XPRNT1,  0                           /CALL BY "PRNT1"
1605   3067  0056              AND     K7
1606   3070  1071              TAD     K260
1607   3071  4435              TYPE
1608   3072  5666              JMP I   XPRNT1
1609
1610
1611                            /ROUTINE TO CHECK FOR A CONTROL S WHILE TYPING OUT MESSAGES
1612                            /TO EXIT ROUTINE IF A CONTROL S WAS TYPED=A CONTROL Q OR C MUST BE
1613                            /INPUTTED ON THE KEYBOARD
1614
1615   3073  0000    CNTRLS,  0
1616   3074  6031              KSF                         /SKIP ON CONSOLE KEYBOARD FLAG
1617   3075  5673              JMP  I  CNTRLS              /RETURN TO TYPE ROUTINE=FLAG NOT SET
1618   3076  6034              KRS                         /READ THE CHARACTER STATICALLY
1619   3077  0377              AND     (177                /MASK TO 7 BIT ASCII
1620   3100  1376              TAD     (=23                /CHECK FOR A CONTROL S
1621   3101  7640              SZA     CLA                 /WAS IT A CONTROL S
1622   3102  5673              JMP  I  CNTRLS              /NO=RETURN WITH KEYBOARD FLAG STILL SET
1623   3103  6032              KCC                         /CLEAR KEYBOARD FLAG FROM =S
1624   3104  4306              JMS     WAITQC              /WAIT FOR CONTROL Q OR C
```

```
1625   3105  5673          JMP  I  CNTRLS        /RETURN TO PRINT MESSAGE BEING TYPED
1626
```

```
1627   3106  0000   WAITQC, 0                    /ROUTINE TO WAIT FOR CONTROL Q OR C
1628   3107  5306          JMP   .-1
1629   3110  6036          KRB                    /READ THE CHARACTER TYPED
1630   3111  0377          AND   (177             /MASK TO 7 BIT ASCII
1631   3112  1375          TAD   (-3              /CHECK FOR A CONTROL C
1632   3113  7450          SNA                    /WAS IT A CONTROL C?
1633   3114  5774'         JMP   CBRM             /YES-RESTORE MONITOR AND RETURN
1634   3115  1373          TAD   (-7              /CHECK FOR A LINE FEED CHARACTER
1635   3116  7450          SNA                    /WAS IT A LINE FEED
1636   3117  5324          JMP   RESTRT           /YES GO RESTART THE PROGRAM
1637   3120  1373          TAD   (-7              /CHECK FOR A CONTROL Q "Q
1638   3121  7640          SZA   CLA              /WAS IT A CONTROL Q
1639   3122  5307          JMP   WAITQC+1         /NO-WAIT FOR APPROPRIATE KEY
1640   3123  5706          JMP  I  WAITQC         /RETURN TO WHENCE IT CAME
1641
1642                /ROUTINE TO RELOCATE PROGRAM TO ORIGINAL PROGRAM FIELD
1643                /AND RESTART PROGRAM.
1644   3124  6224   RESTRT, RIF
1645   3125  1076          TAD   K6201
1646   3126  3337          DCA   RST1             /MAKE CDF INSTRUCTIONS
1647   3127  1337          TAD   RST1
1648   3130  3344          DCA   RST3
1649   3131  1772'         TAD   PRGSTK           /ORIGINAL PROGRAM FIELD
1650   3132  3341          DCA   RST2
1651   3133  1341          TAD   RST2
1652   3134  1054          TAD   K2
1653   3135  3353          DCA   RST4             /MAKE CBF INST
1654   3136  3046          DCA   MOVE             /CLEAR IT
1655   3137  6201   RST1,   CDF0                  /MOVE FROM CURRENT PROGRAM FIELD
1656   3140  1446          TAD  I  MOVE
1657   3141  6201   RST2,   CDF0                  /MOVE TO ORIGINAL PROGRAM FIELD
1658   3142  3446          DCA  I  MOVE
1659   3143  1446          TAD  I  MOVE
1660   3144  6201   RST3,   CDF0                  /MOVE FROM CURRENT PROGRAM FIELD
1661   3145  7041          CIA
1662   3146  1446          TAD  I  MOVE           /WAS TRANSFER OK?
1663   3147  7640          SZA  CLA               /YES - SKIP
1664   3150  4771'         JMS   ERRM             /NO - REPORT AN ERROR
1665   3151  2046          ISZ   MOVE             /DONE 4096 TIMES?
1666   3152  5337          JMP   RST1             /NO
1667   3153  6203   RST4,   CBF0                  /CHANGE TO NEW PROG FIELD
1668   3154  5770'         JMP   XSTRT            /RESTART PROGRAM
1669
1670
1671   3170  0206
1672   3171  2000
1673   3172  0216
1674   3173  7771
1675   3174  2400
1676   3175  7775
1677   3176  7755
1678   3177  0177
       5600          *5600
1679
1680                /LOC'S 5600 TO 7777 USED TO SAVE EITHER APT OR OS8 HANDLERS
```

```
1681
1682          0200    *200                        /FOR BINARY LOADER
1683
1684                       $
```

```
0000  11000000  00000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111110  00000000  00000000  00000000  00000000  00000000  00000000  00000000

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  10000000  11111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111000  00000000  00000111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  10111111  11111111

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11000000  00000000  00001111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11100000  00000000  00001111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11000000
2100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000011

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111110  00000000  01111111  11111111  11111111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111110  00000000  00001111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  11000000  00000011

3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111000  00000000  11111111

3200
3300

3400
3500

3600
3700
```

```
4000
4100

4200
4300

4400
4500

4600
4700


5000
5100

5200
5300

5400
5500

5600
5700


6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300


7400
7500

7600
7700
```

ADD1	1517	CLRLST	0311	K34	0257	PART2	1455
ADDCNT	0771	CNTRLG	2547	K4000	0074	PASCNT	0276
ADDINC	0766	CNTRLS	3073	K4060	0075	PASMES	0345
ADRCHK	1555	CNTRS	2553	K6201	0076	PAT1	0773
AGAIN	1305	CNTRS1	2555	K6203	0077	PAT2	0774
ALLRAD	0502	COLCNT	0050	K7	0056	PATCNT	0772
APTCTX	2253	CONST	0051	K7577	0100	PCOUNT	0260
APTCTY	2254	COUNT	0047	K7600	0101	PERR1	1656
APTF01	1640	CRLF	4436	K77	0062	PERRM	2014
APTF02	2002	DATA	1345	K7700	0102	PRDYN	1606
APTF03	1530	DONE3	1104	KOUNT	0256	PREL	0331
APTER	2255	DYNER1	1613	KSFCHK	0104	PRFLD	0546
APTIMX	2251	DYNERR	1527	LDDATA	1254	PRGFLD	2316
APTIMY	2252	DYNTS2	1115	LDJMP	1227	PRGSTK	0216
APTMES	3002	DYNTS3	1131	LDJMP1	1235	PRNT1	4430
APTMOD	2200	DYNTST	1010	LDJMS1	1220	PRNT2	4432
APTN00	0213	ERRM	2000	LISN	4424	PRNT4	4433
APTN01	0223	FILLER	2600	LISN1	2725	PRNTMS	4425
APTN02	2524	FLD	2314	LISN2	2743	PSEUDO	2440
APTNTP	2637	FLDCNT	0765	LISN3	2736	PSR	0020
APTOK	2234	FLDINC	0767	LISNUM	2746	PSTK1	1343
APTOK0	0261	FLDLST	1725	LOAD	1301	PTR	1560
APTOK1	0745	FOROCK	3037	LODFLD	1274	QESTMK	2331
APTOK2	1040	FOROCT	4431	LODJMS	1212	RBELL	2064
ATTOP	0475	GDATA	0045	LODSTK	1200	RDF	6214
BADCNT	0501	HAFDON	1330	M212	2761	REDFLD	0700
BADFLD	1724	HCW1	0021	M270	2754	REDLUP	0663
BADPTR	0477	HCW2	0022	M3	2760	REDUPD	0713
BADSTK	0443	HEAD	1735	M37	0052	RELERR	2040
BDATA	0044	HEAD1	0037	M40	1351	RELO	0400
BEGIN	0214	IAPTER	0105	M43	3036	RELO1	0422
BFLL	2056	IAPTOK	0106	M7	0313	RELO2	0424
CBRM	2400	INHMES	5600	M75	0053	RELO3	0427
CBRM0	2416	INHTYP	5635	MARCH	1600	RELO4	0441
CBRM1	2435	INIT	0277	MEMLOD	0631	REPERR	1516
CBF0	6203	INST	1154	MESAGF	3017	RESTRT	3124
CBF1	6213	JMSLOD	1205	MESAGX	3000	RETCOD	1400
CBF2	6223	K10	0057	MOSERR	1636	RETURN	1513
CBF3	6233	K100	0063	MOSFLD	0634	RETYPE	2506
CDF0	6201	K1000	0073	MOSLOD	0612	RIF	6224
CDF1	6211	K177	2757	MOSLUP	0624	RST1	3137
CDF2	6221	K2	0054	MOSTST	0600	RST2	3141
CDF3	6231	K20	0060	MOVE	0046	RST3	3144
CHAR	2651	K200	0064	NOBELL	2070	RST4	3153
CHARR0	2472	K207	0065	NWFLD	1557	SAME	1144
CHARR1	2476	K212	0066	NXCOL	1076	SAVCHR	2521
CHECK	0462	K215	0067	NXSTK	0500	SAVFLD	2307
CHGCHR	2454	K240	0070	NXTPAS	0230	SAVOS8	2267
CHGFLD	1340	K260	0071	NXTTST	1111	SETPAT	1000
CHKKSF	2523	K261	0072	ONEOCK	2601	SPACE2	4434
CHKTST	1523	K3	0055	ONEOCT	4426	SPACX2	2667
CLRCNT	0312	K30	0061	OVER	1545	SRMESG	2326

```
        SPQFST  2442
        STACKS  0532
        START   0200
        STKKNT  1155
        STKKT1  1156
        STKBIN  0042
        STKTST  0043
        STKUPD  0643
        STOADD  2325
        STOP    1713
        STOP1   2030
        STPTAD  1153
        TEST    0235
        TESTAD  0040
        TITLE   0314
        TOP     1462
        TOPSTK  0041
        TSTCNT  0770
        TSTK1   1341
        TSTORG  1160
        TSTPTR  1157
        TSTSYS  0523
        TTYCNT  2522
        TWOOCK  2611
        TWOOCT  4427
        TYPE    4435
        UPAPRC  2333
        UPARRG  2335
        UPSTK   1067
        WAITQC  3106
        X       0453
        XAND    1432
        XAPT    2277
        XCDF    1442
        XCRLF   2652
        XDYN1   1037
        XDYN2   1047
        XDYN3   1055
        XFLD    1723
        XJMPI   1447
        XLISN   2675
        XM37    1347
        XM75    1346
        XN37    1350
        XORS    2666
        XPRNT1  3066
        XPRNT2  2624

        XPRNT4  3053
        XSTART  1556
        XSTOP   0103
        XSTRT   0206
        XTYPE   2635
```

ERRORS DETECTED: 0

LINKS GENERATED: 70

RUN-TIME: 4 SECONDS

3K CORE USED

```
ADD1      896   914#
ADDCNT    434   483#   499
ADDINC    404   432    444    446    447    451    480#
ADRCHK    828   852    853    952#
AGAIN     764#  780
ALLBAD    302   313#
APTCTX    1146  1151   1158#
APTCTY    1148  1149   1159#
APTEO1    985#  1125
APTEO2    1060# 1127
APTEO3    929#  1129
APTER     118   1166#  1173
APTIMX    1145  1156#
APTIMY    1147  1157#
APTMES    1131  1540#
APTMOD    1107# 1134   1196
APTNO0    139#  1115
APTNO1    150#  1117
APTNO2    1119  1341#
APTNTP    1133  1425#
APTOK     119   1142#  1154
APTOKU    186#  1109
APTOK1    462#  1111
APTOK2    561#  1113
ATTOP     290   306#
BADCNT    285   299    311#
BADFLD    1025  1027   1038#
BADPTR    294   295    309#
BADSTK    240   278#   297
BDATA     81#   422    428    1019
BEGIN     142#  1197
BELL      930   989    1064   1093#  1102   1103   1104
C8RM      1247# 1301   1350   1633
C8RM0     1252  1261#  1275
C8RM1     1265  1276#
CBF0      18#   270    1667
CBF1      19#
CBF2      20#
CBF3      21#
CDF0      14#   144    255    257    260    1204   1206   1655   1657   1660
CDF1      15#
CDF2      16#
CDF3      17#
CHAR      1424  1428   1436#
CHARR0    1291  1295   1309#  1321
CHARR1    1310  1313#
CHECK     293#  307
CHGCHR    1292  1295#  1311   1312   1320   1323   1367
CHGFLD    690   703    718    741    760    769    774    796#   800    826    831    842    854    861
          869
CHKKSF    117   1340#  1342   1347   1359   1364   1370
CHKTST    890   921#
CLRCNT    206   211    216#

CLRLST    208   209    210    215#
CNTRLG    1352  1361#
CNTRLS    1427  1615#  1617   1622   1625
CNTRS     1303  1366#
CNTRS1    1354  1369#
COLCNT    85#   562    604    605    683    697    714    727    733    817    849    876
CONST     86#   557    620    622    731    734    787
COUNT     84#   239    267    986    1061
CRLF      69#   170    193    551    630    641    941    1079   1330   1489   1566
DATA      732   735    736    740    742    758    764    771    775    802#
DONE3     609#  924
DYNER1    937   978#
DYNERR    910   928#   931    949
DYNTS2    615   620#
DYNTS3    616   632#
DYNTST    172   537#   546    617
ERRM      264   1058#  1065   1089   1664
FILLER    1380# 1448
FLD       1186  1194   1204#  1211
FLDCNT    365   395    411    439    479#
FLDINC    402   437    441    443    453    481#
FLDLST    207   293    892    1024   1040#
FOROCK    60    1542   1544   1549   1551   1575#  1577   1583   1585   1586   1592   1593   1598
FOROCT    59#
GDATA     82#   416    426    1017
HAFDON    746   786#   789    793
HCW1      45#   145
HCW2      46#   128    1343
HEAD      998   1048#
HEAD1     76#   160    995    1081
IAPTER    118#  1124   1126   1128
IAPTOK    119#  1108   1110   1112
INHMES    1130  1569#
INHTYP    1132  1437#
INIT      155   204#   213
INST      564   603    658#   717
JMSLOD    688#  692
K10       94#   393    401    592    881    915    1185   1519
K100      98#   354    705    726    834    1562
K1000     106#  474    610
K177      1479  1523#
K2        91#   252    1652
K20       95#   1096
K200      99#   556    558    698    715    720    738    790    933    992    1067   1480
K207      100#  1099
K212      101#  1451
K215      102#  1446
K240      103#  1563
K260      104#  168    638    939    1002   1013   1075   1606
K261      105#  320    549    627
K3        92#   639    1560
K30       96#   1193
K34       146   179#
```

Symbol													
K4000	107#	623	744										
K4060	108#												
K6201	109#	133	244	247	370	377	407	418	540	566	579	1170	1184	1192
	1251	1645											
K6203	110#	860	900										
K7	93#	1605											
K7577	111#	1182	1253	1257	1259								
K7600	112#	554	903	908									
K77	97#	606	778	851	1554								
K7700	113#	743	830										
KOUNT	158	174	178#										
KSFCHK	117#	143	186	414	590	1101							
LDDATA	734#	749											
LDJMP	693	711#											
LDJMP1	717#	723											
LDJMS1	702#	708											
LISN	49#	1293	1348	1386									
LISN1	1475	1490	1494	1497#	1513								
LISN2	1505	1511#	1518	1521									
LISN3	1500	1506#	1522										
LISNUM	1502	1514#											
LOAD	759#	762											
LODFLD	683	754#	781	782									
LODJMS	685	696#											
LODSTK	684	682#	750										
M212	1483	1525#											
M270	1516	1520#											
M3	1486	1524#											
M37	89#	712	729										
M40	765	806#											
M43	1457	1568#											
M7	205	217#											
M75	90#	700											
MARCH	358	975#	1022										
MEMLOD	379#	389											
MESAGF	1548	1550	1553#	1565	1567								
MESAGX	52	1538#	1541	1543	1556	1569							
MOSERR	430	983#	990	1005	1035								
MOSFLD	371	383#											
MOSLOD	362#	472	476	1034									
MOSLUP	372#	396											
MOSTST	171	352#	356	477									
MOVE	83#	254	256	258	259	262	265	1077	1654	1656	1658	1659	1662	1665
NOBELL	1098	1103#											
NWFLD	987	891	897	938	954#								
NXCOL	603#	923											
NXSTK	241	282	288	291	292	306	310#						
NXTPAS	156#	177											
NXTTST	552	614#											
ONEOCK	54	1385#	1391	1392	1398	1403							
ONEOCT	53#												
OVER	935	942#											
PART2	599	875#											
PASCNT	154	190	191	200#									
PASMES	189	221#											
PAT1	379	415	456	458	465	467	485#	495	496				
PAT2	423	459	461	468	470	486#	498						
PATCNT	360	471	484#										
PCOUNT	176	183#	198										
PERR1	996	999#											
PERRM	1070#												
PRDYN	548	626	637	977#									
PREL	153	220#											
PPFLD	164	328#											
PRGFLD	1201	1206#											
PRGSTK	134	144#	1200	1649									
PRNT1	57#	1416	1418										
PRNT2	61#	1597	1599										
PRNT4	63#	192	1006	1016	1018	1020	1078	1288	1329				
PRNTMS	51#	135	152	163	188	301	322	357	547	625	636	936	997	1021
	1070	1248	1285	1306	1326	1357	1361	1462					
PSEUDO	141	197	303	944	1030	1084	1283#	1325	1331	1363			
PSR	36#	194	353	473	543	609	932	942	945	991	1028	1031	1066	1082
	1085	1095	1287	1309	1314	1318	1328						
PSTK1	567	799#											
PTR	893	894	955#										
QESTMK	1216#	1307	1358										
RBELL	1099#												
RDF	22#												
REDFLD	408	425#											
REDLUP	412#	435	440	464									
REDUPD	413	436#											
RELERR	1071	1091#											
RELO	173	237#	269	271	304								
RELO1	248	249	255#	266	1088								
RELO2	245	251	257#										
RELO3	250	260#											
RELO4	253	270#											
REPERR	841	910#											
RESTRT	1297	1636	1644#										
RETCOD	585	815#	843										
RETURN	825	907#											
RETYPE	1299	1321#											
RIF	23#	132	161	165	539	1169	1250	1644					
RST1	1646	1647	1655#	1666									
RST2	1650	1651	1657#										
RST3	1648	1660#											
RST4	1653	1667#											
SAME	372	412	574	649#	654	655	880						
SAVCHR	1313	1317	1333#										
SAVFLD	1187	1195	1199#	1212									
SAVOSB	131	1181#	1188										
SETPAT	361	493#	500										
SPACE2	65	1007	1600										
SPACX2	66	1461#	1464	1481	1482	1491	1495	1503	1515				
SRMESG	1215#	1286	1327										

```
SRQEST    1285#   1308
STACKS     323    326#
STAPT      126#
STKKNT     570    571    594    659#
STKKT1     572    660#   888
STKPIN      79#   162    246    279    369    406    565    650    859    999
STKTST      80#   368    376    392    394    405    417    436    438    454    455    573    578    591
           593    652    879    882    883    884    914    916   1008   1072
STKUPD     374    392#
STOADD    1202   1214#
STOP       114    994   1028#
STOP1     1069   1082#
STRTAD     555    624    635    657#   816
TEST       161#   175
TESTAD      77#   362    382    384    386    387    421    424    431    433    450    452    560    687
           691    699    704    706    716    719    721    728    737    739    756    761    770    776
           777    791    792    798    818    820    822    824    829    836    838    840    866   1015
TITLE      136    219#
TOP        880#   917
TOPSTK      78#   148    156    283    286    319    363    409    568
TSTCNT     367    463    482#
TSTK1      580    797#
TSTORG     559    581    633    662#   877    921
TSTPTR     553    613    614    661#
TSTSYS     151    318#   324
TTYCNT    1290   1319   1334#
TWOOCK      56   1397#  1399   1404   1406   1407   1412   1413   1417
TWOOCT      55#  1576   1582
TYPE        67#   169    321    550    629    640    940   1003   1014   1076   1100   1447   1452   1496
          1564   1607
UPARRC    1217#  1249
UPARRG    1218#  1362
UPSTK      576    590#
WAITQC    1366   1369   1624   1627#  1639   1640
X          286#   300
XAND       819    848#   855
XAPT       130   1189#
XCDF       821    837    858#   862
XCRLF       70   1444#  1455
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XDYN2      568#   608
XDYN3      574#   595
XFLD      1011   1012   1023   1037#
XJMPI      823    839    865#   870
XLISN       50   1473#  1497   1498   1507   1508   1510   1512
XM37       730    748    804#
XM75       701    707    803#
XN37       713    722    805#
XORS      1450   1453   1457#  1506   1509

XPRNT1      58   1604#  1608
XPRNT2      62   1402   1405   1411#  1419
XPRNT4      64   1581   1584   1591#  1601
XSTART     878    904    953#


XSTOP      114#
XSTRT      132#  1668
XTYPE       68   1423#  1434   1437
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.L0371     173    195    224#
.L0372     172    225#
.L0373     171    226#
.L0374     151    227#
.L0375     141    197    228#
.L0376     131    229#
.L0377     130    230#
.L0575     303    330#
.L0576     293    331#
.L0577     264    332#
.L0775     430    488#
.L0776     372    412    489#
.L0777     361    490#
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.L1163     599    667#
.L1164     585    668#
.L1165     584    669#
.L1166     583    670#
.L1167     580    671#
.L1170     567    672#
.L1171     563    673#
.L1172     552    674#
.L1173     544    675#
.L1174     499    676#
.L1175     498    677#
.L1176     495    496    678#
.L1177     494    679#
.L1374     773    809#
.L1375     768    810#
.L1376     717    811#
.L1377     688    702    759    812#
.L1561     948    960#
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.L1563     930    962#
.L1564     924    963#
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.L1567     888    966#
.L1570     880    967#
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.L1774    1034   1051#
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,L2354   1175    1223#
,L2355   1153    1224#
,L2356   1133    1225#
,L2357   1132    1226#
,L2360   1131    1227#
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,L2362   1129    1229#
,L2363   1127    1230#
,L2364   1125    1231#
,L2365   1124    1126    1128    1232#
,L2366   1123    1233#
,L2367   1121    1234#
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,L2371   1117    1236#
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