LS11

CENTRONICS LINE PRINTER

MD-11-DZLSA-B

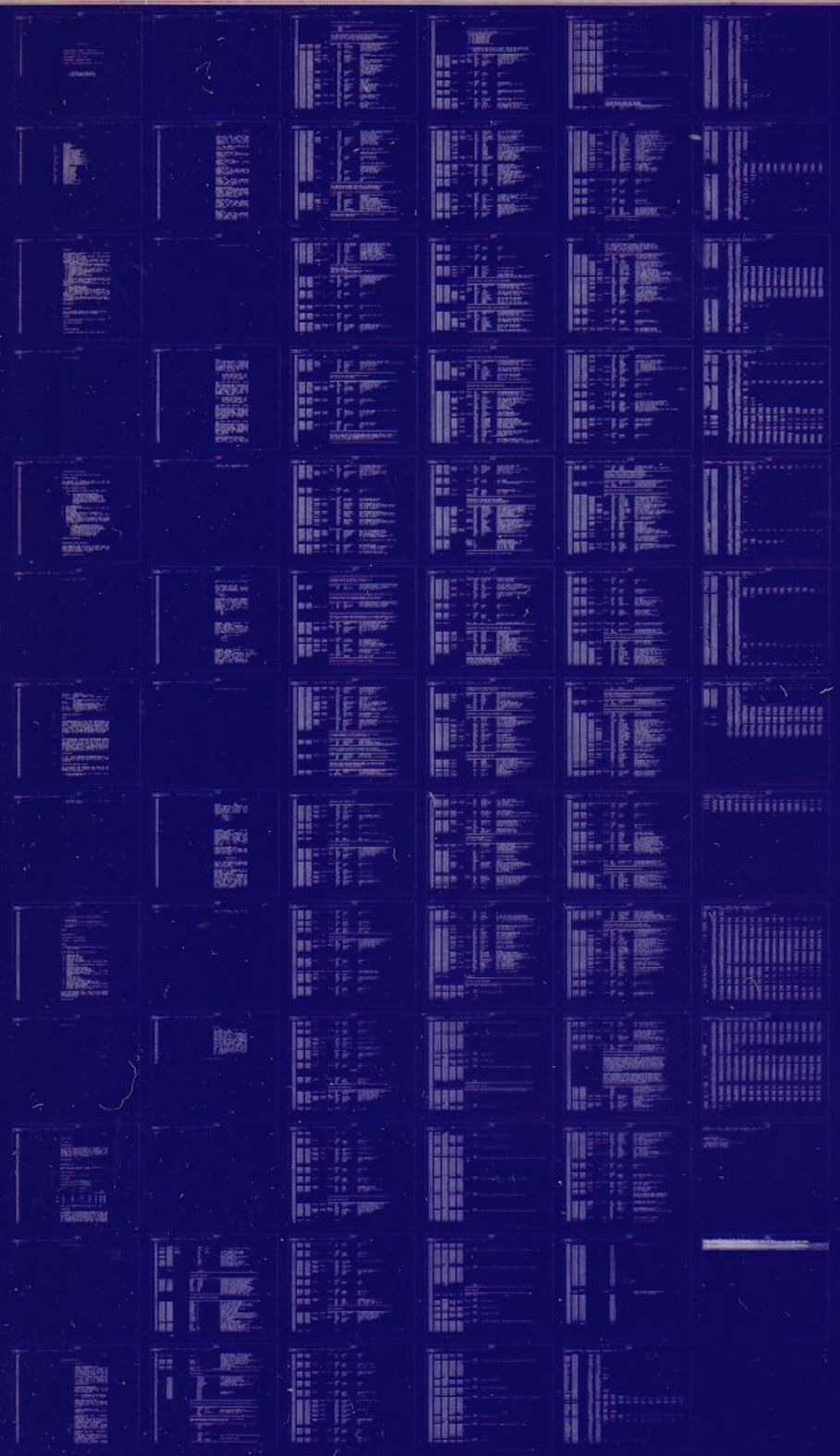
EP-DZLSA-B-DL-A

FICHE 1 OF 1

NOV 1976

digital

MADE IN USA



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                        .REM \
```

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZLSA-B-D

PRODUCT NAME: LS11 CENTRONICS PRINTER TEST

DATE CREATED: NOV., 1972

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: BRUCE BURGESS REVISED: KEN LIND

CONTENTS

1. ABSTRACT

THIS PROGRAM IS DESIGNED TO TEST AND EXERCISE CENTRONICS PRINTERS.
THE BASIC LOGIC TESTS EXECUTED AND EXERCISES PERFORMED ARE AS FOLLOWS:
(A) MANUAL INTERVENTION (OPTIONAL) TO CHECK HARDWARE ALARMS. FOR FURTHER DETAILS SEE TEST 0 UNDER PROGRAM DESCRIPTION.
(B) STATUS AND BUFFER REGISTER ADDRESSABILITY
(C) DONE BIT - CLEAR AND SET; AS WELL AS MODE & IE BITS AFTER RESET
(D) INTERRUPT ENABLE BIT - CLEAR AND SET
(E) INTERRUPTS WITH PROCESSOR AT LEVELS 4 THRU 7
(F) INTERRUPT WITH PROCESSOR AT LEVEL 3
(G) DESELECT INTERRUPT
(H) FORMAT CONTROL CHARACTERS
(I) BELL
(J) RELATIVE TIMING TECHNIQUE FOR CHECKING TIME TO EXECUTE A CERTAIN LINE LENGTH (4 LENGTHS IN THIS PROGRAM) AND SLEWING RATE.
(SEE SECTION 8.4 TO INTERPRET RELATIVE TIME TEST RESULTS)
(K) DATA TRANSFER LINES
(L) CHARACTER GENERATION
(M) LOWER CASE LETTERS FORCED TO UPPER CASE
(N) SWITCH REGISTER INPUT (OPTIONAL) TO PRINT LINES OF CHARACTERS REGULAR OR ELONGATED. FOR FURTHER DETAILS SEE TEST 31 UNDER PROGRAM DESCRIPTION.
(O) PRINT TIME FREE PULSE GENERATOR (OPTIONAL). FOR FURTHER DETAILS SEE TEST 31 UNDER PROGRAM DESCRIPTION.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 STANDARD COMPUTER WITH CONSOLE TELETYPE. A CENTRONICS PRINTER AND LS11 INTERFACE.

2.2 STORAGE

THIS PROGRAM REQUIRES A MINIMUM OF 4K STORAGE.

2.3 PRELIMINARY PROGRAMS

NONE

3. LOADING PROCEDURE

USE STANDARD PROCEDURE FOR LOADING .ABS TAPES.

```
  125
  126                                4.        STARTING PROCEDURE
```

4.1 CONTROL SWITCH SETTINGS

SEE 5.1 (ALL DOWN FOR WORST CASE TESTING).

4.2 STARTING ADDRESS

THE PROGRAM IS STARTED AT 200. IT MAY BE RESTARTED AT 600 AFTER APPROPRIATE SWITCH SETTINGS (IF ANY) HAVE BEEN SELECTED.

4.3 PROGRAM & OPERATOR ACTION

1. LOAD PROGRAM INTO MEMORY USING .ABS LOADER.

   NOTE: THE USER SHOULD NOW SPECIFY THE NUMBER OF COLUMNS DESIRED IN "COLCNT" IN THE VARIABLE SECTION AT THE FRONT OF THE PROGRAM. THE NUMBER SHOULD BE SPECIFIED IN OCTAL, THE LIMITS BEING 80 TO 132 DECIMAL COLUMNS.

2. LOAD ADDRESS 200.
3. SET SWITCHES (SEE SECTION 5.1), ALL DOWN FOR WORST CASE.
4. PRESS START.
5. HIT CONTINUE SWITCH IF TTY REQUESTS IT.
6. THE PROGRAM WILL LOOP & TTY BELL WILL RING ONCE EVERY PASS.
   REPLACE THE CONTENTS OF LOCATION 'RING' IN THE VARIABLE SECTION AT THE FRONT OF THE PROGRAM WITH SOME 'CHARACTER' CODE IF YOUR TTY DOESN'T ECHO THE BELL.

   NOTE: MANUAL INTERVENTION TESTING IS NOT REQUIRED FOR DEVICE TESTING BUT CAN BE ACCESSED FOR CHECKING HARDWARE ALARMS WITH BIT08 SET TO A 1 ON A LOAD ADDRESS = 200, OR BY SELECTING TEST 0 WITH BIT09 SET TO A 1 ON LOAD ADDRESS =600.

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

START ADDRESS = 200 WITH ALL SWITCHES DOWN IS WORSE CASE TESTING. THE BELL WILL RING UPON COMPLETION OF A PASS OF THE ENTIRE PROGRAM. (SEE ITEM 6 UNDER PARAGRAPH 4.3 ABOVE)

THE SWITCH SETTINGS ARE:

```
183
184                                     SW<15>=1....HALT ON ERROR
```

```
                        SW(14)=1....SCOPE LOOP
                        SW(13)=1....INHIBIT ERROR PRINTOUT
                        SW(12)  ....SELECT  "PRINT  TIME  FREE"  PULSE
                            GENERATOR
                                    SEE PROGRAM DESCRIPTION OF TEST 31
                        SW(11)  ... NOT USED
                        SW(10)=1....ELONGATION ON SWR INPUT TEST
                                    SEE PROGRAM DESCRIPTION OF TEST 31
                        SW( 9)=1....SELECTION OF A PARTICULAR TEST
                        SW( 8)=1....SELECT MANUAL INTERVENTION
                        SW(7THRU0)....CONTAINS THE TEST NO.  - USED WITH
                                      SW(9)

                5.2     SUBROUTINE ABSTRACTS

                5.2.1   SCOPE

                        THIS SUBROUTINE CALL (VIA A TRAP  INSTRUCTION)  IS
                        PLACED  BETWEEN  EACH  TEST  IN  THE  INSTRUCTION
                        SECTION.  IT RECORDS THE STARTING ADDRESS OF  EACH
                        TEST  IN LOCATION "RETURN" AS IT IS BEING ENTERED.
                        IF  A  SCOPE  LOOP  IS  REQUESTED,  SW(14)=1,  THE
                        CURRENT  TEST  WILL BE LOOPED UPON UNTIL HALTED BY
                        THE USER.  THE CONTENTS OF "RETURN" MAY BE USED TO
                        DETERMINE THE LAST TEST SUCCESSFULLY COMPLETED.

                5.2.2   HLT

                        THIS ROUTINE CALL (VIA AN EMT INSTRUCTION)  PRINTS
                        OUT  THE PROGRAM COUNTER (PC) AND AN ERROR MESSAGE
                        (SEE SECTION 6.1).   IF  SW(15)=1  AND  A  HLT  IS
                        EXECUTED,  THE  PROGRAM  WILL  HALT  WITH THE PC &
                        ERROR MESSAGE PRINTED OUT.  IF SW(15)=0 AND A  HLT
                        IS  EXECUTED,  THE  PC & ERROR MESSAGE ARE PRINTED
                        OUT AND THE PROGRAM WILL  CONTINUE  IN  EXECUTION.
                        TO INHIBIT ERROR PRINTOUT PUT SW(13) ON A 1.

                5.2.3   TRAPCATCHER

                        A ".+2" - "HALT" SEQUENCE IS REPEATED FROM LOC.  0
                        TO LOC.  776 TO CATCH ANY UNEXPECTED TRAPS.  THUS,
                        ANY UNEXPECTED TRAPS WILL HALT AT THE DEVICE  TRAP
                        VECTOR +2.

                5.3     PROGRAM AND OPERATOR ACTION

                        THE  FOLLOWING  USER  REQUESTS  ARE  MADE  BY  THE
                        PROGRAM  DURING  THE  OPTIONAL MANUAL INTERVENTION
                        SECTION OF THE PROGRAM:

                        1.  SELECT PRINTER ON LINE.  HIT  CONTINUE  SWITCH
                            TO RESUME OPERATION.
```

```
241                                     2.  OPEN FRONT PANEL &  HIT  TOP  OF  FORM - PAPER
242                                         SHOULD NOT ADVANCE.
```

HIT CONTINUE SWITCH TO RESUME OPERATION.

3. REMOVE PAPER.
HIT CONTINUE SWITCH TO RESUME OPERATION.

4. PUT PAPER BACK. HIT CONTINUE SWITCH TO RESUME OPERATION.

6. ERRORS

6.1 ERROR PRINTOUT

THE FORMAT IS AS FOLLOWS:

PC="XXXXX" ERROR MESSAGE

WHERE,

XXXXX=OCTAL VALUE OF PROGRAM COUNTER LOCATION AT TIME OF ERROR

ERROR MESSAGE = ONE OF THE FOLLOWING:

A. ERROR BIT SET
B. ERROR BIT NOT SET
C. DONE BIT NOT SET
D. DONE BIT NOT CLEAR
E. PRINTER INTERRUPTED WHEN PROCESSOR ABOVE LEVEL 3
F. PRINTER DIDN'T INTERRUPT WHEN PROCESSOR AT LEVEL 3
G. DONE BIT NEVER CLEARED
H. SELECT CODE NOT RECOGNIZED
I. DESELECT CODE NOT RECOGNIZED - IF MODEL DOESN'T HAVE FEATURE - OK
J. ADDRESS FAILURE - 'ADDERR' CONTAINS PC OF ERROR
K. IE BIT NOT SET
L. IE BIT NOT CLEAR
M. IE BIT SET - SHOULDN'T BE
N. MODE BIT (BIT0) SET - SHOULDN'T BE
O. PRINTER DIDN'T INTERRUPT ON DESELECT FEATURE
P. DONE BIT NEVER CLEARED
Q. PRINTER INTERRUPTED WITH PROCESSOR BELOW PRINTER LEVEL & IE BIT CLEAR

TO FIND THE FAILING TEST, LOOK AT THE LISTING ABOVE THE ADDRESS TYPED. FROM THIS IT SHOULD BECOME APPARENT AS TO WHAT WAS BEING DONE BEFORE THE ERROR OCCURRED.

6.2 ERROR RECOVERY

```
   299
   300                                  RESTART AT 600
```

6.3 ERROR COUNTER

NOT USED

7. RESTRICTIONS

THE PROGRAM HAS THE CAPABILITY OF VARIABLE COLUMN WIDTH BY CHANGING LOCATION 'COLCNT' IN THE VARIABLE SECTION AT THE FRONT OF THE PROGRAM. THE PROGRAM IS CURRENTLY SET FOR 132 (DECIMAL) COLS. BE AWARE THAT THE PROGRAM WILL ONLY HANDLE 80 TO 132 (DECIMAL) COLS. PROPERLY.

8. MISCELLANEOUS

8.1 EXECUTION TIME

WORSE CASE (ALL SWITCHES DOWN) APPROXIMATELY 11 MIN. FOR FULL 132 COL. TESTING.

8.2 STACK POINTER

STACK IS INITIALLY SET TO 1100.

8.3 PASS COUNT

A PROGRAM PASS THRU COUNT IS KEPT IN "PCNT".

8.4 AVERAGE RELATIVE TIME TABLE

TEST NO.	MACHINE					
	15/20	05/10	/40	/45 CORE	/45 MOS	/45 BIP
14	33	29	40	47	88	132
15	26	23	32	37	70	104
16	22	19	28	31	60	88
17	15	13	18	21	40	60
20	9	8	17	13	19	36

NOTE: THE NUMBERS ABOVE CAN VARY + OR - 20%

8.5 ITERATIONS

AS MENTIONED IN THE NOTE BELOW (UNDER TEST NO. 5) THE BASIC LOGIC TESTS ARE AUTOMATICALLY DONE 200 TIMES EACH. IF DESIRABLE THE NO. OF ITERATIONS CAN BE CHANGED BY CHANGING "ICNT" & "REICNT" IN THE VARIABLE SECTION AT THE FRONT OF THE PROGRAM. IF AN ERROR OCCURS WHILE ITERATING, ITERATIONS ON THAT PARTICULAR TEST STOPS, AND THE PROGRAM

```
   357                                  PROCEEDS TO THE NEXT TEST.
```

9. PROGRAM DESCRIPTION

TEST NO.	FUNCTION
0	MANUAL INTERVENTION TEST CHECKS THE ERROR BIT & SELECT AND DESELECT CODES. SEE SECTION 5.3 FOR OPERATOR ACTION. THIS TEST IS NOT PERFORMED ON WORSE CASE TESTING (ALL SWITCHES DOWN). IT IS ACCESSED, HOWEVER, WITH BIT08 SET TO A 1 WITH A LOAD ADDRESS OF 200. IT CAN ALSO BE ACCESSED BY SELECTING TEST 0 IN CONJUNCTION WITH BIT09 SET TO A 1 WITH A LOAD ADDRESS OF 600.
1	CENTRONICS ADDRESS TEST CHECKS THE ADDRESSABILITY OF THE USED STATUS AND DATA BUFFER REGISTER ADDRESSES. NOTE: THE ADDRESS OF THE FAILING ADDRESS IS KEPT IN 'ADDERR'.
2	DONE, MODE & IE BIT TEST CHECKS THE DONE BIT FOR CLEAR & SET CAPABILITY, AS WELL AS CHECKING THAT RESET DOESN'T SET THE MODE OR IE BITS.
3	INTERRUPT ENABLE BIT TEST CHECKS THE IE BIT FOR CLEAR AND SET CAPABILITY.
4	INTERRUPT LEVEL TEST - PROCESSOR ABOVE LEVEL 3 CHECKS THAT THE PRINTER WHICH IS AT A PRIORITY LEVEL OF 4 WILL NOT INTERRUPT WHEN THE PROCESSOR IS AT A PRIORITY LEVEL OF 4 THRU 7. NOTE: 'LSINT' CONTAINS PRINTER INTERRUPT VECTOR OF 200 & A PRINTER PRIORITY LEVEL OF 4 IS IN 'INTLVL'.
5	INTERRUPT LEVEL TEST - PROCESSOR AT LEVEL 3 CHECKS THAT THE PRINTER WHICH IS AT A PRIORITY LEVEL OF 4 WILL INTERRUPT WHEN THE PROCESSOR IS AT A PRIORITY LEVEL OF 3. NOTE: 'LSINT' CONTAINS PRINTER INTERRUPT VECTOR OF 200 & A PRINTER

```
414                                     PRIORITY LEVEL OF 4 IS IN 'INTLVL'.
```

NOTE: (A) TESTS 1 THRU 5 WILL AUTOMATICALLY BE DONE 200 TIMES EACH UNDER PROGRAM CONTROL. HOWEVER, IF AN ERROR OCCURS ITERATIONS WILL STOP & TESTING WILL PROCEED.
(B) TESTS 6 THRU 27 ARE DONE 1 TIME UNLESS BIT14 IS SET FOR LOOPING ON THE TEST.

6 DESELECT INTERRUPT TEST
CHECKS THAT THE PRINTER WILL INTERRUPT EVEN THOUGH IT HAS BEEN DESELECTED.

7 CARRIAGE RETURN TEST
CHECKS THAT CARRIAGE RETURN FUNCTIONS PROPERLY. 'CR' IS PRINTED OUT.

10 LINE FEED TEST
CHECKS THAT LINE FEED FUNCTIONS PROPERLY. 'LF' IS PRINTED OUT. ON WORSE CASE TESTING IT SHOULD APPEAR DIRECTLY UNDER 'CR'.

11 DELETE TEST
CHECKS THAT DELETE FUNCTIONS PROPERLY. 'DEL' IS PRINTED OUT. ON WORSE CASE TESTING IT SHOULD APPEAR DIRECTLY UNDER 'LF'.

12 VERTICAL TAB TEST
CHECKS THAT VERTICAL TAB FUNCTIONS PROPERLY. 3 'VT'S ARE PRINTED OUT. ON WORSE CASE TESTING IT SHOULD APPEAR A NUMBER OF LINES AFTER 'DEL' DEPENDENT ON THE PAPER TAPE CURRENTLY IN THE PRINTER.

13 FORM FEED TEST
CHECKS THAT FORM FEED FUNCTIONS PROPERLY. 2 'FF'S ARE PRINTED OUT. IF PAPER HAS BEEN POSITIONED PROPERLY 'FF' WILL APPEAR AT THE TOP OF PAGE.

14 BELL TEST
CHECKS THAT THE BELL FUNCTIONS PROPERLY. 'BELL' IS PRINTED OUT. ON WORSE CASE TESTING IT SHOULD APPEAR DIRECTLY UNDER 'FF'. AN AUDIBLE SOUND IS HEARD.

```
471
472                                     15          132  CHARS./LINE  RELATIVE   TIMING
```

```
                                                                    PAGE 10


                                        TEST
                                        CHECKS RELATIVE TIME TO EXECUTE 132
                                        CHARS./LINE PRINTOUT.  THE PRINTOUT
                                        IS  1  FULL  LINE  OF  CHARACTERS
                                        FOLLOWED BY RELATIVE TIMING=N WHERE
                                        N=A DECIMAL NUMBER  WHICH  WILL  BE
                                        DEPENDENT  ON  THE  MACHINE  THE
                                        PRINTER IS INTERFACED TO.

                                        NOTE:  IF LESS THAN 132 COLS.  IS
                                               SPECIFIED IN 'COLCNT' THIS
                                               TEST IS NOT DONE.  ONLY THE
                                               'TEST NO.' WILL APPEAR!

                              16        100  CHARS./LINE  RELATIVE  TIMING
                                        TEST
                                        CHECKS RELATIVE TIME TO EXECUTE 100
                                        CHARS./LINE PRINTOUT.  THE PRINTOUT
                                        IS 1 LINE OF 100  CHARS.  FOLLOWED
                                        BY  RELATIVE  TIMING=N  WHERE  N=A
                                        DECIMAL  NUMBER  WHICH  WILL  BE
                                        DEPENDENT  ON  THE  MACHINE  THE
                                        PRINTER IS INTERFACED TO.

                                        NOTE:  IF LESS THAN 100 COLS.  IS
                                               SPECIFIED IN 'COLCNT' THIS
                                               TEST IS NOT DONE.  ONLY THE
                                               'TEST NO.' WILL APPEAR!

                              17         80  CHARS./LINE  RELATIVE  TIMING
                                        TEST
                                        CHECKS RELATIVE TIME TO EXECUTE  80
                                        CHARS./LINE PRINTOUT.  THE PRINTOUT
                                        IS 1 LINE OF 80 CHARS.  FOLLOWED BY
                                        RELATIVE TIMING=N WHERE N=A DECIMAL
                                        NUMBER WHICH WILL BE  DEPENDENT  ON
                                        THE    MACHINE    THE    PRINTER    IS
                                        INTERFACED TO.

                              20         40  CHARS./LINE  RELATIVE  TIMING
                                        TEST
                                        CHECKS RELATIVE TIME TO EXECUTE  40
                                        CHARS./LINE PRINTOUT.  THE PRINTOUT
                                        IS 1 LINE OF 40 CHARS.  FOLLOWED BY
                                        RELATIVE TIMING=N WHERE N=A DECIMAL
                                        NUMBER WHICH WILL BE  DEPENDENT  ON
                                        THE    MACHINE    THE    PRINTER    IS
                                        INTERFACED TO.

                              21        SLEW RATE RELATIVE TIMING TEST
                                        CHECKS RELATIVE TIME TO  EXECUTE  2
                                        LINE   FEEDS.   2  LINE  FEEDS  ARE
                                        EXECUTED   FOLLOWED   BY   RELATIVE
```

```
                                                    TIMING=N  WHERE  N=A DECIMAL NUMBER
                                                    WHICH  WILL  BE  DEPENDENT  ON  THE
```

MACHINE THE PRINTER IS INTERFACED
TO.

22 DATA TRANSFER LINES TEST
CHECKS THAT THE DATA TRANSFERS
LINES FUNCTION PROPERLY. PRINTOUT
IS 2 LINES OF ALTERNATING @'S AND
?'S
I.E.@?@?@?....
?@?@?@....

23 LEFT-HANDED WEDGE WITH OVERPRINT
CHECKS SPACING, OVERPRINT, CARRIAGE
RETURN, & LINE FEED RIGOROUSLY.
PRINTOUT IS A LEFT-HANDED WEDGE
CONSISTING OF LINES OF E'S
OVERPRINTED 1 TIME WITH A '/'
APPEARING IN THE LAST COLUMN
POSITION OF EACH LINE.
I.E. EEE..../
EEE.../
EEE../
.
.
.

24 REGULAR BLOCK PATTERN WITH
OVERPRINT (64 CHARS.)
CHECKS CHARACTER GENERATION OF
REGULAR SIZE CHARS. PRINTOUT IS A
BLOCK PATTERN OF EACH OF 64 CHARS.
FROM A 'SPACE' TO '←'. EACH LINE
OF EACH CHARACTER IS OVERPRINTED 1
TIME.
I.E. 1ST LINE - SPACES
!!!!!!! ....
""""""" ....
####### ....
.
.
.
.

25 ELONGATED BLOCK PATTERN WITH
OVERPRINT (64 CHARS.)
CHECKS CHARACTER GENERATION OF
ELONGATED SIZE CHARS. PRINTOUT IS
A BLOCK PATTERN OF EACH OF 64
CHARS. FROM A 'SPACE' TO '←'.
EACH LINE OF EACH CHARACTER IS
OVERPRINTED 1 TIME. THE PATTERN IS
THE SAME AS SHOWN ABOVE EXCEPT
ELONGATED.

```
587
588                                          26          REGULAR COUNTER CLOCKWISE  ROTATING
```

```
                                                                PAGE 12


                        PATTERN
                        CHECKS  CHARACTER   GENERATION   OF
                        REGULAR  SIZE  CHARS.  FROM A WORSE
                        CASE  STANDPOINT.   PRINTOUT  IS  A
                        COUNTERCLOCKWISE   ROTATING   BLOCK
                        PATTERN OF EACH OF 64 CHARS.   FROM
                        'SPACE' TO '←'.
                        I.E.   !"#$%&'()*.....
                              - !"#$%&'().....
                              ↑- !"#$%&'(.....
                              ]↑- !"#$%&'.....
                                    .
                                    .
                                    .
                                    .

          27            ELONGATED     COUNTER     CLOCKWISE
                        ROTATING PATTERN
                        CHECKS  CHARACTER   GENERATION   OF
                        ELONGATED SIZE CHARS.  FROM A WORSE
                        CASE  STANDPOINT.   PRINTOUT  IS  A
                        COUNTERCLOCKWISE   ROTATING   BLOCK
                        PATTERN OF EACH OF 64 CHARS.   FROM
                        'SPACE'  TO  '←'.   THE  PATTERN IS
                        SAME   AS   SHOWN   ABOVE    EXCEPT
                        ELONGATED.

          30            LOWER CASE ALPHABET TEST
                        CHECKS THAT CODES  FOR  LOWER  CASE
                        LETTERS  ARE  FORCED  TO UPPER CASE
                        CODES FOR PRINTOUT.  TWO LINES  ARE
                        PRINTED OUT, THUSLY

                                A B C D E F .....
                                 A B C D E F ....

                        THE 1ST LINE PRODUCED BY UPPER CASE
                        CODES  &  THE  2ND LINE PRODUCED BY
                        LOWER  CASE  CODES.    BOTH   LINES
                        SHOULD BE UPPER CASE!

          31            THIS TEST IS  A  COMBINATION  OF  2
                        ROUTINES:    (A)  SWITCH   REGISTER
                        INPUT TEST (OPTIONAL).
                        THIS TEST CAN ONLY BE  ACCESSED  BY
                        SELECTING  TEST  31  IN CONJUNCTION
                        WITH BIT09 SET TO A 1.   BIT10  SET
                        TO  A 1 INDICATES ELONGATION.  FULL
                        LINES OF THE  CHAR.   SELECTED  ARE
                        PRINTED  OUT.  IF A 'DESELECT' CODE
                        IS  ACCIDENTALLY  GIVEN,  THE  TEST
                        WILL WAIT FOR A 'SELECT' CODE TO BE
                        GIVEN BEFORE PROCEEDING.
```

```
                                                        NOTE:  A  DESELECT  CODE  IS  23
                                                        (OCTAL)  &  A  SELECT  CODE  IS  21
```

(OCTAL).

(8) PRINT TIME FREE PULSE GENERATOR (OPTIONAL).
THIS TEST CAN ONLY BE ACCESSED BY SELECTING TEST 31 IN CONJUNCTION WITH BIT09 SET TO A 1. BIT12 MUST ALSO BE SET TO A 1. IF THERE IS A PROBLEM WITH A PARTICULAR CHARACTER ALL YOU NEED TO DO IS TO ACCESS THIS TEST FOR SCOPING. ONCE YOU THINK THE PROBLEM IS CORRECTED ALL YOU HAVE TO DO IS TO THROW BIT12 DOWN (SET TO 0) TO SEE IT PRINTED OUT. WITH BIT12 DOWN YOU ARE IN THE OTHER OPTIONAL ROUTINE OF TEST 31. IN ESSENCE, YOU CAN ALTERNATE BACK & FORTH.

```
                .TITLE  MAINDEC-11-DZLSA-B
```

```
   674                              ;
   675                              ;
```

```
                                ;
                                ;
                 000200                 .=200
000200  000167  001074                 JMP     BEGIN           ;JMP TO INITIAL START OF PROGRAM
                 000600                 .=600
000600  005067  000450                 CLR     PCNT            ;CLEAR PROGRAM PASS COUNT
000604  000167  001024                 JMP     RSTART          ;GO TO RESTART OF PROGRAM
                 000020                 .=20                    ;IOT TRAP VECTOR
000020  006144                         TYP                     ;START LOCATION OF IOT HANDLER
000022  000340                         340                     ;NEW PROCESSOR LEVEL OF 7
                 000030                 .=30                    ;EMT TRAP VECTOR
000030  006412                         ERROR                   ;START LOC. OF EMT HANDLER
000032  000340                         340                     ;NEW PROCESSOR LEVEL OF 7
000034  006254                         SCOPEC                  ;START LOCATION OF SCOPE HANDLER
000036  000000                         0                       ;NEW PROCESSOR LEVEL
                                ;
                                ;
                 001200                 .=1200
                                ;*****************************************************************
                                ;
                                ;HARDWARE REGISTERS
                                ;
                                ;*****************************************************************
001200  177514                  LSCS:   177514                  ;CENTRONICS STATUS REGISTER ADDRESS
001202  177516                  LSDB:   177516                  ;CENTRONICS DATA BUFFER ADDRESS
001204  177776                  PSW:    177776                  ;PROCESSOR STATUS REGISTER ADDRESS
001206  177566                  TPB:    177566                  ;TELETYPE DATA BUFFER ADDRESS
001210  177564                  TPS:    177564                  ;TELETYPE STATUS REGISTER ADDRESS
001212  000200                  LSINT:  200                     ;CENTRONICS PRINTER INTERRUPT VECTOR
001214  000202                  LSPR:   202                     ;CONTAINS PSW FOR PRINTER INTERRUPTS
001216  000200                  INTLVL: 200                     ;CONTAINS PRINTER INTERRUPT LEVEL
                                                                ;IN THIS INSTANCE, 200 = LEVEL 4
                                ;*****************************************************************
                                ;
                                ;PROGRAM COUNTERS AND VARIABLES
                                ;
                                ;*****************************************************************
001220  000000                  LFNO:   0                       ;NO. OF LINE FEEDS ISSUED
001222  000000                  CHARS:  0                       ;NO. OF PRINTABLE CHARS. ON A LINE
001224  000000                  CHRGEN: 0                       ;CHARACTER TO BE LOADED INTO BUFFER
001226  000000                  CNTR:   0                       ;LINE REPEAT COUNTER
001230  000000                  TIMER:  0                       ;RELATIVE TIME COUNT HOLDER
001232  000000                  WAREA:  0                       ;DECODING WORK AREA
001234  000000                  WORK:   0                       ;CHARS./LINE HOLDER
001236  000000                  TYPDAT: 0                       ;CHARACTER TO BE OUTPUTTED ON TELETYPE
001240  000000                  CYCLE:  0                       ;1000 TIME LOOP COUNTER FOR RELATIVE TIME
001242  000000                  ELONG:  0                       ;DETERMINES REGULAR OR ELONGATED CHARS.
001244  000000                  SAVESP: 0                       ;NO. OF SPACES=NO. OF E'S IN WEDGE
001246  000000                  LINCNT: 0                       ;LINE COUNTER
001250  000000                  CHARNO: 0                       ;NO. OF AVAILABLE CHARS. AT A TIME
                                                                ;IN ROTATING PATTERNS
001252  000000                  TEST:   0                       ;CHARS./LINE TIME TEST INDICATOR
001254  000000                  PCNT:   0                       ;PROGRAM PASS COUNT HOLDER
001256  000310                  ICNT:   310                     ;WORKING AREA FOR ITERATION COUNT (200 DECIMAL)
001260  000310                  REICNT: 310                     ;USED FOR RESTORING OF ICNT
001262  000000                  ICOUNT: 0                       ;ICOUNT=0 INDICATES DON'T ITERATE
```

```
                                                        ;USED FOR MANUAL INTERVENTION TEST
001264  000000                ERRIND: 0                 ;SCOPE INDICATOR TO STOP ITERATIONS
                                                        ;BECAUSE AN ERROR HAS OCCURRED
                                                        ;ERRIND=1 SET IN ERROR ROUTINE
001266  000000                DELAY:  0                 ;VARIABLE DELAY FOR WAITING ON PRINTER FLAGS
001270  000000                ADDERR: 0                 ;CONTAINS PC OF ADDRESS FAILURE
001272  000000                SAVEPC: 0                 ;CONTAINS PC TO BE DECODED ON
                                                        ;ERROR PRINTOUTS
001274  000204                COLCNT: 204               ;COLUMN WIDTH DESIRED FOR TESTING (OCTAL VALUE)
001276  000007                RING:   7           ;TELETYPE BELL CODE
                        ;*******************************************************************
                        ;
                        ;EQUIVALENCES
                        ;
                        ;*******************************************************************
            000240              NOP=240                 ;USED FOR ACT-11 OVERLAY
            000004              TYPE=IOT                ;TTY MESSAGE PRINTOUT CALL
            104000              HLT=EMT                 ;TTY ERROR MESSAGE PRINTOUT CALL
            104400              SCOPE=TRAP              ;LOOP ON TEST CALL
            177570              SWR=177570              ;ADDRESS OF CONSOLE SWITCH REGISTER
            000004              BUSERR=4                ;BUS ERROR TIME OUT VECTOR
            000000              R0=%0                   ;
            000001              R1=%1                   ;
            000002              R2=%2                   ;
            000003              R3=%3                   ;GENERAL PURPOSE
            000004              R4=%4                   ;REGISTERS
            000005              R5=%5                   ;
            000006              R6=%6                   ;
            000007              R7=%7                   ;
                        ;*******************************************************************
                        ;
                        ;MACRO DEFINITION FOR PRINTING OUT TEST NOS. ON CENTRONICS PRINTER
                        ;
                        ;*******************************************************************
                              .MACRO  TYPTST V,W
                        'V:   .ASCIZ  /W/               ;TEST NO. TO BE PRINTED OUT
                              MOV     #'V,R1            ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
                              JSR     R7,TSTTAG         ;GO TO PRINT OUT TEST NO.
                              .ENDM
                        ;*******************************************************************
                        ;
                        ;MACRO DEFINITIONS FOR PICKING UP THE TEST TO BE PERFORMED
                        ;FROM THE CONTENTS OF THE SWITCH REGISTER
                        ;
                        ;*******************************************************************
                              .MACRO  TESTNO Y
                              TST'Y
                              .ENDM
                        ;
                        ;
                              .MACRO  UPDATE
                              .NLIST                    ;DON'T LIST NEXT LINE DURING MACRO EXPANSION
                              X=X+1
                              .LIST                     ;BEGIN LISTING AGAIN
                              .ENDM   UPDATE
                        ;*******************************************************************
```

```
                                        ;
                                        ;MACRO DEFINITION FOR PICKING UP ERROR MESSAGES
                                        ;
                                        ;*****************************************************************************
                                                .MACRO  MESSNO Z
                                                EMSG'Z
                                                .ENDM
                                        ;*****************************************************************************
                                        ;
                                        ;THIS MARKS THE BEGINNING OF THE PRINTER DIAGNOSTIC
                                        ;ROUTINE (OPTIONAL) TO PERFORM BASIC MANUAL INTERVENTION TESTS.
                                        ;IF BIT08 ISN'T SET AND ALL SWITCHES ARE DOWN THE PROGRAM WILL
                                        ;START AT TEST #1 ON A PASS THRU PROGRAM BASIS.
                                        ;
                                        ;*****************************************************************************
001300  005067  177750        BEGIN:  CLR     PCNT            ;CLEAR PASS COUNT INDICATOR
001304  012706  001100                MOV     #1100,R6        ;SET UP STACK POINTER
001310  112777  000021  177664        MOVB    #21,@LSDB       ;SELECT PRINTER ON LINE IN CASE IT
                                                                ;IS INITIALLY DESELECTED
001316  005067  177744                CLR     DELAY           ;WAIT FOR EXECUTION
001322  004467  004560                JSR     R4,WAITON
001326  000005                        RESET                   ;INITIALIZE
001330  036727  176234  000400        BIT     SWR,#400        ;DO WE WANT MANUAL INTERVENTION TESTS?
001336  001536                        BEQ     RSTART          ;NO!
001340  012767  001346  005030        MOV     #TSTO,RETURN    ;YES!
001346  005067  177710        TSTO:   CLR     ICOUNT          ;ICOUNT=0 INDICATING DON'T ITERATE
001352  005067  177706                CLR     ERRIND          ;RESET ERROR INDICATOR
001356  000004                        TYPE                    ;PRINT OUT
001360  006752                        MES2                    ;"SELECT PRINTER ON LINE"
001362  000004                        TYPE                    ;PRINT OUT "HIT CONTINUE SWITCH
001364  007002                        MES3                    ;TO RESUME OPERATION"
001366  000000                        HALT                    ;WAIT FOR CONTINUE SWITCH
001370  112777  000023  177604        MOVB    #23,@LSDB       ;ISSUE A DESELECT CODE
001376  005777  177576                TST     @LSCS           ;IS ERROR BIT SET?
001402  100402                        BMI     SEL1            ;YES - SHOULD BE
001404  104007                        HLT     +7              ;NO
001406  104400                        SCOPE
001410  012767  017777  177616  SEL1: MOV     #17777,WORK     ;GIVE PLENTY OF TIME
001416  005367  177612                DEC     WORK            ;FOR LIGHT TO
001422  001375                        BNE     .-4             ;TURN OFF
001424  112777  000021  177550        MOVB    #21,@LSDB       ;ISSUE A SELECT CODE
001432  005067  177630                CLR     DELAY           ;SELECT CODE NEEDS A MIN. OF 3 MSEC TO SET
001436  004467  004444                JSR     R4,WAITON       ;WAIT FOR LOADING
001442  005777  177532                TST     @LSCS           ;IS ERROR BIT SET?
001446  100002                        BPL     DESEL1          ;NO - SHOULDN'T BE
001450  104006                        HLT     +6              ;YES
001452  104400                        SCOPE
001454  112777  000023  177520  DESEL1: MOVB  #23,@LSDB       ;ISSUE A DESELECT CODE
001462  005777  177512                TST     @LSCS           ;IS ERROR BIT SET?
001466  100402                        BMI     SEL2            ;YES - IT SHOULD BE
001470  104007                        HLT     +7              ;NO
001472  104400                        SCOPE
001474  012767  017777  177532  SEL2: MOV     #17777,WORK     ;GIVE PLENTY OF TIME
001502  005367  177526                DEC     WORK            ;FOR LIGHT TO
001506  001375                        BNE     .-4             ;TURN OFF
001510  000004                        TYPE                    ;PRINT OUT "OPEN FRONT PANEL & HIT TOP
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                                                MES4                    ;OF FORM - PAPER SHOULDN'T ADVANCE"
                                                TYPE                    ;PRINT OUT "HIT CONTINUE SWITCH TO
                                                MES3                    ;RESUME OPERATION"
                                                HALT                    ;WAIT FOR CONTINUE SWITCH
001522  112777  000021  177452                  MOVB    #21,@LSDB       ;ISSUE A SELECT CODE
001530  005067  177532                          CLR     DELAY           ;SELECT CODE NEEDS A MIN. OF 3 MSEC TO SET
001534  004467  004346                          JSR     R4,WAITON       ;WAIT FOR LOADING
001540  005777  177434                          TST     @LSCS           ;IS ERROR BIT CLEAR?
001544  100002                                  BPL     SEL3            ;YES - IT SHOULD BE
001546  104006                                  HLT     +6              ;NO
001550  104400                                  SCOPE
001552  000004                          SEL3:   TYPE                    ;PRINT OUT "REMOVE PAPER"
001554  007150                                  MES5
001556  000004                                  TYPE                    ;PRINT OUT "HIT CONTINUE SWITCH TO
001560  007002                                  MES3                    ;RESUME OPERATION"
001562  000000                                  HALT
001564  005777  177410                          TST     @LSCS           ;IS ERROR BIT SET?
001570  100402                                  BMI     SEL4            ;YES - IT SHOULD BE
001572  104010                                  HLT     +10             ;NO
001574  104400                                  SCOPE
001576  000004                          SEL4:   TYPE                    ;PRINT OUT "PUT PAPER BACK"
001600  007166                                  MES6
001602  000004                                  TYPE                    ;PRINT OUT "HIT CONTINUE SWITCH TO
001604  007002                                  MES3                    ;RESUME OPERATION"
001606  000000                                  HALT                    ;WAIT FOR CONTINUE SWITCH
001610  005777  177364                          TST     @LSCS           ;IS ERROR BIT CLEAR?
001614  100002                                  BPL     SEL5            ;YES - IT SHOULD BE
001616  104000                                  HLT     +0              ;NO
001620  104400                                  SCOPE
001622  105777  177352                  SEL5:   TSTB    @LSCS           ;IS DONE BIT SET?
001626  100402                                  BMI     RSTART          ;YES
001630  104001                                  HLT     +1              ;NO
                                ;*****************************************************************
                                ;
                                ;THIS ROUTINE WILL SELECT AND START AT A PARTICULAR TEST.
                                ;IF BIT09 IS NOT INITIALLY SET IN THE SWITCH REGISTER
                                ;A PASS THRU THE PROGRAM FROM THE BEGINNING IS ASSUMED.
                                ;
                                ;*****************************************************************
001632  104400                                  SCOPE
001634  012706  001100                  RSTART: MOV     #1100,R6        ;INITIALIZE STACK POINTER
001640  000004                                  TYPE                    ;PRINT OUT
001642  006730                                  MES1                    ;"MAINDEC-11-DZLSAB"
001644  062767  000001  177410                  ADD     #1,ICOUNT       ;ICOUNT=1 INDICATING ITERATIONS
001652  005067  177406                          CLR     ERRIND          ;RESET ERROR INDICATOR
001656  036727  175706  001000                  BIT     SWR,#1000       ;DO WE WANT A PARTICULAR TEST?
001664  001405                                  BEQ     TST1            ;NO - START FROM TEST #1
001666  116701  175676                          MOVB    SWR,R1          ;MOVE THE TEST NO. TO REGISTER 1
001672  006301                                  ASL     R1              ;SHIFT TEST NO. TO GET PROPER WORD COUNT
001674  000171  014270                          JMP     @TABLE(R1)      ;JUMP TO SELECTED TEST
                                ;*****************************************************************
                                ;
                                ;SECTION TO TEST THAT THE PRINTER IS ACTUALLY IN THE SYSTEM
                                ;AND RESPONDS TO ADDRESSING
                                ;
                                ;*****************************************************************
```

```
  900  001700  012767  001700  004470  TST1:   MOV     #TST1,RETURN    ;INITIALIZE BEGINNING SCOPE LOOP
  901  001706  012767  001732  176070          MOV     #ERRA,BUSERR    ;ERROR JUMP FOR BUS TIME OUT ERROR
  902  001714  010700                          MOV     R7,R0           ;PC TO 'ADDERR' FROM R0
  903  001716  005077  177256                  CLR     @LSCS           ;ADDRESS USED ADDRESS 177514
  904  001722  010700                          MOV     R7,R0           ;PC TO 'ADDERR' FROM R0
  905  001724  005277  177252                  INC     @LSDB           ;ADDRESS USED ADDRESS 177515
  906  001730  000403                          BR      .+10            ;ADDRESSES OK! - PROCEED
  907  001732  104011                  ERRA:   HLT     +11             ;ERROR - DIDN'T RESPOND TO ADDRESSING
  908  001734  022626                          CMP     (R6)+,(R6)+     ;RESTORE THE STACK TO 1100
  909  001736  000760                          BR      TST1            ;FAILURE! - DON'T PROCEED WITH TESTING
  910  001740  012767  000006  176036          MOV     #6,BUSERR       ;RESTORE TRAPCATCHER
  911  001746  005067  176034                  CLR     6
  912  001752  000404                          BR      SCO
  913                                  ;*************************************************************************
  914                                  ;
  915                                  ;SECTION TO TEST THAT THE DONE BIT
  916                                  ;FUNCTIONS PROPERLY
  917                                  ;ALSO THAT THE INTERRUPT ENABLE BIT & MODE BIT
  918                                  ;NEVER SET ON A RESET INSTRUCTION
  919                                  ;
  920                                  ;*************************************************************************
  921  001754  012767  001766  004414  TST2:   MOV     #RDY0,RETURN    ;SET RETURN ADDRESS FOR SCOPE
  922  001762  000401                          BR      RDY0            ;IF SELECTING THIS TEST
  923  001764  104400                  SCO:    SCOPE                   ;LOOP ON ADDRESS TEST?
  924  001766  000005                  RDY0:   RESET                   ;CLEAR THE WORLD
  925  001770  005777  177204                  TST     @LSCS           ;IS ERROR BIT SET?
  926  001774  100002                          BPL     RDY1            ;NO
  927  001776  104000                          HLT     +0              ;YES
  928                                  ;
  929                                  ;
  930  002000  104400                          SCOPE
  931  002002  105777  177172          RDY1:   TSTB    @LSCS           ;IS DONE BIT SET?
  932  002006  100402                          BMI     ERBIT2          ;YES
  933  002010  104001                          HLT     +1              ;NO
  934  002012  104400                          SCOPE
  935
  936
  937                                  ;
  938                                  ;
  939  002014  032777  000100  177156  ERBIT2: BIT     #100,@LSCS      ;IS IE BIT (BIT06) SET?
  940  002022  001402                          BEQ     RDY2            ;NO
  941  002024  104014                          HLT     +14             ;YES
  942                                  ;
  943                                  ;
  944  002026  104400                          SCOPE
  945  002030  032777  000001  177142  RDY2:   BIT     #1,@LSCS        ;IS MODE BIT (BIT0) SET?
  946  002036  001402                          BEQ     RDY3            ;NO
  947  002040  104015                          HLT     +15             ;YES
  948                                  ;
  949                                  ;
  950  002042  104400                          SCOPE
  951  002044  112777  000101  177130  RDY3:   MOVB    #101,@LSDB      ;LOAD BUFFER WITH AN 'A'
  952  002052  012767  177754  177206          MOV     #-20.,DELAY     ;SET A DELAY FOR DONE FLAG BACK UP
  953  002060  004467  004022                  JSR     R4,WAITON       ;WAIT FOR DONE FLAG
  954  002064  105777  177110                  TSTB    @LSCS           ;IS DONE BIT SET?
  955  002070  100402                          BMI     RDY4            ;YES
```

```
  956  002072  104005                          HLT     +5              ;NO - IT NEVER SET!
  957                                ;
  958                                ;
  959  002074  104400                          SCOPE
  960  002076  112777  000177  177076  RDY4:   MOVB    #177,@LSDB      ;LOAD BUFFER WITH 'DELETE' CHAR.
  961  002104  005067  177156                  CLR     DELAY           ;DELETE CODE NEEDS A LONG TIME TO CLEAR  BUFFER
  962  002110  004467  003772                  JSR     R4,WAITON       ;WAIT FOR DONE FLAG
  963  002114  105777  177060                  TSTB    @LSCS           ;IS DONE BIT SET?
  964  002120  100406                          BMI     SC00            ;YES
  965  002122  104005                          HLT     +5              ;NO - IT NEVER SET
  966  002124  000404                          BR      SC00
  967                                ;*********************************************************************
  968                                ;
  969                                ;SECTION TO TEST THAT THE INTERRUPT ENABLE
  970                                ;BIT CAN BE SET AND CLEARED
  971                                ;
  972                                ;*********************************************************************
  973  002126  012767  002140  004242  TST3:   MOV     #IEBIT,RETURN   ;SET RETURN ADDRESS FOR SCOPE
  974  002134  000401                          BR      IEBIT           ;IF SELECTING THIS TEST
  975  002136  104400                  SC00:   SCOPE                   ;LOOP ON IE BIT TEST?
  976  002140  012777  000340  177036  IEBIT:  MOV     #340,@PSW       ;SET PROCESSOR STATUS AT LEVEL 7
  977  002146  052777  000100  177024          BIS     #100,@LSCS      ;SET IE BIT
  978  002154  032777  000100  177016          BIT     #100,@LSCS      ;IS IE BIT SET?
  979  002162  001002                          BNE     .+6             ;YES
  980  002164  104012                          HLT     +12             ;NO
  981                                ;
  982                                ;
  983  002166  104400                          SCOPE
  984  002170  042777  000100  177002          BIC     #100,@LSCS      ;CLEAR IE BIT
  985  002176  032777  000100  176774          BIT     #100,@LSCS      ;IS IE BIT CLEAR?
  986  002204  001403                          BEQ     .+10            ;YES
  987  002206  104013                          HLT     +13             ;NO
  988                                ;
  989                                ;
  990  002210  104400                          SCOPE
  991  002212  000411                          BR      IEBIT1          ;IE BIT NOT CLEAR - SEE IF RESET CLEARS IT
  992  002214  052777  000100  176756          BIS     #100,@LSCS      ;SET IE BIT AGAIN
  993  002222  032777  000100  176750          BIT     #100,@LSCS      ;IS IE BIT SET?
  994  002230  001002                          BNE     .+6             ;YES
  995  002232  104012                          HLT     +12             ;NO
  996                                ;
  997                                ;
  998  002234  104400                          SCOPE
  999  002236  000005                  IEBIT1: RESET                   ;CLEAR THE IE BIT!
 1000  002240  032777  000100  176732          BIT     #100,@LSCS      ;IS IE BIT CLEAR?
 1001  002246  001406                          BEQ     SC1             ;YES
 1002  002250  104013                          HLT     +13             ;NO
 1003  002252  000404                          BR      SC1
 1004                                ;*********************************************************************
 1005                                ;
 1006                                ;SECTION TO TEST THAT THE PRINTER WHICH HAS A NORMAL PRIORITY LEVEL OF 4
 1007                                ;WILL NOT INTERRUPT TILL THE PROCESSOR IS AT A PRIORITY LEVEL OF 3
 1008                                ;ALSO, THAT IT WILL NOT INTERRUPT EVEN IF THE PROCESSOR IS AT LEVEL 3
 1009                                ;AS LONG AS THE INTERRUPT ENABLE BIT IS NOT SET!
 1010                                ;
 1011                                ;*********************************************************************
```

```
1012  002254  012767  002266  004114  TST4:   MOV     #IENAB,RETURN   ;SET RETURN ADDRESS FOR SCOPE
1013  002262  000401                  BR      IENAB           ;IF SELECTING THIS TEST
1014  002264  104400                  SC1:    SCOPE           ;LOOP ON DONE BIT CHECK?
1015  002266  000005                  IENAB:  RESET           ;CLEAR THE WORLD
1016  002270  012777  002534  176714          MOV     #INTVEC,@LSINT  ;NEW 'PC' IF INTERRUPT OCCURS
1017  002276  012777  000340  176710          MOV     #340,@LSPR      ;NEW 'PS' IF INTERRUPT OCCURS
1018  002304  005777  176670                  TST     @LSCS           ;IS ERROR BIT SET?
1019  002310  100002                          BPL     IENAB1          ;NO
1020  002312  104000                          HLT     +0              ;YES
1021                                  ;
1022
1023
1024                                  ;
1025                                  ;
1026  002314  104400                          SCOPE
1027  002316  105777  176656          IENAB1: TSTB    @LSCS           ;IS DONE BIT SET?
1028  002322  100402                          BMI     IENAB2          ;YES
1029  002324  104001                          HLT     +1              ;NO
1030                                  ;
1031                                  ;
1032  002326  104400                          SCOPE
1033  002330  012777  000340  176646  IENAB2: MOV     #340,@PSW       ;SET PROCESSOR AT LEVEL 7
1034  002336  004467  000140                  JSR     R4,IECHK        ;CHECK FOR INTERRUPT
1035  002342  104400                          SCOPE
1036  002344  012777  000300  176632          MOV     #300,@PSW       ;SET PROCESSOR AT LEVEL 6
1037  002352  127767  176626  176636          CMPB    @PSW,INTLVL     ;ARE WE ABOVE PRINTER INTERRUPT LEVEL??
1038  002360  002426                          BLT     IENOGO          ;NO - JUMP TO TEST WITH IE BIT NOT SET
1039  002362  004467  000114                  JSR     R4,IECHK        ;CHECK FOR INTERRUPT
1040  002366  104400                          SCOPE
1041  002370  012777  000240  176606          MOV     #240,@PSW       ;SET PROCESSOR AT LEVEL 5
1042  002376  127767  176602  176612          CMPB    @PSW,INTLVL     ;ARE WE ABOVE PRINTER INTERRUPT LEVEL??
1043  002404  002414                          BLT     IENOGO          ;NO - JUMP TO TEST WITH IE BIT NOT SET
1044  002406  004467  000070                  JSR     R4,IECHK        ;CHECK FOR INTERRUPT
1045  002412  104400                          SCOPE
1046  002414  012777  000200  176562          MOV     #200,@PSW       ;SET PROCESSOR AT LEVEL 4
1047  002422  127767  176556  176566          CMPB    @PSW,INTLVL     ;ARE WE ABOVE PRINTER INTERRUPT LEVEL??
1048  002430  002402                          BLT     IENOGO          ;NO - JUMP TO TEST WITH IE BIT NOT SET
1049  002432  004467  000044                  JSR     R4,IECHK        ;CHECK FOR INTERRUPT
1050                                  ;
1051                                  ;
1052  002436  104400                  IENOGO: SCOPE
1053  002440  012777  002542  176544          MOV     #INVEC,@LSINT   ;NEW 'PC' IF INTERRUPT OCCURS
1054  002446  012777  000340  176540          MOV     #340,@LSPR      ;NEW 'PS' IF INTERRUPT OCCURS
1055  002454  012777  000140  176522          MOV     #140,@PSW       ;SET PROCESSOR AT LEVEL 3
1056  002462  012767  000002  176544          MOV     #2,WORK         ;SET UP FOR APPROX. 20 MICROSEC. WAIT
1057  002470  005367  176540                  DEC     WORK            ;TO SEE IF INTERRUPT OCCURS
1058  002474  001375                          BNE     .-4
1059  002476  000167  000064                  JMP     SC2             ;IT DIDN'T! OK BECAUSE IE BIT WASN'T SET
1060                                  ;
1061                                  ;
1062  002502  052777  000100  176470  IECHK:  BIS     #100,@LSCS      ;SET PRINTER IE BIT
1063  002510  012767  000002  176516          MOV     #2,WORK         ;SET UP FOR APPROX. 20 MICROSEC. WAIT
1064  002516  005367  176512                  DEC     WORK            ;TO SEE IF INTERRUPT OCCURS
1065  002522  001375                          BNE     .-4
1066  002524  042777  000100  176446  CLRIE:  BIC     #100,@LSCS      ;NO INTERRUPT-CLEAR IE BIT
1067  002532  000204                          RTS     R4              ;OK! CHECK NEXT PROCESSOR LEVEL
```

```
                                        ;*****************************************************************************
                                        ;
                                        ;INTERRUPT HANDLER IF PRINTER INTERRUPTS WHILE
                                        ;PROCESSOR IS AT PRIORITY LEVEL 4 THRU 7
                                        ;
                                        ;*****************************************************************************
002534  104003                          INTVEC: HLT     +3              ;PRINT ERROR MESSAGE - INTERRUPT OCCURRED!
002536  022626                                  CMP     (R6)+,(R6)+     ;POP STACK BACK 2 FROM INTERRUPT
002540  000771                                  BR      CLRIE           ;GO BACK TO CLEAR IE BIT
                                        ;
                                        ;
                                        ;*****************************************************************************
                                        ;
                                        ;INTERRUPT HANDLER IF PRINTER INTERRUPTS WHILE PROCESSOR
                                        ;IS AT LEVEL 3 BUT THE INTERRUPT ENABLE BIT IS NOT SET
                                        ;
                                        ;*****************************************************************************
002542  104020                          INVEC:  HLT     +20             ;PRINT ERROR MESSAGE - INTERRUPT OCCURRED!
002544  022626                                  CMP     (R6)+,(R6)+     ;POP STACK BACK 2 FROM INTERRUPT
002546  012777  000340  176430                  MOV     #340,@PSW       ;GIVE PROCESSOR CONTROL AGAIN
002554  000404                                  BR      SC2
                                        ;
                                        ;
                                        ;*****************************************************************************
                                        ;
                                        ;SECTION TO TEST THAT THE PRINTER WHICH IS AT A NORMAL PRIORITY LEVEL OF 4
                                        ;WILL INDEED INTERRUPT WHEN THE PROCESSOR IS AT A PRIORITY LEVEL OF 3
                                        ;
                                        ;*****************************************************************************
002556  012767  002570  003612          TST5:   MOV     #IENAB3,RETURN  ;SET RETURN ADDRESS FOR SCOPE
002564  000401                                  BR      IENAB3          ;IF SELECTING THIS TEST
002566  104400                          SC2:    SCOPE                   ;LOOP ON INTERRUPT NOT OCCURRING
002570  012777  003044  176414          IENAB3: MOV     #INVEC1,@LSINT  ;NEW 'PC' IF INTERRUPT OCCURS
002576  012777  000340  176410                  MOV     #340,@LSPR      ;NEW 'PS' IF INTERRUPT OCCURS
002604  005777  176370                          TST     @LSCS           ;IS ERROR BIT SET^
002610  100002                                  BPL     IENAB4          ;NO
002612  104000                                  HLT     +0              ;YES
                                        ;
                                        ;
002614  104400                                  SCOPE
002616  012777  000140  176360          IENAB4: MOV     #140,@PSW       ;SET PROCESSOR AT LEVEL 3
002624  052777  000100  176346                  BIS     #100,@LSCS      ;SET PRINTER IE BIT
                                                                        ;AN INTERRUPT SHOULD OCCUR
002632  012767  000002  176374                  MOV     #2,WORK         ;SET UP FOR APPROX. 20 MICROSEC. WAIT
002640  005367  176370                          DEC     WORK            ;TO SEE IF INTERRUPT OCCURS
002644  001375                                  BNE     .-4
002646  012777  000340  176330                  MOV     #340,@PSW       ;GIVE PROCESSOR CONTROL
002654  042777  000100  176316                  BIC     #100,@LSCS      ;CLEAR IE BIT
002662  104004                                  HLT     +4              ;NO INTERRUPT OCCURRED! - IT SHOULD HAVE
002664  104400                          IECHK1: SCOPE
002666  000403                                  BR      IENAB5          ;GO TO NEXT TEST
                                        ;*****************************************************************************
                                        ;
                                        ;SECTION TO TEST THE DESELECT INTERRUPT FEATURE
                                        ;
                                        ;*****************************************************************************
```

```
 1124  002670  012767  002676  003500  TST6:   MOV     #IENAB5,RETURN  ;SET RETURN ADDRESS FOR SCOPE
 1125  002676  112777  000023  176276  IENAB5: MOVB    #23,@LSDB       ;ISSUE A DESELECT CODE
 1126  002704  005777  176270          TST     @LSCS           ;IS ERROR BIT SET?
 1127  002710  100402                  BMI     IENAB6          ;YES - IT SHOULD BE
 1128  002712  104007                  HLT     +7              ;NO - IT IS NOT
 1129  002714  104400                  SCOPE
 1130  002716  012767  017777  176310  IENAB6: MOV     #17777,WORK     ;GIVE PLENTY OF TIME
 1131  002724  005367  176304          DEC     WORK            ;FOR LIGHT TO
 1132  002730  001375                  BNE     .-4             ;TURN OFF
 1133  002732  012777  003056  176252          MOV     #INVEC2,@LSINT  ;NEW 'PC' IF INTERRUPT OCCURS
 1134  002740  012777  000340  176246          MOV     #340,@LSPR      ;NEW 'PS' IF INTERRUPT OCCURS
 1135  002746  005077  176232          CLR     @PSW            ;MAKE PROCESSOR INACTIVE
 1136  002752  052777  000100  176220          BIS     #100,@LSCS      ;SET IE BIT
 1137  002760  012767  000002  176246          MOV     #2,WORK         ;SET UP FOR APPROX. 20 MICROSEC. WAIT
 1138  002766  005367  176242          DEC     WORK            ;TO SEE IF INTERRUPT OCCURS
 1139  002772  001375                  BNE     .-4
 1140  002774  012777  000340  176202          MOV     #340,@PSW       ;GIVE PROCESSOR CONTROL
 1141  003002  042777  000100  176170          BIC     #100,@LSCS      ;CLEAR IE BIT
 1142  003010  104016                  HLT     +16             ;NO INTERRUPT OCCURRED - IT SHOULD HAVE
 1143  003012  104400          IECHK2: SCOPE
 1144  003014  112777  000021  176160          MOVB    #21,@LSDB       ;ISSUE A SELECT CODE
 1145  003022  005067  176240          CLR     DELAY           ;SELECT CODE NEEDS A MIN. OF 3 MSEC TO SET
 1146  003026  004467  003054          JSR     R4,WAITON       ;WAIT FOR LOADING
 1147  003032  005777  176142          TST     @LSCS           ;IS ERROR BIT CLEAR?
 1148  003036  100020                  BPL     SC3             ;YES
 1149  003040  104000                  HLT     +0              ;NO
 1150  003042  000416                  BR      SC3
 1151                          ;*****************************************************************
 1152                          ;
 1153                          ;INTERRUPT HANDLER IF PRINTER INTERRUPTS AS IT SHOULD
 1154                          ;I.E.-WHEN PROCESSOR IS AT PRIORITY LEVEL 3
 1155                          ;
 1156                          ;*****************************************************************
 1157  003044  042777  000100  176126  INVEC1: BIC     #100,@LSCS      ;CLEAR IE BIT
 1158  003052  022626                          CMP     (R6)+,(R6)+     ;RESET STACK AND RETURN
 1159  003054  000703                          BR      IECHK1          ;CHECK INTERRUPT INDICATOR & ACT ACCORDINGLY
 1160                          ;*****************************************************************
 1161                          ;
 1162                          ;INTERRUPT HANDLER IF PRINTER INTERRUPTS AS IT SHOULD
 1163                          ;I.E. - PROCESSOR INACTIVE, IE BIT SET, AND PRINTER DESELECTED
 1164                          ;
 1165                          ;*****************************************************************
 1166  003056  042777  000100  176114  INVEC2: BIC     #100,@LSCS      ;CLEAR IE BIT
 1167  003064  022626                          CMP     (R6)+,(R6)+     ;POP STACK BACK 2 FROM INTERRUPT
 1168  003066  000751                          BR      IECHK2
 1169                          ;*****************************************************************
 1170                          ;
 1171                          ;SECTION TO TEST THAT THE SPECIAL CHARS. I.E CARRIAGE RETURN,
 1172                          ;LINE FEED,DELETE,VERTICAL TAB,FORM FEED,AND BELL DO INDEED
 1173                          ;FUNCTION PROPERLY BEFORE PROCEEDING
 1174                          ;
 1175                          ;*****************************************************************
 1176  003070  012767  003102  003300  TST7:   MOV     #CARRET,RETURN  ;SET RETURN ADDRESS FOR SCOPE
 1177  003076  000401                  BR      CARRET          ;IF SELECTING THIS TEST
 1178  003100  104400          SC3:    SCOPE                   ;LOOP ON INTERRUPT OCCURRED AT WRONG LEVEL?
 1179                          ;*****************************************************************
```

```
1180                                    ;
1181                                    ;CARRIAGE RETURN CHECKED NEXT
1182                                    ;
1183                                    ;*****************************************************************
1184  003102  112777  000103  176072    CARRET: MOVB    #103,@LSDB      ;MOVE 'CR' INTO
1185  003110  105777  176064                    TSTB    @LSCS
1186  003114  100375                     BPL     .-4
1187  003116  112777  000122  176056            MOVB    #122,@LSDB      ;DATA BUFFER
1188  003124  105777  176050                    TSTB    @LSCS
1189  003130  100375                     BPL     .-4
1190  003132  112777  000015  176042            MOVB    #15,@LSDB       ;AND A CARRIAGE RETURN
1191  003140  105777  176034                    TSTB    @LSCS           ;CHECK FOR DONE BIT CLEAR
1192  003144  100002                     BPL     ERBIT3          ;YES
1193  003146  104002                     HLT     +2              ;NO
1194                                    ;
1195  003150  104400                     SCOPE
1196  003152  005777  176022            ERBIT3: TST     @LSCS           ;IS ERROR BIT SET?
1197  003156  100002                     BPL     RETCHK          ;NO
1198  003160  104000                     HLT     +0              ;YES
1199                                    ;
1200  003162  104400                     SCOPE
1201  003164  105777  176010            RETCHK: TSTB    @LSCS           ;IS PRINTER STILL BUSY?
1202
1203
1204  003170  100405                     BMI     SC4             ;NO
1205  003172  000767                     BR      ERBIT3          ;YES - WAIT
1206                                    ;*****************************************************************
1207                                    ;
1208                                    ;LINE FEED CHECKED NEXT
1209                                    ;
1210                                    ;*****************************************************************
1211  003174  012767  003206  003174    TST10:  MOV     #LFEED,RETURN   ;SET RETURN ADDRESS FOR SCOPE
1212  003202  000401                     BR      LFEED           ;IF SELECTING THIS TEST
1213  003204  104400                     SC4:    SCOPE                   ;LOOP ON CARRIAGE RETURN CHECK?
1214  003206  112777  000012  175766    LFEED:  MOVB    #12,@LSDB       ;ISSUE A LINE FEED
1215  003214  105777  175760                    TSTB    @LSCS           ;IS DONE BIT CLEAR?
1216  003220  100002                     BPL     ERBIT4          ;YES
1217  003222  104002                     HLT     +2              ;NO
1218                                    ;
1219  003224  104400                     SCOPE
1220  003226  005777  175746            ERBIT4: TST     @LSCS           ;ERROR BIT SET?
1221  003232  100035                     BPL     LFCHK           ;NO
1222  003234  104000                     HLT     +0              ;YES
1223  003236  104400                     SCOPE
1224  003240  000432                     BR      LFCHK
1225  003242  112777  000114  175732    LFEED1: MOVB    #114,@LSDB      ;MOVE 'LF' INTO
1226  003250  105777  175724                    TSTB    @LSCS
1227  003254  100375                     BPL     .-4
1228  003256  112777  000106  175716            MOVB    #106,@LSDB      ;DATA BUFFER AND
1229  003264  105777  175710                    TSTB    @LSCS
1230  003270  100375                     BPL     .-4
1231  003272  112777  000015  175702            MOVB    #15,@LSDB       ;ISSUE A CARRIAGE RETURN
1232  003300  105777  175674                    TSTB    @LSCS           ;DONE BIT CLEAR?
1233  003304  100002                     BPL     ERBIT5          ;YES
1234  003306  104002                     HLT     +2              ;NO
1235                                    ;
```

```
1236  003310  104400                          SCOPE
1237  003312  005777  175662          ERBIT5: TST     @LSCS           ;ERROR BIT SET?
1238  003316  100007                          BPL     CRCHK           ;NO
1239  003320  104000                          HLT     +0              ;YES
1240  003322  104400                          SCOPE
1241  003324  000404                          BR      CRCHK
1242                                  ;
1243  003326  105777  175646          LFCHK:  TSTB    @LSCS           ;PRINTER BUSY?
1244  003332  100743                          BMI     LFEED1          ;NO
1245  003334  000734                          BR      ERBIT4          ;YES - WAIT
1246                                  ;
1247  003336  105777  175636          CRCHK:  TSTB    @LSCS           ;PRINTER BUSY?
1248  003342  100405                          BMI     SCS             ;NO
1249  003344  000762                          BR      ERBIT5          ;YES - WAIT
1250                                  ;*****************************************************************
1251                                  ;
1252                                  ;DELETE CHECKED NEXT
1253                                  ;
1254                                  ;*****************************************************************
1255  003346  012767  003360  003022  TST11:  MOV     #DELETE,RETURN  ;SET RETURN ADDRESS FOR SCOPE
1256  003354  000401                          BR      DELETE          ;IF SELECTING THIS TEST
1257  003356  104400                  SCS:    SCOPE                   ;LOOP ON LINE FEED CHECK?
1258  003360  112777  000012  175614  DELETE: MOVB    #12,@LSDB       ;ISSUE A LINE FEED
1259  003366  105777  175606                  TSTB    @LSCS           ;IS DONE BIT CLEAR?
1260  003372  100002                          BPL     ERBIT6          ;YES
1261  003374  104002                          HLT     +2              ;NO
1262
1263
1264                                  ;
1265                                  ;
1266  003376  104400                          SCOPE
1267  003400  005777  175574          ERBIT5: TST     @LSCS           ;ERROR BIT SET?
1268  003404  100027                          BPL     LFCHK1          ;NO
1269  003406  104000                          HLT     +0              ;YES
1270  003410  104400                          SCOPE
1271  003412  000424                          BR      LFCHK1
1272                                  ;
1273                                  ;
1274  003414  112777  041102  175560  DLETE:  MOVB    #'BB,@LSDB      ;LOAD BUFFER WITH 'B'
1275                                                                  ;ONLY LOWER BYTE LOADED
1276  003422  105777  175552                  TSTB    @LSCS
1277  003426  100375                          BPL     .-4
1278  003430  112777  000177  175544          MOVB    #177,@LSDB      ;ISSUE A DELETE COMMAND
1279  003436  105777  175536                  TSTB    @LSCS           ;IS DONE BIT CLEAR?
1280  003442  100002                          BPL     ERBIT7          ;YES
1281  003444  104002                          HLT     +2              ;NO
1282                                  ;
1283                                  ;
1284  003446  104400                          SCOPE
1285  003450  005777  175524          ERBIT7: TST     @LSCS           ;ERROR BIT SET?
1286  003454  100007                          BPL     DELCHK          ;NO
1287  003456  104000                          HLT     +0              ;YES
1288  003460  104400                          SCOPE
1289  003462  000404                          BR      DELCHK
1290                                  ;
1291                                  ;
```

```
1292  003464  105777  175510          LFCHK1: TSTB    @LSCS           ;PRINTER STILL BUSY?
1293  003470  100751                          BMI     DLETE           ;NO
1294  003472  000742                          BR      ERBIT6          ;YES
1295                                  ;
1296                                  ;
1297  003474  105777  175500          DELCHK: TSTB    @LSCS           ;PRINTER BUSY?
1298  003500  100401                          BMI     DLETE1          ;NO
1299  003502  000762                          BR      ERBIT7          ;YES-WAIT
1300                                  ;
1301                                  ;
1302  003504  112777  000104  175470  DLETE1: MOVB    #104,@LSDB      ;LOAD PRINTER DATA
1303  003512  105777  175462                  TSTB    @LSCS
1304  003516  100375                          BPL     .-4
1305  003520  112777  000105  175454          MOVB    #105,@LSDB      ;BUFFER WITH 'DEL'
1306  003526  105777  175446                  TSTB    @LSCS
1307  003532  100375                          BPL     .-4
1308  003534  112777  000114  175440          MOVB    #114,@LSDB      ;DELETE WORKED IF LINE HAS
1309                                                                  ;'DEL' AND NOT 'BDEL'
1310  003542  105777  175432                  TSTB    @LSCS
1311  003546  100375                          BPL     .-4
1312  003550  112777  000015  175424          MOVB    #15,@LSDB       ;ISSUE A CARRIAGE RETURN
1313  003556  105777  175416                  TSTB    @LSCS           ;DONE BIT CLEAR?
1314  003562  100002                          BPL     ERBIT8          ;YES
1315  003564  104002                          HLT     +2              ;NO
1316                                  ;
1317                                  ;
1318  003566  104400                          SCOPE
1319  003570  005777  175404          ERBIT8: TST     @LSCS           ;ERROR BIT SET?
1320  003574  100002                          BPL     CRCHK1          ;NO
1321  003576  104000                          HLT     +0              ;YES
1322
1323
1324
1325                                  ;
1326                                  ;
1327  003600  104400                          SCOPE
1328  003602  105777  175272          CRCHK1: TSTB    @LSCS           ;PRINTER BUSY?
1329  003606  100405                          BMI     SC6             ;NO
1330  003610  000767                          BR      ERBIT8          ;YES-WAIT
1331                                  ;*******************************************************************
1332                                  ;
1333                                  ;VERTICAL TAB CHECKED NEXT
1334                                  ;
1335                                  ;*******************************************************************
1336  003612  012767  003624  002556  TST12:  MOV     #VERTAB,RETURN  ;SET RETURN ADDRESS FOR SCOPE
1337  003620  000401                          BR      VERTAB          ;IF SELECTING THIS TEST
1338  003622  104400                  SC6:    SCOPE                   ;LOOP ON DELETE CHECK?
1339  003624  012767  000003  175402  VERTAB: MOV     #3,WORK         ;SET UP FOR 3 VERTICAL TABS
1340  003632  112777  000013  175342  VTAB1:  MOVB    #13,@LSDB       ;ISSUE A VERTICAL TAB
1341  003640  105777  175334                  TSTB    @LSCS           ;DONE BIT CLEAR?
1342  003644  100002                          BPL     ERBIT5          ;YES
1343  003646  104002                          HLT     +2
1344                                  ;
1345                                  ;
1346  003650  104400                          SCOPE
1347  003652  005777  175322          ERBIT5: TST     @LSCS           ;ANY ERROR?
```

```
1348  003656  100002                          BPL     VTCHK           ;NO
1349  003660  104000                          HLT     +0              ;YES
1350                                  ;
1351                                  ;
1352  003662  104400                          SCOPE
1353  003664  105777  175310          VTCHK:  TSTB    @LSCS           ;PRINTER BUSY?
1354  003670  100401                          BMI     VTAB2           ;NO
1355  003672  000767                          BR      ERBITS          ;YES-WAIT
1356                                  ;
1357                                  ;
1358  003674  112777  000126  175300  VTAB2:  MOVB    #126,@LSDB      ;LOAD PRINTER DATA
1359  003702  105777  175272                  TSTB    @LSCS
1360  003706  100375                          BPL     .-4
1361  003710  112777  000124  175264          MOVB    #124,@LSDB      ;BUFFER WITH 'VT'
1362  003716  105777  175256                  TSTB    @LSCS
1363  003722  100375                          BPL     .-4
1364  003724  112777  000015  175250          MOVB    #015,@LSDB      ;AND A CARRIAGE RETURN
1365  003732  105777  175242                  TSTB    @LSCS           ;DONE BIT CLEAR?
1366  003736  100002                          BPL     ERBIT9          ;YES
1367  003740  104002                          HLT     +2              ;NO
1368                                  ;
1369                                  ;
1370  003742  104400                          SCOPE
1371  003744  005777  175230          ERBIT9: TST     @LSCS           ;ANY ERROR?
1372  003750  100002                          BPL     CRCHK2          ;NO
1373  003752  104000                          HLT     +0              ;YES
1374                                  ;
1375                                  ;
1376  003754  104400                          SCOPE
1377  003756  105777  175216          CRCHK2: TSTB    @LSCS           ;PRINTER BUSY?
1378  003762  100401                          BMI     MOREVT          ;NO
1379  003764  000767                          BR      ERBIT9          ;YES - WAIT
1380                                  ;
1381                                  ;
1382  003766  005367  175242          MOREVT: DEC     WORK            ;DECREASE # OF VT'S
1383  003772  005767  175236                  TST     WORK            ;HAVE WE DONE 3 VT'S
1384  003776  001315                          BNE     VTAB1           ;NO - GO BACK & DO ANOTHER
1385  004000  000404                          BR      SC7             ;YES - GO ON
1386
1387
1388                                  ;*******************************************************************
1389                                  ;
1390                                  ;FORM FEED CHECKED NEXT
1391                                  ;
1392                                  ;*******************************************************************
1393  004002  012767  004014  002366  TST13:  MOV     #FFEED,RETURN   ;SET RETURN ADDRESS FOR SCOPE
1394  004010  000401                          BR      FFEED           ;IF SELECTING THIS TEST
1395  004012  104400                  SC7:    SCOPE                   ;LOOP ON VERTICAL TAB CHECK?
1396  004014  012767  000002  175212  FFEED:  MOV     #2,WORK         ;SET UP FOR 2 FORM FEEDS
1397  004022  112777  000014  175152  FFEED1: MOVB    #14,@LSDB       ;ISSUE A FORM FEED
1398  004030  105777  175144                  TSTB    @LSCS           ;DONE BIT CLEAR?
1399  004034  100002                          BPL     ERR10           ;YES
1400  004036  104002                          HLT     +2              ;NO
1401                                  ;
1402                                  ;
1403  004040  104400                          SCOPE
```

```
1404  004042  005777  175132          ERR10:  TST     @LSCS           ;ANY ERROR?
1405  004046  100002                          BPL     FFCHK           ;NO
1406  004050  104000                          HLT     +0              ;YES
1407                                  ;
1408                                  ;
1409  004052  104400                          SCOPE
1410  004054  105777  175120          FFCHK:  TSTB    @LSCS           ;PRINTER BUSY?
1411  004060  100401                          BMI     FFEED2          ;NO
1412  004062  000767                          BR      ERR10           ;YES-WAIT
1413                                  ;
1414                                  ;
1415  004064  112777  000106  175110  FFEED2: MOVB    #'F,@LSDB       ;PUT 'FF' INTO DATA BUFFER
1416  004072  105777  175102                  TSTB    @LSCS
1417  004076  100375                          BPL     .-4
1418  004100  112777  000106  175074          MOVB    #'F,@LSDB
1419  004106  105777  175066                  TSTB    @LSCS
1420  004112  100375                          BPL     .-4
1421  004114  112777  000015  175060          MOVB    #15,@LSDB       ;AND ISSUE CARRIAGE RETURN
1422  004122  105777  175052                  TSTB    @LSCS           ;DONE BIT CLEAR?
1423  004126  100002                          BPL     ERR11           ;YES
1424  004130  104002                          HLT     +2              ;NO
1425                                  ;
1426                                  ;
1427  004132  104400                          SCOPE
1428  004134  005777  175040          ERR11:  TST     @LSCS           ;ERROR?
1429  004140  100002                          BPL     CRCHK3          ;NO
1430  004142  104000                          HLT     +0              ;YES
1431                                  ;
1432                                  ;
1433  004144  104400                          SCOPE
1434  004146  105777  175026          CRCHK3: TSTB    @LSCS           ;PRINTER BUSY?
1435  004152  100401                          BMI     MOREFF          ;NO
1436  004154  000767                          BR      ERR11           ;YES-WAIT
1437                                  ;
1438                                  ;
1439  004156  005367  175052          MOREFF: DEC     WORK            ;DECREASE # OF FF'S
1440  004162  005767  175046                  TST     WORK            ;HAVE WE DONE 2 FF'S
1441  004166  001315                          BNE     FFEED1          ;NO - GO BACK & DO ANOTHER
1442  004170  000404                          BR      SC8             ;YES - GO ON
1443                                  ;*******************************************************************
1444                                  ;
1445                                  ;BELL CHECKED NEXT
1446                                  ;
1447                                  ;*******************************************************************
1448  004172  012767  004204  002176  TST14:  MOV     #BELL,RETURN    ;SET RETURN ADDRESS FOR SCOPE
1449  004200  000401                          BR      BELL            ;IF SELECTING THIS TEST
1450  004202  104400                  SC8:    SCOPE                   ;LOOP ON FORM FEED CHECK?
1451  004204  112777  000007  174770  BELL:   MOVB    #7,@LSDB        ;ISSUE A BELL COMMAND
1452  004212  105777  174762                  TSTB    @LSCS           ;DONE BIT CLEAR?
1453  004216  100002                          BPL     ERR12           ;YES
1454  004220  104002                          HLT     +2              ;NO
1455
1456
1457                                  ;
1458                                  ;
1459  004222  104400                          SCOPE
```

```
1460  004224  005777  174750          ERR12:  TST     @LSCS           ;ERROR?
1461  004230  100002                          BPL     BELLT           ;NO
1462  004232  104000                          HLT     +0              ;YES
1463                                  ;
1464                                  ;
1465  004234  104400                          SCOPE
1466  004236  105777  174736          BELLT:  TSTB    @LSCS           ;SOUND STILL HERE
1467  004242  100401                          BMI     BELL1           ;NO
1468  004244  000767                          BR      ERR12           ;YES-WAIT TILL DONE
1469                                  ;
1470                                  ;
1471  004246  112777  000012  174726  BELL1:  MOVB    #012,@LSDB      ;ISSUE A LINE FEED
1472  004254  105777  174720                  TSTB    @LSCS           ;DONE BIT CLEAR?
1473  004260  100002                          BPL     ERR12A          ;YES
1474  004262  104002                          HLT     +2
1475                                  ;
1476                                  ;
1477  004264  104400                          SCOPE
1478  004266  005777  174706          ERR12A: TST     @LSCS           ;ERROR?
1479  004272  100002                          BPL     LFCHK2          ;NO
1480  004274  104000                          HLT     +0              ;YES
1481                                  ;
1482                                  ;
1483  004276  104400                          SCOPE
1484  004300  105777  174674          LFCHK2: TSTB    @LSCS           ;PRINTER STILL BUSY?
1485  004304  100401                          BMI     BELL2           ;NO
1486  004306  000767                          BR      ERR12A          ;YES-WAIT
1487                                  ;
1488                                  ;
1489  004310  112777  000102  174664  BELL2:  MOVB    #'B,@LSDB       ;LOAD BUFFER WITH 'BELL'
1490  004316  105777  174656                  TSTB    @LSCS
1491  004322  100375                          BPL     .-4
1492  004324  112777  000105  174650          MOVB    #'E,@LSDB
1493  004332  105777  174642                  TSTB    @LSCS
1494  004336  100375                          BPL     .-4
1495  004340  112777  000114  174634          MOVB    #'L,@LSDB       ;AND ISSUE A
1496  004346  105777  174626                  TSTB    @LSCS
1497  004352  100375                          BPL     .-4
1498  004354  112777  000114  174620          MOVB    #'L,@LSDB
1499  004362  105777  174612                  TSTB    @LSCS
1500  004366  100375                          BPL     .-4
1501  004370  112777  000015  174604          MOVB    #15,@LSDB       ;CARRIAGE RETURN
1502  004376  105777  174576                  TSTB    @LSCS           ;DONE BIT CLEAR?
1503  004402  100002                          BPL     ERR13           ;YES
1504  004404  104002                          HLT     +2              ;NO
1505                                  ;
1506                                  ;
1507  004406  104400                          SCOPE
1508  004410  005777  174564          ERR13:  TST     @LSCS           ;ERROR?
1509  004414  100002                          BPL     CRCHK4          ;NO
1510  004416  104000                          HLT     +0              ;YES
1511                                  ;
1512                                  ;
1513  004420  104400                          SCOPE
1514  004422  105777  174552          CRCHK4: TSTB    @LSCS           ;DONE PRINTING?
1515  004426  100405                          BMI     SC9             ;YES
```

```
1516  004430  000767                          BR      ERR13           ;NO-WAIT
1517                                  ;
1518                                  ;
1519
1520
1521                                  ;*************************************************************************
1522                                  ;
1523                                  ;SECTION TO TEST PRINTING SPEEDS
1524                                  ;TESTS ARE DONE USING A RELATIVE TIMING TECHNIQUE
1525                                  ;5 AREAS ARE TESTED, NAMELY:
1526                                  ;(A) 131 CHARACTERS/LINE
1527                                  ;(B) 100 CHARACTERS/LINE
1528                                  ;(C) 80 CHARACTERS/LINE
1529                                  ;(D) 40 CHARACTERS/LINE
1530                                  ;(E) LINE ADVANCE(SLEW RATE)
1531                                  ;
1532                                  ;
1533                                  ;NOTE:DEPENDING ON THE VALUE IN 'COLCNT' SOME OF THE ABOVE TIMING
1534                                  ;     TESTS MAY OR MAY NOT BE EXECUTED.  IF SOME ARE NOT EXECUTED,
1535                                  ;     HOWEVER, THE TEST NO. WILL STILL BE PRINTED OUT.
1536                                  ;
1537                                  ;*************************************************************************
1538  004432  012767  004444  001736  TST15:  MOV     #CH132,RETURN   ;SET RETURN ADDRESS FOR SCOPE
1539  004440  000401                          BR      CH132           ;IF SELECTING THIS TEST
1540  004442  104400                  SC9:    SCOPE                   ;LOOP ON BELL CHECK?
1541  004444  012767  000002  174546  CH132:  MOV     #2,LFNO         ;SETUP NO. OF LINE FEEDS COUNTER
1542  004452  112777  000012  174522  AGAIN:  MOVB    #012,@LSDB      ;ISSUE A LINE FEED
1543  004460  105777  174514                  TSTB    @LSCS           ;DONE BIT CLEAR?
1544  004464  100002                          BPL     ERR14           ;YES
1545  004466  104002                          HLT     +2              ;NO
1546                                  ;
1547                                  ;
1548  004470  104400                          SCOPE
1549  004472  005777  174502          ERR14:  TST     @LSCS           ;ERROR BIT SET?
1550  004476  100002                          BPL     LFCHK3          ;NO
1551  004500  104000                          HLT     +0              ;YES
1552                                  ;
1553                                  ;
1554  004502  104400                          SCOPE
1555  004504  105777  174470          LFCHK3: TSTB    @LSCS           ;PRINTER BUSY?
1556  004510  100401                          BMI     RELF            ;NO-ISSUE ANOTHER LINE FEED
1557  004512  000767                          BR      ERR14           ;YES
1558                                  ;
1559                                  ;
1560  004514  005367  174500          RELF:   DEC     LFNO            ;DECREASE NO. OF LINE FEEDS BY 1
1561  004520  001401                          BEQ     CH132A          ;MORE LINE FEEDS CALLED FOR?
1562  004522  000753                          BR      AGAIN           ;YES
1563                                  ;
1564                                  ;
1565  004524  012701  007274          CH132A: MOV     #TITL1,R1       ;MOVE TEST TITLE INTO A BUFFER
1566  004530  004767  001200                  JSR     R7,TSTTAG       ;PRINT THE TITLE
1567  004534  000403                          BR      .+10
1568  004536  051524  030524  000065  A:      .ASCIZ  /TST15/         ;TEST NO. TO BE PRINTED OUT
1569  004544  012701  004536                  MOV     #A,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
1570  004550  004767  001160                  JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
1571  004554  005067  174472                  CLR     TEST            ;CLEAR CHARS./LINE TEST INDICATOR
```

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1572  004560  012767  000203  174446          MOV     #203,WORK       ;SET UP LINE FOR 131 CHARS.
1573  004566  026767  174502  174440          CMP     COLCNT,WORK     ;IS 131 COLS. ACCESSIBLE?
1574  004574  002555                          BLT     CH100           ;NO
1575  004576  012767  177700  174416  RPEAT:  MOV     #-64.,CHARS     ;SETUP NO. OF PRINTABLE CHARS.
1576  004604  012767  000040  174412          MOV     #40,CHRGEN      ;SET 1ST CHAR.=SPACE
1577  004612  116777  174406  174362  CH132F: MOVB    CHRGEN,@LSDB    ;LOAD CHAR. INTO BUFFER
1578  004620  105777  174354                  TSTB    @LSCS           ;WAIT FOR LOADING
1579  004624  100375                          BPL     .-4
1580  004626  005367  174402                  DEC     WORK            ;DECREASE NO. OF CHARS./LINE
1581  004632  005767  174376                  TST     WORK            ;IS LINE FULL?
1582  004636  001417                          BEQ     TIMING          ;YES - GET SET TO PRINT & MONITOR RELATIVE TIME
1583  004640  005767  174356                  TST     CHARS           ;START AT 1ST CHAR. ALL OVER?
1584  004644  001405                          BEQ     STOVER          ;YES - 64 CHARS./LINE DEPLETED BUT LINE NOT FULL YET!
1585  004646  005267  174350                  INC     CHARS           ;NO-DECREASE CHAR. COUNT
1586  004652  005267  174346                  INC     CHRGEN          ;GET NEXT CHARACTER
1587  004656  000755                          BR      CH132F          ;GO BACK TO LOAD BUFFER
1588  004660  012767  177700  174334  STOVER: MOV     #-64.,CHARS     ;RESET CHARACTER COUNT
1589  004666  012767  000040  174330          MOV     #40,CHRGEN      ;RESET TO START OVER AGAIN
1590  004674  000746                          BR      CH132F          ;KEEP LOADING CHARS.
1591                                  ;
1592                                  ;
1593  004676  112777  000012  174276  TIMING: MOVB    #12,@LSDB       ;ISSUE A LINE FEED
1594  004704  005067  174330          TIM132: CLR     CYCLE           ;CLEAR 1000 TIME LOOP COUNTER
1595  004710  005267  174314                  INC     TIMER           ;RELATIVE TIME COUNTER
1596  004714  105777  174260                  TSTB    @LSCS           ;DONE BIT SET?
1597  004720  100416                          BMI     RTTYP           ;YES-LINE HAS BEEN PRINTED
1598  004722  005267  174312          CYCNT:  INC     CYCLE           ;NO-CONTINUE LOOP COUNTING
1599  004726  022767  001750  174304          CMP     #1000.,CYCLE    ;1000 TIMES THRU LOOP?
1600  004734  001763                          BEQ     TIM132          ;YES - INCREMENT RELATIVE TIME COUNT
1601                                                                  ;AND CLEAR 1000X LOOP COUNTER
1602  004736  105777  174236                  TSTB    @LSCS           ;DONE BIT SET?
1603  004742  100760                          BMI     TIM132          ;YES - LINE HAS BEEN PRINTED
1604  004744  005777  174230                  TST     @LSCS           ;NO - ERROR BIT SET?
1605  004750  100364                          BPL     CYCNT           ;NO - KEEP CYCLING
1606  004752  104000                          HLT     +0              ;YES
1607
1608
1609                                  ;
1610                                  ;
1611  004754  104400                  SCOPE
1612  004756  012701  007356          RTTYP:  MOV     #TITL2,R1       ;MOVE RESULT TITLE INTO A BUFFER
1613  004762  105711                  CTST:   TSTB    (R1)            ;IS CHAR. A 0 SYMBOL?
1614  004764  001406                          BEQ     CTST1           ;YES-PICK UP TIME COUNT FROM TIMING ROUTINE
1615  004766  112177  174210                  MOVB    (R1)+,@LSDB     ;NO-LOAD CHAR.
1616  004772  105777  174202                  TSTB    @LSCS           ;WAIT FOR CHAR. TO LOAD
1617  004776  100375                          BPL     .-4
1618  005000  000770                          BR      CTST            ;LOOK AT NEXT CHAR.
1619  005002  016767  174222  174222  CTST1:  MOV     TIMER,WAREA     ;MOVE TIME COUNT INTO A WORK AREA
1620  005010  005067  174214                  CLR     TIMER           ;RESET TIME COUNTER
1621  005014  004367  000572                  JSR     R3,OCTDEC       ;CONVERT OCTAL TO ASCII 7-BIT DECIMAL
1622                                                                  ;AND LOAD INTO PRINTER BUFFER
1623  005020  112777  000012  174154          MOVB    #12,@LSDB       ;ISSUE A LINE FEED
1624  005026  105777  174146                  TSTB    @LSCS           ;DONE BIT CLEAR
1625  005032  100002                          BPL     ERR18           ;YES
1626  005034  104002                          HLT     +2              ;NO
1627                                  ;
```

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1628                                    ;
1629  005036  104400                    SCOPE
1630  005040  005777  174134  ERR18:    TST     @LSCS           ;ERROR?
1631  005044  100002                    BPL     CRCHK6          ;NO
1632  005046  104000                    HLT     +0              ;YES
1633                                    ;
1634                                    ;
1635  005050  104400                    SCOPE
1636  005052  105777  174122  CRCHK6:   TSTB    @LSCS           ;PRINTER BUSY PRINTING?
1637  005056  100401                    BMI     MORE            ;NO
1638  005060  000767                    BR      ERR18           ;YES
1639
1640
1641                                    ;
1642  005062  022767  000000  174162  MORE:   CMP     #0,TEST
1643  005070  001416                    BEQ     SC10            ;DO 100 CHARS/LINE
1644  005072  022767  000001  174152          CMP     #1,TEST
1645  005100  001443                    BEQ     SC11            ;DO 80 CHARS/LINE
1646  005102  022767  000002  174142          CMP     #2,TEST
1647  005110  001470                    BEQ     SC12            ;DO 40 CHARS/LINE
1648  005112  000167  000236                    JMP     SC13            ;CHARS./LINE TEST ALL DONE - GO TO NEXT TEST
1649                                    ;*****************************************************************
1650                                    ;
1651                                    ;RELATIVE TIME OF 100 CHARS./LINE CHECKED NEXT
1652                                    ;
1653                                    ;*****************************************************************
1654  005116  012767  005130  001252  TST16:  MOV     #CH100,RETURN   ;SET RETURN ADDRESS FOR SCOPE
1655  005124  000401                    BR      CH100           ;IF SELECTING THIS TEST
1656  005126  104400                    SC10:   SCOPE                   ;LOOP ON 132 CHARS./LINE TIMING CHECK?
1657  005130  000403                    CH100:  BR      .+10
1658  005132  051524  030524  000066  B:      .ASCIZ  /TST16/         ;TEST NO. TO BE PRINTED OUT
1659  005140  012701  005132                  MOV     #B,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
1660  005144  004767  000564                  JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
1661  005150  012767  000001  174074          MOV     #1,TEST
1662  005156  012767  000144  174050          MOV     #144,WORK       ;SET UP LINE FOR 100 CHARS.
1663  005164  026767  174104  174042          CMP     COLCNT,WORK     ;IS 100 COLS. ACCESSIBLE?
1664  005172  002407                    BLT     CH80            ;NO
1665  005174  000167  177376                    JMP     RPEAT           ;GO BACK TO TIME 100 CHARS./LINE
1666                                    ;*****************************************************************
1667                                    ;
1668                                    ;RELATIVE TIME OF 80 CHARS./LINE CHECKED NEXT
1669                                    ;
1670                                    ;*****************************************************************
1671  005200  012767  005212  001170  TST17:  MOV     #CH80,RETURN    ;SET RETURN ADDRESS FOR SCOPE
1672  005206  000401                    BR      CH80            ;IF SELECTING THIS TEST
1673  005210  104400                    SC11:   SCOPE                   ;LOOP ON 100 CHARS./LINE TIMING CHECK?
1674  005212  000403                    CH80:   BR      .+10
1675  005214  051524  030524  000067  C:      .ASCIZ  /TST17/         ;TEST NO. TO BE PRINTED OUT
1676  005222  012701  005214                  MOV     #C,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
1677  005226  004767  000502                  JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
1678  005232  012767  000002  174012          MOV     #2,TEST
1679  005240  012767  000120  173766          MOV     #120,WORK       ;SET UP LINE FOR 80 CHARS.
1680  005246  026767  174022  173760          CMP     COLCNT,WORK     ;IS 80 COLS. ACCESSIBLE?
1681  005254  002407                    BLT     CH40            ;NO
1682  005256  000167  177314                    JMP     RPEAT           ;GO BACK TO TIME 80 CHARS./LINE
1683                                    ;*****************************************************************
```

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1684                                    ;
1685                                    ;RELATIVE TIME OF 40 CHARS./LINE CHECKED NEXT
1686                                    ;
1687                                    ;*****************************************************************************
1688  005262  012767  005274  001106  TST20:  MOV     #CH40,RETURN    ;SET RETURN ADDRESS FOR SCOPE
1689  005270  000401                    BR      CH40            ;IF SELECTING THIS TEST
1690  005272  104400                    SC12:   SCOPE           ;LOOP ON 80 CHARS./LINE TIMING CHECK?
1691  005274  000403                    CH40:   BR      .+10
1692  005276  051524  031124  000060  D:       .ASCIZ  /TST20/         ;TEST NO. TO BE PRINTED OUT
1693  005304  012701  005276            MOV     #D,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
1694  005310  004767  000420            JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
1695  005314  012767  000003  173730    MOV     #3,TEST
1696  005322  012767  000050  173704    MOV     #50,WORK        ;SET UP LINE FOR 40 CHARS.
1697  005330  026767  173740  173676    CMP     COLCNT,WORK     ;IS 40 COLS. ACCESSIBLE?
1698  005336  002406                    BLT     SC13            ;NO
1699  005340  000167  177232            JMP     RPEAT           ;GO BACK TO TIME 40 CHARS./LINE
1700                                    ;
1701                                    ;*****************************************************************************
1702                                    ;
1703                                    ;RELATIVE TIME OF SLEW RATE CHECKED NEXT
1704                                    ;
1705                                    ;*****************************************************************************
1706                                    ;
1707  005344  012767  005356  001024  TST21:  MOV     #LFRATE,RETURN  ;SET RETURN ADDRESS FOR SCOPE
1708  005352  000401                    BR      LFRATE          ;IF SELECTING THIS TEST
1709  005354  104400                    SC13:   SCOPE           ;LOOP ON 40 CHARS./LINE TIMING CHECK?
1710  005356  000403                    LFRATE: BR      .+10
1711  005360  051524  031124  000061  E:       .ASCIZ  /TST21/         ;TEST NO. TO BE PRINTED OUT
1712  005366  012701  005360            MOV     #E,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
1713  005372  004767  000336            JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
1714  005376  012701  007402            MOV     #TITL3,R1       ;MOVE TEST TITLE INTO A BUFFER
1715  005402  105711                    LFRAT1: TSTB    (R1)            ;IS CHAR. A 0 SYMBOL?
1716  005404  001406                    BEQ     LFRAT2          ;YES-ISSUE A 'CR'
1717  005406  112177  173570            MOVB    (R1)+,@LSDB     ;NO-LOAD CHAR.
1718  005412  105777  173562            TSTB    @LSCS           ;WAIT FOR LOADING
1719  005416  100375                    BPL     .-4
1720  005420  000770                    BR      LFRAT1          ;LOOK AT NEXT CHAR
1721  005422  112777  000015  173552  LFRAT2: MOVB    #15,@LSDB       ;ISSUE A CARRIAGE RETURN
1722  005430  105777  173544            TSTB    @LSCS           ;WAIT FOR EXECUTION
1723  005434  100375                    BPL     .-4
1724  005436  112777  000012  173536    MOVB    #12,@LSDB       ;ISSUE A LINE FEED-80MS
1725  005444  004467  000364            JSR     R4,40FLAG       ;KEEP A RELATIVE TIME COUNT
1726  005450  112777  000012  173524    MOVB    #12,@LSDB       ;ISSUE 2ND LINE FEED-40MS
1727  005456  004467  000356            JSR     R4,SLEWT        ;KEEP ON WITH RELATIVE TIME COUNTING
1728  005462  012701  007356            MOV     #TITL2,R1       ;MOVE RESULT TITLE INTO A BUFFER
1729  005466  112777  000012  173506    MOVB    #12,@LSDB       ;ISSUE A LINE FEED
1730  005474  105777  173500            TSTB    @LSCS           ;WAIT FOR EXECUTION
1731  005500  100375                    BPL     .-4
1732  005502  016767  173522  173522    MOV     TIMER,WAREA     ;MOVE TIME COUNT INTO A WORK AREA
1733  005510  005067  173524            CLR     CYCLE           ;CLEAR 1000X LOOP COUNTER
1734  005514  005067  173510            CLR     TIMER           ;CLEAR TIME COUNT
1735  005520  105777  173454    RLOAD:  TSTB    @LSCS   ;IS PRINTER READY?
1736  005524  100375                    BPL     .-4
1737  005526  105711                    TSTB    (R1)            ;GET A CHAR. OF RESULT TITLE
1738  005530  001403                    BEQ     CONT            ;GO TO DECODE TIME COUNT IF IT IS A '0' SYMBOL
1739  005532  112177  173444            MOVB    (R1)+,@LSDB     ;IF IT ISN'T A '0' LOAD IT INTO PRINTER
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1740  005536  000770                          BR      RLOAD           ;GO TO LOOK AT NEXT CHAR.
1741  005540  004367  000046        CONT:     JSR     R3,OCTDEC       ;DECODE TIME COUNT
1742  005544  112777  000012  173430          MOVB    #12,@LSDB       ;ISSUE A LINE FEED TO PRINT RESULT
1743  005552  105777  173422                  TSTB    @LSCS           ;DONE BIT SET?
1744  005556  100002                          BPL     ERR19           ;NO - CHECK FOR ANY ERROR
1745  005560  104002                          HLT     +2              ;YES - IT IS SET
1746                                ;
1747                                ;
1748  005562  104400                          SCOPE
1749  005564  005777  173410        ERR19:    TST     @LSCS           ;ANY ERROR?
1750  005570  100002                          BPL     CRCHK7          ;NO - CHECK TO SEE IF PRINTER STILL BUSY
1751  005572  104000                          HLT     +0              ;YES - AN ERROR OCCURRED
1752                                ;
1753                                ;
1754  005574  104400                          SCOPE
1755  005576  105777  173376        CRCHK7:   TSTB    @LSCS           ;PRINTER STILL BUSY?
1756  005602  100401                          BMI     XERSIZ          ;NO - PROCEED TO NEXT TEST
1757  005604  000767                          BR      ERR19           ;YES - WAIT
1758  005606  000167  003612        XERSIZ:   JMP     SC14
1759                                ;*********************************************************************
1760                                ;
1761                                ;SUBROUTINE TO CONVERT AN OCTAL NUMBER
1762                                ;TO AN ASCII 7-BIT DECIMAL VALUE AND LOAD THE
1763                                ;RESULTS INTO THE CENTRONICS PRINTER BUFFER
1764                                ;
1765                                ;*********************************************************************
1766  005612  116702  173414        OCTDEC:   MOVB    WAREA,R2        ;MOVE TIME COUNT TO A REGISTER
1767  005616  012704  005726                  MOV     #ADTENP,R4      ;MOVE POWERS OF TEN ADDRESS TO A REGISTER
1768  005622  012767  000003  000070          MOV     #3,CNVCTR       ;SET POWER CONVERSION COUNTER
1769  005630  012467  000070        BDCNVA:   MOV     (R4)+,TENPWR    ;MOVE TENS POWER TO A WORK AREA
1770  005634  004767  000010                  JSR     R7,SUBTEN       ;DO THE CONVERSION
1771  005640  005367  000054                  DEC     CNVCTR          ;DECREASE CONVERSION COUNTER
1772  005644  001371                          BNE     BDCNVA          ;ARE WE DONE CONVERTING?
1773  005646  000203                          RTS     R3              ;YES
1774  005650  005067  000046        SUBTEN:   CLR     DIGIT           ;CLEAR CONVERTED ANSWER AREA
1775  005654  166702  000044        SUBTNA:   SUB     TENPWR,R2       ;SUBTRACT TENS POWER FROM OCTAL VALUE
1776  005660  103403                          BCS     SUBTNB          ;BRANCH IF CARRY BIT SET
1777  005662  005267  000034                  INC     DIGIT           ;OTHERWISE INCREMENT CONVERTED ANSWER
1778  005666  000772                          BR      SUBTNA          ;AND BRANCH BACK TO SUBTRACT AGAIN
1779  005670  066702  000030        SUBTNB:   ADD     TENPWR,R2       ;ADD BACK LAST SUBTRACTION
1780  005674  062767  000060  000020          ADD     #60,DIGIT       ;CONVERT TO ASCII
1781  005702  116777  000014  173272          MOVB    DIGIT,@LSDB     ;MOVE DIGIT INTO PRINTER BUFFER
1782  005710  105777  173264                  TSTB    @LSCS           ;WAIT FOR EXECUTION
1783  005714  100375                          BPL     .-4
1784  005716  000207                          RTS     R7              ;BRANCH BACK TO PICK UP NEXT DIGIT
1785                                ;
1786                                ;
1787  005720  000000        CNVCTR:   0               ;CONVERSION COUNTER
1788  005722  000000        DIGIT:    0               ;CONVERTED ANSWER/DIGIT
1789  005724  000000        TENPWR:   0               ;TENS POWER FOR CONVERSION
1790  005726  000144        ADTENP:   100.            ;TEN TO THE 2 POWER
1791  005730  000012                  10.             ;TEN TO THE 1 POWER
1792  005732  000001                  1.              ;TEN TO THE 0 POWER
1793                                ;*********************************************************************
1794                                ;
1795                                ;SUBROUTINE TO PRINT OUT TEST NOS. & TEST TITLES
```

```
1796                                        ;
1797                                        ;*****************************************************************************
1798  005734  112777  000012  173240  TSTTAG: MOVB    #12,@LSDB       ;ISSUE A LINE FEED
1799  005742  105777  173232                TSTB    @LSCS           ;WAIT FOR EXECUTION
1800  005746  100375                      BPL     .-4
1801  005750  105711                TAG1:   TSTB    (R1)            ;LOOK AT A CHAR. OF PRINTOUT
1802  005752  001406                      BEQ     TAG2            ;IF LAST CHAR. OF PRINTOUT ISSUE A LF
1803  005754  112177  173222              MOVB    (R1)+,@LSDB     ;OTHERWISE, LOAD INTO PRINTER BUFFER
1804  005760  105777  173214              TSTB    @LSCS           ;AND WAIT FOR LOADING
1805  005764  100375                      BPL     .-4
1806  005766  000770                      BR      TAG1            ;GO BACK TO LOOK AT ANOTHER CHAR.
1807  005770  112777  000012  173204  TAG2:   MOVB    #12,@LSDB       ;ISSUE A LINE FEED TO PRINT TEST NO.
1808  005776  105777  173176              TSTB    @LSCS           ;DONE BIT CLEAR?
1809  006002  100002                      BPL     ERR20           ;YES
1810  006004  104002                      HLT     +2              ;NO
1811                                      ;
1812                                      ;
1813  006006  104400                      SCOPE
1814  006010  005777  173164        ERR20:  TST     @LSCS           ;ERROR BIT SET?
1815  006014  100002                      BPL     TAG3            ;NO
1816  006016  104000                      HLT     +0              ;YES
1817                                      ;
1818                                      ;
1819  006020  104400                      SCOPE
1820  006022  105777  173152        TAG3:   TSTB    @LSCS           ;PRINTER STILL BUSY?
1821  006026  100401                      BMI     TAG4            ;NO
1822  006030  000767                      BR      ERR20           ;YES
1823                                      ;
1824                                      ;
1825  006032  000207                TAG4:   RTS     R7              ;RETURN TO NORMAL PROGRAM FLOW
1826                                      ;*****************************************************************************
1827                                      ;
1828                                      ;SUBROUTINE TO CYCLE TIME FOR SLEW RATE TESTING
1829                                      ;
1830                                      ;*****************************************************************************
1831  006034  005067  173200        WOFLAG: CLR     CYCLE           ;CLEAR 1000X LOOP COUNTER
1832  006040  005267  173164        SLEWT:  INC     TIMER           ;INCREMENT THE TIME COUNT
1833  006044  105777  173130              TSTB    @LSCS           ;PRINTER DONE?
1834  006050  100415                      BMI     SECLF           ;YES - RETURN
1835  006052  005267  173162        CYCLE1: INC     CYCLE           ;NO - INCREMENT 1000X LOOP COUNTER
1836  006056  022767  001750  173154      CMP     #1000.,CYCLE    ;HAVE WE LOOPED 1000X?
1837  006064  001763                      BEQ     WOFLAG          ;YES - GO BACK TO INCREMENT TIME COUNT
1838                                                              ;AND TEST THE DONE BIT
1839  006066  105777  173106              TSTB    @LSCS           ;NO - IS PRINTER DONE?
1840  006072  100762                      BMI     SLEWT           ;YES - INCREMENT TIME COUNT
1841  006074  005777  173100              TST     @LSCS           ;DID ANY ERROR OCCUR?
1842  006100  100364                      BPL     CYCLE1          ;NO - KEEP WITHIN 1000X LOOP COUNT
1843  006102  104000                      HLT     +0              ;YES - AN ERROR OCCURRED
1844  006104  000204                SECLF:  RTS     R4              ;RETURN
1845                                      ;*****************************************************************************
1846                                      ;
1847                                      ;AVERAGE TIME WAIT ROUTINE FOR CHECKING THAT THE
1848                                      ;DONE BIT FUNCTIONS PROPERLY BEFORE
1849                                      ;GOING ON TO FURTHER PROGRAM TESTING.
1850                                      ;IF THE DONE BIT DOESN'T SET WITHIN
1851                                      ;THE MORE THAN AMPLE TIME ALLOWED, THEN A
```

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                                        ;MESSAGE WILL BE TYPED OUT ON THE TTY INDICATING
                                        ;A PROBLEM E.G. DONE BIT NEVER SET
                                        ;
                                        ;*****************************************************************************
006106  016767  173154  173120    WAITON: MOV     DELAY,WORK      ;SET A WAIT VALUE OF X'TIMES THRU LOOP
006114  005267  173114              INCR1:  INC     WORK            ;INCREMENT THE PASS THRU LOOP
006120  005767  173110                      TST     WORK            ;DID WE LOOP X'TIMES WITHOUT DONE RESETTING?
006124  00.405                             BEQ     ALMOST          ;YES
006126  105777  173046                      TSTB    @LSCS           ;NO - STILL OK!
006132  100401                             BMI     FINI            ;RETURN IF DONE BIT SET
006134  000767                             BR      INCR1           ;IF NOT READY INCREMENT LOOP
006136  000204                  FINI:   RTS     R4              ;OK - RETURN WHERE LEFT OFF
006140  104005                  ALMOST: HLT     +5              ;NOT QUITE! TOOK TOO LONG
006142  000204                          RTS     R4              ;RETURN
                                        ;*****************************************************************************
                                        ;
                                        ;SUBROUTINE TO OUTPUT ASCII MESSAGES ON TELETYPE
                                        ;
                                        ;*****************************************************************************
006144  011600                  TYP:    MOV     @R6,R0          ;GET MESSAGE ADDRESS
006146  062716  000002                  ADD     #2,@R6          ;SET UP EXIT LOCATION
                                                                ;I.E. - LOCATION AFTER MESSAGE ADDRESS
006152  011000                          MOV     @R0,R0          ;SET UP FOR 1ST CHAR. OF MESSAGE
006154  112777  000015  173024          MOVB    #15,@TPB        ;ISSUE A CARRIAGE RETURN
006162  105777  173022                  TSTB    @TPS            ;WAIT FOR EXECUTION
006166  100375                          BPL     .-4
006170  112777  000012  173010          MOVB    #12,@TPB        ;ISSUE A LINE FEED
006176  105777  173006                  TSTB    @TPS            ;WAIT FOR EXECUTION
006202  100375                          BPL     .-4
006204  112067  173026          TYPA:   MOVB    (R0)+,TYPDAT    ;GET A CHARACTER
006210  122767  000000  173020          CMPB    #0,TYPDAT       ;IS IT A 0?
006216  001007                          BNE     TYPB            ;NO - GO AND PRINT IT
006220  012777  177777  172760          MOV     #-1,@TPB        ;ISSUE A -1 FOR DOUBLE BUFFERED UART
006226  105777  172756                  TSTB    @TPS            ;WAIT FOR EXECUTION
006232  100375                          BPL     .-4
006234  000002                          RTI                     ;YES - RETURN FROM EMT CALL
006236  116777  172774  172742  TYPB:   MOVB    TYPDAT,@TPB     ;MOVE CHARACTER INTO TTY BUFFER
006244  105777  172740                  TSTB    @TPS            ;WAIT FOR EXECUTION
006250  100375                          BPL     .-4
006252  000754                          BR      TYPA            ;GET ANOTHER CHARACTER
                                        ;*****************************************************************************
                                        ;
                                        ;SCOPE ROUTINE TO LOOP ON TEST
                                        ;
                                        ;*****************************************************************************
006254  005767  173002          SCOPEC: TST     ICOUNT          ;DO WE WANT ITERATIONS?
006260  001420                          BEQ     SCOPEF          ;NO - SEE IF WE WANT TO LOOP!
006262  005767  172776                  TST     ERRIND          ;YES - SEE IF ERROR OCCURRED PREVIOUSLY
006266  001015                          BNE     SCOPEF          ;IT DID! DON'T ITERATE
006270  021627  003102                  CMP     (R6),#CARRET    ;NO ERROR OCCURRED - SEE IF WE WANT TO
                                                                ;ITERATE 1X OR X'TIMES
006274  101012                          BHI     SCOPEF          ;ITERATE 1X
006276  005367  172754                  DEC     ICNT            ;BEGIN ITERATING X'TIMES OR TILL
                                                                ;AN ERROR OCCURS
006302  016700  172750                  MOV     ICNT,R0         ;FLASH SOME LIGHTS
006306  005767  172744                  TST     ICNT            ;ARE WE DONE?
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 1908  006312  001032                          BNE     SCOPEB          ;NO - KEEP ITERATING!
 1909  006314  016767  172740  172734          MOV     REICNT,ICNT     ;YES - RESTORE ITERATION COUNT
 1910  006322  032767  040000  171240  SCOPEF: BIT     #40000,SWR      ;LOOP ON TEST?
 1911  006330  001023                          BNE     SCOPEB          ;YES - RESET STACK & REDO TEST
 1912  006332  000411                          BR      SCOPEG          ;NOP FOR XOR TESTER
 1913                                  ;
 1914                                  ;
 1915  006334  013746  000004                  MOV     @#4,-(R6)       ;SAVE TRAPCATCHER
 1916  006340  012737  006400  000004          MOV     #SCOPEB,@#4     ;SET UP TO REDO TEST IF ERROR OCCURS
 1917  006346  005737  177060                  TST     @#177060        ;TIMEOUT ERROR?
 1918  006352  012637  000004                  MOV     (R6)+,@#4       ;NO - RESTORE TRAPCATCHER & CONTINUE TESTING
 1919                                  ;
 1920                                  ;
 1921  006356  011667  000014          SCOPEG: MOV     @R6,RETURN      ;SAVE THE RETURN ADDRESS OF NEXT TEST
 1922  006362  005067  172676                  CLR     ERRIND          ;CLEAR ERROR INDICATOR
 1923  006366  016767  172666  172662          MOV     REICNT,ICNT     ;RESTORE ITERATION COUNT
 1924  006374  000002                          RTI                     ;RETURN TO CONTINUE TESTING
 1925  006376  000000                  RETURN: .WORD   0
 1926  006400  005726                  SCOPEB: TST     (R6)+           ;RESET STACK AND OLD
 1927  006402  012677  172576                  MOV     (R6)+,@PSW      ;PROCESSOR STATUS WORD
 1928  006406  000177  177764                  JMP     @RETURN         ;RETURN TO REDO A TEST
 1929                                  ;*****************************************************************************
 1930                                  ;
 1931                                  ;SUBROUTINE FOR ERROR PRINTOUT
 1932                                  ;IT IS OF THE FORM:
 1933                                  ;PC = XXXXX  'ERROR MESSAGE'
 1934                                  ;
 1935                                  ;*****************************************************************************
 1936  006412  012767  000001  172644  ERROR:  MOV     #1,ERRIND       ;SET ERROR INDICATOR
 1937  006420  010067  172644                  MOV     R0,ADDERR       ;IF AN ERROR OCCURRED IN TST1 THEN
 1938                                                                  ;'ADDERR' WILL CONTAIN THE ADDRESS OF
 1939                                                                  ;THE ADDRESS ERROR
 1940  006424  036727  171140  020000          BIT     SWR,#20000      ;INHIBIT ERROR PRINTOUT?
 1941  006432  001401                          BEQ     .+4             ;NO - PRINT CONTENTS OF PC
 1942  006434  000002                          RTI
 1943  006436  105777  172546                  TSTB    @TPS            ;WAIT FOR EXECUTION
 1944  006442  100375                          BPL     .-4
 1945  006444  000004                          TYPE                    ;  'PE THE ERROR MESSAGE
 1946  006446  010252                          ERRORM                  ;  'C= '
 1947  006450  011667  172616                  MOV     (R6),SAVEPC     ;SAVE PC - LOCATION AFTER HLT
 1948  006454  016705  172612                  MOV     SAVEPC,R5       ;SAVE PC OF HLT FOR ERROR MESSAGE USE
 1949  006460  004467  000014                  JSR     R4,DECPC        ;DECODE ACTUAL PC FOR TELETYPE PRINTOUT
 1950  006464  036727  171100  100000          BIT     SWR,#100000     ;DO WE WANT TO HALT ON ERROR?
 1951  006472  001401                          BEQ     .+4             ;NO - CONTINUE TESTING
 1952  006474  000000                          HALT                    ;HALT ON ERROR
 1953  006476  000002                          RTI                     ;RETURN TO TESTING
 1954                                  ;
 1955                                  ;
 1956  006500  012701  000500          DECPC:  MOV     #500,R1         ;SET STARTING LOCATION FOR LOADING OF DECODED PC
 1957  006504  116702  172562          REIT:   MOVB    SAVEPC,R2       ;MOVE PC (OCTAL) INTO REGISTER 2
 1958  006510  042702  177770                  BIC     #177770,R2      ;MASK OUT ALL BUT RIGHTMOST DIGIT
 1959  006514  062702  000060                  ADD     #60,R2          ;CONVERT TO 7-BIT ASCII OCTAL
 1960  006520  110241                          MOVB    R2,-(R1)        ;SAVE THE CONVERTED DIGIT
 1961                                                                  ;STARTING AT LOCATION 500
 1962  006522  000241                          CLC
 1963  006524  006067  172542                  ROR     SAVEPC          ;SHIFT OVER PC
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1964  006530  000241                          CLC
1965  006532  006067  172534                  ROR     SAVEPC          ;3X
1966  006536  000241                          CLC
1967  006540  006067  172526                  ROR     SAVEPC          ;TO GET NEXT DIGIT FOR CONVERSION
1968  006544  022767  000000  172520          CMP     #0,SAVEPC       ;IS WHAT'S LEFT OF PC EQUAL TO 0?
1969  006552  001401                          BEQ     TTYLD           ;YES - GO TO LOAD BUFFER WITH CONVERTED PC
1970  006554  000753                          BR      REIT            ;NO - GO TO CONVERT NEXT RIGHTMOST DIGIT
1971                                  ;
1972                                  ;
1973  006556  112177  172424          TTYLD:  MOVB    (R1)+,@TPB      ;MOVE CONVERTED PC INTO TELETYPE BUFFER
1974                                                                  ;STARTING WITH THE LEFTMOST DIGIT
1975  006562  105777  172422                  TSTB    @TPS            ;WAIT FOR EXECUTION
1976  006566  100375                          BPL     .-4
1977  006570  022701  000500                  CMP     #500,R1         ;HAVE WE GOT THE WHOLE PC?
1978  006574  001424                          BEQ     TTYMSG          ;YES - PRINT ERROR MESSAGE ASSOCIATED WITH HLT
1979  006576  000767                          BR      TTYLD           ;NO - KEEP LOADING PC
1980  006600  112777  000015  172400  ERROR1: MOVB    #15,@TPB        ;ISSUE A CARRIAGE RETURN
1981  006606  105777  172376                  TSTB    @TPS            ;WAIT FOR EXECUTION
1982  006612  100375                          BPL     .-4
1983  006614  112777  000012  172364          MOVB    #12,@TPB        ;ISSUE A LINE FEED
1984  006622  105777  172362                  TSTB    @TPS            ;WAIT FOR EXECUTION
1985  006626  100375                          BPL     .-4
1986  006630  012777  177777  172350          MOV     #-1,@TPB        ;ISSUE A -1 FOR DOUBLE BUFFERED UART
1987  006636  105777  172346                  TSTB    @TPS            ;WAIT FOR EXECUTION
1988  006642  100375                          BPL     .-4
1989  006644  000204                          RTS     R4              ;RETURN
1990  006646  010567  000054          TTYMSG: MOV     R5,HLTADD       ;GET THE PROGRAM COUNTER
1991  006652  162767  000002  000046          SUB     #2,HLTADD       ;SUBTRACT 1 WORD TO GET ACTUAL HLT
1992  006660  117703  000042                  MOVB    @HLTADD,R3      ;STORE ERROR MESSAGE NUMBER
1993  006664  006303                          ASL     R3              ;SHIFT MESSAGE NO. TO GET PROPER WORD COUNT
1994  006666  016301  014354                  MOV     MSGTAB(R3),R1   ;STORE ERROR MESSAGE ADDRESS
1995  006672  112167  172340          MSGA:   MOVB    (R1)+,TYPDAT    ;LOOK AT A CHARACTER
1996  006676  122767  000000  172332          CMPB    #0,TYPDAT       ;IS IT A 0 SYMBOL?
1997  006704  001001                          BNE     MSGB            ;NO - LOAD THE CHARACTER
1998  006706  000734                          BR      ERROR1          ;YES - MESSAGE DONE
1999  006710  116777  172322  172270  MSGB:   MOVB    TYPDAT,@TPB     ;MOVE CHAR. INTO TELETYPE BUFFER
2000  006716  105777  172266                  TSTB    @TPS            ;WAIT FOR EXECUTION
2001  006722  100375                          BPL     .-4
2002  006724  000762                          BR      MSGA            ;LOOK AT NEXT CHARACTER
2003                                  ;
2004                                  ;
2005  006726  000000                  HLTADD: 0
2006                                  ;*****************************************************************************
2007                                  ;
2008                                  ;INITIAL TELETYPE MESSAGES
2009                                  ;
2010                                  ;*****************************************************************************
2011  006730  040515  047111  042504  MES1:   .ASCIZ  /MAINDEC-11-DZLSAB/
2012  006736  026503  030461  042055
2013  006744  046132  040523  000102
2014                                          .EVEN
2015  006752  042523  042514  052103  MES2:   .ASCIZ  /SELECT PRINTER ON LINE/
2016  006760  050040  044522  052116
2017  006766  051105  047440  020116
2018  006774  044514  042516     000
2019          007002                          .EVEN
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2020  007002  044510  020124  047503  MES3:   .ASCIZ  /HIT CONTINUE SWITCH TO RESUME OPERATION/
2021  007010  052116  047111  042525
2022  007016  051440  044527  041524
2023  007024  020110  047524  051040
2024  007032  051505  046525  020105
2025  007040  050117  051105  052101
2026  007046  047511  000116
2027                                  .EVEN
2028  007052  050117  047105  043040  MES4:   .ASCIZ  /OPEN FRONT PANEL & HIT TOP OF FORM - PAPER SHOULD NOT ADVANCE/
2029  007060  047522  052116  050040
2030  007066  047101  046105  023040
2031  007074  044040  052111  052040
2032  007102  050117  047440  020106
2033  007110  047506  046522  026440
2034  007116  050040  050101  051105
2035  007124  051440  047510  046125
2036  007132  020104  047516  020124
2037  007140  042101  040526  041516
2038  007146  000105
2039                                  .EVEN
2040  007150  042522  047515  042526  MES5:   .ASCIZ  /REMOVE PAPER/
2041  007156  050040  050101  051105
2042  007164     000
2043          007166                  .EVEN
2044  007166  052520  020124  040520  MES6:   .ASCIZ  /PUT PAPER BACK/
2045  007174  042520  020122  040502
2046  007202  045503     000
2047          007206                  .EVEN
2048  007206  047111  042523  052122  MES7:   .ASCIZ  /INSERT CODE FOR DESIRED CHARACTER IN SWITCH REGISTER/
2049  007214  041440  042117  020105
2050  007222  047506  020122  042504
2051  007230  044523  042522  020104
2052  007236  044103  051101  041501
2053  007244  042524  020122  047111
2054  007252  051440  044527  041524
2055  007260  020110  042522  044507
2056  007266  052123  051105     000
2057          007274                  .EVEN
2058                                  ;*************************************************************************
2059                                  ;
2060                                  ;CENTRONICS TEST TITLES
2061                                  ;
2062                                  ;*************************************************************************
2063  007274  042522  040514  044524  TITL1:  .ASCIZ  /RELATIVE TIMING TESTS FOR DIFFERENT LINE LENGTHS/
2064  007302  042526  052040  046511
2065  007310  047111  020107  042524
2066  007316  052123  020123  047506
2067  007324  020122  044504  043106
2068  007332  051105  047105  020124
2069  007340  044514  042516  046040
2070  007346  047105  052107  051510
2071  007354     000
2072          007356                  .EVEN
2073  007356  042522  040514  044524  TITL2:  .ASCIZ  /RELATIVE TIMING = /
2074  007364  042526  052040  046511
2075  007372  047111  020107  020075
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 2076  007400     000
 2077             007402                              .EVEN
 2078  007402  042522  040514  044524  TITL3:  .ASCIZ  /RELATIVE TIMING TEST FOR SLEWING/
 2079  007410  042526  052040  046511
 2080  007416  047111  020107  042524
 2081  007424  052123  043040  051117
 2082  007432  051440  042514  044527
 2083  007440  043516     000
 2084             007444                              .EVEN
 2085  007444  040504  040524  052040  TITL4:  .ASCIZ  /DATA TRANSFER LINES FUNCTIONAL TEST/
 2086  007452  040522  051516  042506
 2087  007460  020122  044514  042516
 2088  007466  020123  052506  041516
 2089  007474  044524  047117  046101
 2090  007502  052040  051505  000124
 2091                                                 .EVEN
 2092  007510  050123  041501  047111  TITL5:  .ASCIZ  /SPACING, CARRIAGE RETURN, AND LINE FEED EXERCISE TEST (WITH OVERPRINT)/
 2093  007516  026107  041440  051101
 2094  007524  044522  043501  020105
 2095  007532  042522  052524  047122
 2096  007540  020054  047101  020104
 2097  007546  044514  042516  043040
 2098  007554  042505  020104  054105
 2099  007562  051105  044503  042523
 2100  007570  052040  051505  020124
 2101  007576  053450  052111  020110
 2102  007604  053117  051105  051120
 2103  007612  047111  024524     000
 2104             007620                              .EVEN
 2105  007620  044103  051101  041501  TITL6:  .ASCIZ  /CHARACTER GENERATION TEST - REGULAR (WITH OVERPRINT)/
 2106  007626  042524  020122  042507
 2107  007634  042516  040522  044524
 2108  007642  047117  052040  051505
 2109  007650  020124  020055  042522
 2110  007656  052507  040514  020122
 2111  007664  053450  052111  020110
 2112  007672  053117  051105  051120
 2113  007700  047111  024524     000
 2114             007706                              .EVEN
 2115  007706  047522  040524  044524  TITL7:  .ASCIZ  /ROTATING COUNTERCLOCKWISE PATTERN ENDURANCE TEST/
 2116  007714  043516  041440  052517
 2117  007722  052116  051105  046103
 2118  007730  041517  053513  051511
 2119  007736  020105  040520  052124
 2120  007744  051105  020116  047105
 2121  007752  052504  040522  041516
 2122  007760  020105  042524  052123
 2123  007766     000
 2124             007770                              .EVEN
 2125  007770  042524  052123  052040  TITL8:  .ASCIZ  /TEST THAT LOWER CASE ALPHABET CODES PRINT OUT AS UPPER CASE/
 2126  007776  040510  020124  047514
 2127  010004  042527  020122  040503
 2128  010012  042523  040440  050114
 2129  010020  040510  042502  020124
 2130  010026  047503  042504  020123
 2131  010034  051120  047111  020124
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2132  010042  052517  020124  051501
2133  010050  052440  050120  051105
2134  010056  041440  051501  000105
2135                                          .EVEN
2136  010064  044103  051101  041501  TITL10: .ASCIZ  /CHARACTER GENERATION TEST - ELONGATED (WITH OVERPRINT)/
2137  010072  042524  020122  042507
2138  010100  042516  040522  044524
2139  010106  047117  052040  051505
2140  010114  020124  020055  046105
2141  010122  047117  040507  042524
2142  010130  020104  053450  052111
2143  010136  020110  053117  051105
2144  010144  051120  047111  024524
2145  010152     000
2146          010154                          .EVEN
2147  010154  047522  040524  044524  TITL11: .ASCIZ  /ROTATING COUNTERCLOCKWISE PATTERN ENDURANCE TEST (ELONGATED)/
2148  010162  043516  041440  052517
2149  010170  052116  051105  046103
2150  010176  041517  053513  051511
2151  010204  020105  040520  052124
2152  010212  051105  020116  047105
2153  010220  052504  040522  041516
2154  010226  020105  042524  052123
2155  010234  024040  046105  047117
2156  010242  040507  042524  024504
2157  010250     000
2158          010252                          .EVEN
2159                                  ;*****************************************************************
2160                                  ;
2161                                  ;ERROR MESSAGES
2162                                  ;
2163                                  ;*****************************************************************
2164  010252  041520  020075     000  ERRORM: .ASCIZ  /PC= /
2165                                  ;
2166                                  ;
2167          010260                          .EVEN
2168  010260  042440  051122  051117  EMSG0:  .ASCIZ  / ERROR BIT SET/
2169  010266  041040  052111  051440
2170  010274  052105     000
2171          010300                          .EVEN
2172  010300  042040  047117  020105  EMSG1:  .ASCIZ  / DONE BIT NOT SET/
2173  010306  044502  020124  047516
2174  010314  020124  042523  000124
2175                                          .EVEN
2176  010322  042040  047117  020105  EMSG2:  .ASCIZ  / DONE BIT NOT CLEAR/
2177  010330  044502  020124  047516
2178  010336  020124  046103  040505
2179  010344  000122
2180                                          .EVEN
2181  010346  050040  044522  052116  EMSG3:  .ASCIZ  / PRINTER INTERRUPTED WHEN PROCESSOR ABOVE PRINTER LEVEL/
2182  010354  051105  044440  052116
2183  010362  051105  052522  052120
2184  010370  042105  053440  042510
2185  010376  020116  051120  041517
2186  010404  051505  047523  020122
2187  010412  041101  053117  020105
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 2188  010420  051120  047111  042524
 2189  010426  020122  042514  042526
 2190  010434  000114
 2191                                          .EVEN
 2192  010436  050040  044522  052116  EMSG4:  .ASCIZ  / PRINTER DIDN'T INTERRUPT WHEN PROCESSOR BELOW PRINTER LEVEL/
 2193  010444  051105  042040  042111
 2194  010452  023516  020124  047111
 2195  010460  042524  051122  050125
 2196  010466  020124  044127  047105
 2197  010474  050040  047522  042503
 2198  010502  051523  051117  041040
 2199  010510  046105  053517  050040
 2200  010516  044522  052116  051105
 2201  010524  046040  053105  046105
 2202  010532     000
 2203          010534                          .EVEN
 2204  010534  042040  047117  020105  EMSG5:  .ASCIZ  / DONE BIT NEVER SET/
 2205  010542  044502  020124  042516
 2206  010550  042526  020122  042523
 2207  010556  000124
 2208                                          .EVEN
 2209  010560  051440  046105  041505  EMSG6:  .ASCIZ  / SELECT CODE NOT RECOGNIZED/
 2210  010566  020124  047503  042504
 2211  010574  047040  052117  051040
 2212  010602  041505  043517  044516
 2213  010610  042532  000104
 2214                                          .EVEN
 2215  010614  042040  051505  046105  EMSG7:  .ASCIZ  / DESELECT CODE NOT RECOGNIZED - IF MODEL DOESN'T HAVE FEATURE-OK/
 2216  010622  041505  020124  047503
 2217  010630  042504  047040  052117
 2218  010636  051040  041505  043517
 2219  010644  044516  042532  020104
 2220  010652  020055  043111  046440
 2221  010660  042117  046105  042040
 2222  010666  042517  047123  052047
 2223  010674  044040  053101  020105
 2224  010702  042506  052101  051125
 2225  010710  026505  045517     000
 2226          010716                          .EVEN
 2227  010716  042440  051122  051117  EMSG10: .ASCIZ  / ERROR BIT NOT SET/
 2228  010724  041040  052111  047040
 2229  010732  052117  051440  052105
 2230  010740     000
 2231          010742                          .EVEN
 2232  010742  040440  042104  042522  EMSG11: .ASCIZ  / ADDRESS FAILURE! - 'ADDERR' CONTAINS PC OF ERROR/
 2233  010750  051523  043040  044501
 2234  010756  052514  042522  020041
 2235  010764  020055  040447  042104
 2236  010772  051105  023522  041440
 2237  011000  047117  040524  047111
 2238  011006  020123  041520  047440
 2239  011014  020106  051105  047522
 2240  011022  000122
 2241                                          .EVEN
 2242  011024  044440  020105  044502  EMSG12: .ASCIZ  / IE BIT NOT SET/
 2243  011032  020124  047516  020124
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  2244  011040  042523  000124
  2245                                          .EVEN
  2246  011044  044440  020105  044502  EMSG13: .ASCIZ  / IE BIT NOT CLEAR/
  2247  011052  020124  047516  020124
  2248  011060  046103  040505  000122
  2249                                          .EVEN
  2250  011066  044440  020105  044502  EMSG14: .ASCIZ  / IE BIT SET - SHOULDN'T BE/
  2251  011074  020124  042523  020124
  2252  011102  020055  044123  052517
  2253  011110  042114  023516  020124
  2254  011116  042502     000
  2255          011122                          .EVEN
  2256  011122  046440  042117  020105  EMSG15: .ASCIZ  / MODE BIT (BIT0) SET - SHOULDN'T BE/
  2257  011130  044502  020124  041050
  2258  011136  052111  024460  051440
  2259  011144  052103  026440  051440
  2260  011152  047510  046125  047104
  2261  011160  052047  041040  000105
  2262                                          .EVEN
  2263  011166  050040  044522  052116  EMSG16: .ASCIZ  / PRINTER DIDN'T INTERRUPT - IF NO DESELECT FEATURE-OK/
  2264  011174  051105  042040  042111
  2265  011202  023516  020124  047111
  2266  011210  042524  051122  050125
  2267  011216  020124  020055  043111
  2268  011224  047040  020117  042504
  2269  011232  042523  042514  052103
  2270  011240  043040  040505  052524
  2271  011246  042522  047455  000113
  2272                                          .EVEN
  2273  011254  042040  047117  020105  EMSG17: .ASCIZ  / DONE BIT NEVER CLEARED/
  2274  011262  044502  020124  042516
  2275  011270  043526  020122  046103
  2276  011276  040505  042522  000104
  2277                                          .EVEN
  2278  011304  050040  044522  052116  EMSG20: .ASCIZ  / PRINTER INTERRUPTED WITH PROCESSOR BELOW PRINTER LEVEL & IE BIT CLEAR/
  2279  011312  051105  044440  052116
  2280  011320  051105  052522  052120
  2281  011326  042105  053440  052111
  2282  011334  020110  051120  041517
  2283  011342  051505  047523  020122
  2284  011350  042502  047514  020127
  2285  011356  051120  047111  042524
  2286  011364  020122  042514  042526
  2287  011372  020114  020046  042511
  2288  011400  041040  052111  041440
  2289  011406  042514  051101     000
  2290          011414                  .EVEN
  2291
  2292
  2293                                  ;*************************************************************************
  2294                                  ;
  2295                                  ;THIS SECTION WILL CHECK THAT THE DATA
  2296                                  ;TRANSFER LINES ARE FUNCTIONING PROPERLY
  2297                                  ;*************************************************************************
  2298  011414  012767  011426  174754  TST22:  MOV     #DATAL,RETURN   ;SET RETURN ADDRESS FOR SCOPE
  2299  011422  000401                          BR      DATAL           ;IF SELECTING THIS TEST
```

```
2300  011424  104400                  SC14:   SCOPE                   ;LOOP ON SLEW TIMING CHECK?
2301  011426  000403                  DATAL:  BR      .+10
2302  011430  051524  031124  000062  F:      .ASCIZ  /TST22/         ;TEST NO. TO BE PRINTED OUT
2303  011436  012701  011430          MOV     #F,R1                   ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
2304  011442  004767  174266          JSR     R7,TSTTAG               ;GO TO PRINT OUT TEST NO.
2305  011446  012701  007444          MOV     #TITL4,R1               ;MOVE TEST TITLE INTO A BUFFER
2306  011452  004767  174256          JSR     R7,TSTTAG               ;PRINT TEST TITLE
2307  011456  012767  177777  167542  MOV     #-1,CNTR                ;SET INDICATOR FOR 1ST LINE OF DATA PATH TEST
2308  011464  016767  167604  167542  MOV     COLCNT,WORK             ;NO OF CHARS. PER LINE
2309  011472  005767  167530          DATAL4: TST     CNTR            ;1ST OR 2ND LINE OF DATA PATH TEST?
2310  011476  100004                  BPL     DATAL5                  ;2ND LINE!
2311  011500  112767  000100  167516  MOVB    #100,CHRGEN             ;START 1ST LINE WITH AN @ SYMBOL
2312  011506  000403                  BR      DATAL6                  ;KEEP ON LOADING
2313  011510  112767  000077  167506  DATAL5: MOVB    #077,CHRGEN     ;START 2ND LINE WITH A ? SYMBOL
2314  011516  005767  167512          DATAL6: TST     WORK            ;LINE FULL?
2315  011522  001424                  BEQ     DATAPR                  ;YES-PRINT IT!
2316  011524  005367  167504          DEC     WORK                    ;DECREASE NO. OF CHARS./LINE
2317  011530  116777  167470  167444  MOVB    CHRGEN,@LSDB            ;LOAD CHAR. INTO PRINTER BUFFER
2318  011536  105777  167436          TSTB    @LSCS                   ;WAIT FOR LOADING
2319  011542  100375                  BPL     .-4
2320  011544  022767  000100  167452  CMP     #100,CHRGEN             ;@OR ? SYMBOL NEXT?
2321  011552  001404                  BEQ     DATAL7                  ;? SYMBOL NEXT
2322  011554  112767  000100  167442  MOVB    #100, CHRGEN            ;@ SYMBOL NEXT
2323  011562  000755                  BR      DATAL6                  ;GO BACK TO KEEP LOADING
2324  011564  112767  000077  167432  DATAL7: MOVB    #077,CHRGEN     ;SET NEXT CHAR. TO BE A '?'
2325  011572  000751                  BR      DATAL6                  ;GO BACK TO KEEP LOADING
2326                                  ;
2327                                  ;
2328
2329
2330  011574  112777  000012  167400  DATAPR: MOVB    #12,@LSDB       ;ISSUE A LINE FEED
2331  011602  105777  167372          TSTB    @LSCS                   ;DONE BIT CLEAR?
2332  011606  100002                  BPL     ERR21                   ;YES
2333  011610  104002                  HLT     +2                      ;NO
2334                                  ;
2335                                  ;
2336  011612  104400                  SCOPE
2337  011614  005777  167360          ERR21:  TST     @LSCS           ;ERROR BIT SET?
2338  011620  100002                  BPL     LFCHK7                  ;NO
2339  011622  104000                  HLT     +0                      ;YES
2340                                  ;
2341                                  ;
2342  011624  104400                  SCOPE
2343  011626  105777  167346          LFCHK7: TSTB    @LSCS           ;PRINTER BUSY?
2344  011632  100401                  BMI     RPEAT1                  ;NO
2345  011634  000767                  BR      ERR21                   ;YES-WAIT FOR FLAG
2346                                  ;
2347                                  ;
2348  011636  005767  167364          RPEAT1: TST     CNTR            ;WAS 1ST OR 2ND LINE JUST PRINTED?
2349  011642  100012                  BPL     SC15                    ;2ND LINE-TEST COMPLETE
2350  011644  005267  167356          INC     CNTR                    ;1ST LINE-SET UP FOR 2ND
2351  011650  016767  167420  167356  MOV     COLCNT,WORK             ;RESET LENGTH OF LINE
2352  011656  000705                  BR      DATAL4                  ;GO BACK TO PRINT 2ND LINE
2353                                  ;*****************************************************************
2354                                  ;
2355                                  ;SECTION TO PRINT A LEFT-HANDED WEDGE
```

```
                                        ;EACH LINE OF THE WEDGE IS INITIALLY SPACED OVER WITH
                                        ;A '/' APPEARING IN THE LAST APPROPRIATE COLUMN POSITION.
                                        ;THEN, A LINE OF E'S IS PRINTED OVER THE SPACES (2X) UP
                                        ;TO THE SLASH.  SPACING, OVER PRINTING, CARRIAGE RETURNING,
                                        ;AND LINE FEEDING ARE RIGOROUSLY CHECKED
                                        ;
                                        ;*************************************************************************
011660  012767  011672  174510  TST23:  MOV     #WEDGE,RETURN   ;SET RETURN ADDRESS FOR SCOPE
011666  000401                          BR      WEDGE           ;IF SELECTING THIS TEST
011670  104400                  SC15:   SCOPE                   ;LOOP ON DATA LINES CHECK?
011672  000403                  WEDGE:  BR      .+10
011674  051524  031124  000063  G:      .ASCIZ  /TST23/         ;TEST NO. TO BE PRINTED OUT
011702  012701  011674                  MOV     #G,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
011706  004767  174022                  JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
011712  012701  007510                  MOV     #TITLS,R1       ;MOVE TEST TITLE INTO A BUFFER
011716  004767  174012                  JSR     R7,TSTTAG       ;PRINT TEST TITLE
011722  016767  167346  167304          MOV     COLCNT,WORK     ;SET UP 1ST LINE SPACING
011730  005367  167300                  DEC     WORK            ;NEED 1 LESS FOR THIS TEST
011734  016767  167274  167270          MOV     WORK,WAREA      ;MOVE CURRENT SPACING INTO A WORK AREA
011742  016767  167266  167274          MOV     WORK,SAVESP     ;MOVE CURRENT SPACING INTO A SAVED AREA
                                        ;FOR SUBSEQUENT LINE USAGE
011750  016767  167256  167256  WEDGE1: MOV     WAREA,WORK      ;MOVE NEW SPACING VALUE BACK FOR USE
011756  022767  000000  167246          CMP     #0,WAREA        ;ARE WE ABOUT TO PRINT THE LAST LINE OF THE WEDGE?
011764  001534                          BEQ     LASTIN          ;YES - SET UP FOR PRINTING A '/'
011766  112777  000040  167206  WEDGE2: MOVB    #40,@LSDB       ;NO - MOVE A SPACE INTO PRINTER BUFFER
011774  105777  167200                  TSTB    @LSCS           ;WAIT FOR LOADING
012000  100375                          BPL     .-4
012002  005367  167226                  DEC     WORK            ;INCREMENT SPACING COUNT
012006  005767  167222                  TST     WORK            ;DO WE HAVE NO. OF SPACES DESIRED?
012012  001401                          BEQ     WEDGE3          ;YES - GO TO LOAD A '/'
012014  000764                          BR      WEDGE2          ;NO - LOAD ANOTHER SPACE
012016  005367  167210          WEDGE3: DEC     WAREA           ;DECREASE LINE SPACING BY 1
012022  112777  000057  167152          MOVB    #057,@LSDB      ;MOVE A SLASH IN AS LAST
012030  105777  167144                  TSTB    @LSCS           ;CHARACTER ON A LINE
012034  100375                          BPL     .-4             ;AND WAIT FOR IT TO BE LOADED
012036  112777  000015  167136          MOVB    #15,@LSDB       ;ISSUE A CARRIAGE RETURN TO PRINT SPACES & '/'
012044  105777  167130                  TSTB    @LSCS           ;IS DONE BIT CLEAR?
012050  100002                          BPL     ERR23           ;YES
012052  104002                          HLT     +2              ;NO
                                        ;
                                        ;
012054  104400                  ERR23:  SCOPE
012056  005777  167116                  TST     @LSCS           ;ERROR BIT SET?
012062  100002                          BPL     CRCHKB          ;NO
012064  104000                          HLT     +0              ;YES
                                        ;
                                        ;
012066  104400                  CRCHKB: SCOPE
012070  105777  167104                  TSTB    @LSCS           ;PRINTER STILL BUSY?
012074  100401                          BMI     WEDGE4          ;NO-GO ON TO E'S PRINTING
012076  000767                          BR      ERR23           ;YES-WAIT
                                        ;
                                        ;
012100  012767  177777  167120  WEDGE4: MOV     #-1,CNTR        ;SET LINE REPEAT COUNTER
012106  016767  167132  167120          MOV     SAVESP,WORK     ;SET LINE LENGTH FOR E'S
                                        ;=NO. OF SPACES JUST EXECUTED
```

```
 2412  012114  112777  000105  167060  WEDGE5: MOVB    #105,@LSDB      ;LOAD AN 'E' INTO PRINTER BUFFER
 2413  012122  105777  167052          TSTB    @LSCS           ;WAIT FOR LOADING
 2414  012126  100375                  BPL     .-4
 2415  012130  005367  167100          DEC     WORK            ;INCREMENT 'E' LOADING COUNT
 2416  012134  005767  167074          TST     WORK            ;DO WE HAVE NO. OF E'S DESIRED?
 2417  012140  001401                  BEQ     WEDGE6          ;YES - SET UP TO PRINT THEM
 2418  012142  000764                  BR      WEDGE5          ;NO - LOAD ANOTHER 'E'
 2419  012144  005767  167056  WEDGE6: TST     CNTR            ;1ST TIME FOR PRINTING 'E'S?
 2420  012150  001411                  BEQ     TIME2           ;NO - OVERPRINTING DONE - SET UP FOR NEXT LINE OF WEDGE
 2421  012152  112777  000015  167022  MOVB    #15,@LSDB       ;YES - ISSUE A CARRIAGE RETURN
 2422  012160  105777  167014  WEDG6A: TSTB    @LSCS           ;DONE BIT CLEAR?
 2423  012164  100007                  BPL     ERR24           ;YES
 2424  012166  104002                  HLT     +2              ;NO
 2425  012170  104400                  SCOPE
 2426  012172  000404                  BR      ERR24
 2427  012174  112777  000012  167000  TIME2:  MOVB    #12,@LSDB       ;ISSUE A LINE FEED
 2428  012202  000766                  BR      WEDG6A
 2429                                  ;
 2430  012204  005777  166770  ERR24:  TST     @LSCS           ;ERROR BIT SET?
 2431  012210  100002                  BPL     CRCHK9          ;NO
 2432  012212  104000                  HLT     +0              ;YES
 2433                                  ;
 2434                                  ;
 2435  012214  104400                  SCOPE
 2436  012216  105777  166756  CRCHK9: TSTB    @LSCS           ;PRINTER STILL BUSY?
 2437  012222  100401                  BMI     WEDGE7          ;NO
 2438  012224  000767                  BR      ERR24           ;YES-WAIT
 2439                                  ;
 2440                                  ;
 2441  012226  005767  166774  WEDGE7: TST     CNTR            ;1ST OR 2ND TIME FOR 'E'S PRINTING?
 2442  012232  100401                  BMI     WEDGE8          ;1ST TIME - SET UP FOR 2ND TIME
 2443  012234  000645                  BR      WEDGE1          ;2ND TIME-SET UP FOR NEXT WEDGE LINE
 2444  012236  005267  166764  WEDGE8: INC     CNTR            ;PRINT E'S A 2ND TIME
 2445  012242  016767  166776  166764  MOV     SAVESP,WORK     ;RESET NO. OF E'S WANTED
 2446  012250  005367  166770          DEC     SAVESP          ;NEW LINE LENGTH OF E'S FOR NEXT LINE OF WEDGE
 2447  012254  000717                  BR      WEDGE5          ;GO BACK TO OVERPRINT E'S
 2448                                  ;
 2449                                  ;
 2450
 2451
 2452  012256  112777  000057  166716  LASTIN: MOVB    #'/,@LSDB       ;LAST LINE OF WEDGE=/
 2453  012264  105777  166710          TSTB    @LSCS           ;WAIT FOR LOADING
 2454  012270  100375                  BPL     .-4
 2455  012272  112777  000012  166702  MOVB    #12,@LSDB       ;ISSUE A LINE FEED
 2456  012300  105777  166674          TSTB    @LSCS           ;DONE BIT CLEAR?
 2457  012304  100002                  BPL     ERR25           ;YES
 2458  012306  104002                  HLT     +2              ;NO
 2459                                  ;
 2460                                  ;
 2461  012310  104400                  SCOPE
 2462  012312  005777  166662  ERR25:  TST     @LSCS           ;ERROR BIT SET?
 2463  012316  100002                  BPL     LFCHK9          ;NO
 2464  012320  104000                  HLT     +0              ;YES
 2465                                  ;
 2466                                  ;
 2467  012322  104400                  SCOPE
```

```
2468  012324  105777  166650          LFCHK9: TSTB    @LSCS           ;PRINTER STILL BUSY?
2469  012330  100405                          BMI     SC16            ;NO-PROCEED TO NEXT TEST - WEDGE DONE
2470  012332  000767                          BR      ERR25           ;YES-WAIT
2471                                  ;*****************************************************************************
2472                                  ;SECTION TO PRINT A BLOCK PATTERN CONSISTING
2473                                  ;OF A FULL LINE OF EACH OF THE 64 PRINTABLE
2474                                  ;CHARACTERS.  EACH LINE IS PRINTED 2X FOR BOTH THE
2475                                  ;REGULAR AND ELONGATED CHARACTER OPTIONS.
2476                                  ;
2477                                  ;*****************************************************************************
2478  012334  012767  012346  174034  TST24:  MOV     #BP1,RETURN     ;SET RETURN ADDRESS FOR SCOPE
2479  012342  000401                          BR      BP1             ;IF SELECTING THIS TEST
2480  012344  104400                  SC16:   SCOPE                   ;LOOP ON WEDGE PATTERN?
2481                                  ;*****************************************************************
2482                                  ;
2483                                  ;REGULAR BLOCK PATTERN EXECUTED NEXT WITH OVERPRINT
2484                                  ;
2485                                  ;*****************************************************************
2486  012346  000403                  BP1:    BR      .+10
2487  012350  051524  031124  000064  H:      .ASCIZ  /TST24/         ;TEST NO. TO BE PRINTED OUT
2488  012356  012701  012350                  MOV     #H,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
2489  012362  004767  173346                  JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
2490  012366  012701  007620                  MOV     #TITL6,R1       ;MOVE TEST TITLE INTO A BUFFER
2491  012372  004767  173336                  JSR     R7,TSTTAG       ;PRINT TEST TITLE
2492  012376  012767  177777  166636          MOV     #-1,ELONG       ;ELONG=-1 INDICATING REGULAR CHARS.
2493  012404  012767  000040  166612          MOV     #40,CHRGEN      ;SET 1ST PRINTABLE CHAR. = SPACE
2494  012412  005067  166610                  CLR     CNTR            ;CLEAR LINE REPEAT COUNTER
2495  012416  016767  166652  16660E          MOV     COLCNT,WAREA    ;SET LINE LENGTH
2496  012424  016767  166602  1666CE          MOV     WAREA, WORK     ;PUT LINE LENGTH INTO A WORK AREA
2497  012432  012767  177600  166562  BP1CA:  MOV     #-128.,CHARS    ;SET UP NO. OF CHARS. (INCLUDES OVERPRINT)
2498  012440  005767  166576          BP1D:   TST     ELONG           ;DO WE WANT ELONGATED CHARS.?
2499  012444  100403                          BMI     BP1DA           ;NO
2500  012446  112777  000016  166526          MOVB    #16,@LSDB       ;YES - ISSUE ELONGATION CODE
2501  012454  105777  166520          BP1DA:  TSTB    @LSCS           ;WAIT FOR LOADING
2502  012460  100375                          BPL     .-4
2503  012462  116777  166536  166512          MOVB    CHRGEN,@LSDB    ;LOAD CHAR. INTO BUFFER
2504  012470  005367  166540                  DEC     WORK            ;DECREASE LINE LENGTH
2505  012474  005767  166534                  TST     WORK            ;IS LINE FULL?
2506  012500  001401                          BEQ     BP1E            ;YES-PRINT IT
2507  012502  000764                          BR      BP1DA           ;LOAD ANOTHER CHAR.
2508  012504  005267  166512          BP1E:   INC     CHARS           ;DECREASE NO. OF CHARS. LEFT
2509                                                                  ;(INCLUDES OVERPRINT) CHARS.=2/LINE
2510  012510  005767  166506                  TST     CHARS           ;HAVE WE FINISHED 1ST BLOCK PATTERN?
2511  012514  100404                          BMI     BP1EA           ;NO
2512  012516  005767  166520                  TST     ELONG           ;YES - IS ELONGATION BLOCK PATTERN NEXT?
2513  012522  100127                          BPL     SC18            ;YES-SET UP FOR ELONGATED
2514                                                                  ;BLOCK PATTERN OF EACH
2515                                                                  ;OF THE 64 PRINTABLE CHARS.
2516  012524  000457                          BR      SC17
2517  012526  022767  000001  166472  BP1EA:  CMP     #1,CNTR         ;HAVE WE OVERPRINTED YET?
2518  012534  001443                          BEQ     TIMER2          ;YES - SET UP FOR NEXT LINE OF BLOCK PATTERN
2519  012536  112777  000015  166436          MOVB    #15,@LSDB       ;NO - ISSUE A CARRIAGE RETURN TO PRINT
2520  012544  105777  166430          BP1F:   TSTB    @LSCS           ;DONE BIT CLEAR?
2521  012550  100002                          BPL     ERR27           ;YES
2522  012552  104002                          HLT     +2              ;NO
2523                                  ;
```

```
2524
2525  012554  104400                    ;
2526  012556  005777  166416            ERR27:  SCOPE
2527  012562  100002                    TST     @LSCS           ;ERROR BIT SET?
2528  012564  104000                    BPL     LFCK11          ;NO
2529                                    HLT     +0              ;YES
2530                                    ;
2531  012566  104400                    ;
2532  012570  105777  166404            LFCK11: SCOPE
2533  012574  100401                    TSTB    @LSCS           ;PRINTER STILL BUSY?
2534  012576  000767                    BMI     BP1G            ;NO-CONTINUE
2535                                    BR      ERR27           ;YES-WAIT
2536                                    ;
2537  012600  005767  166422            ;
2538  012604  001401                    BP1G:   TST     CNTR            ;1ST OR 2ND TIME PRINTING?
2539  012606  000406                    BEQ     BP1H            ;1ST TIME
2540  012610  005267  166412            BR      BP1J            ;2ND TIME-SET UP FOR NEXT LINE
2541  012614  016767  166412  166412    BP1H:   INC     CNTR            ;2ND TIME PRINT COUNTER
2542  012622  000706                    MOV     WAREA,WORK      ;RESET LINE LENGTH
2543                                    BR      BP1D            ;GO BACK TO PRINT AGAIN
2544                                    ;
2545  012624  005067  166376            ;
2546  012630  005267  166370            BP1J:   CLR     CNTR            ;RESET LINE REPEAT COUNTER
2547  012634  016767  166372  166372    INC     CHRGEN          ;GET NEXT CHAR.
2548  012642  000676                    MOV     WAREA,WORK      ;RESET LINE LENGTH
2549                                    BR      BP1D            ;GO BACK TO PRINT NEXT LINE
2550
2551                                    ;
2552                                    ;
2553  012644  112777  000012  166330    TIMER2: MOVB    #012,@LSDB      ;ISSUE A LINE FEED FOR 2ND PRINT
2554  012652  000734                    BR      BP1F            ;GO BACK TO WAIT FOR PRINTING
2555                                    ;
2556                                    ;
2557  012654  012767  012666  173514    TST25:  MOV     #BP2,RETURN     ;SET RETURN ADDRESS FOR SCOPE
2558  012662  000401                    BR      BP2             ;IF SELECTING THIS TEST
2559  012664  104400                    SC17:   SCOPE                   ;LOOP ON REGULAR BLOCK PATTERN?
2560                                    ;*****************************************************************
2561                                    ;
2562                                    ;ELONGATED BLOCK PATTERN EXECUTED NEXT WITH OVERPRINT
2563                                    ;
2564                                    ;*****************************************************************
2565  012666  112777  000012  166306    BP2:    MOVB    #12,@LSDB       ;ISSUE A LINE FEED
2566  012674  105777  166300            TSTB    @LSCS           ;WAIT FOR EXECUTION
2567  012700  100375                    BPL     .-4
2568  012702  000403                    BR      .+10
2569  012704  051524  031124  000065    I:      .ASCIZ  /TST25/         ;TEST NO. TO BE PRINTED OUT
2570  012712  012701  012704            MOV     #I,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
2571  012716  004767  173012            JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
2572  012722  012701  010064            MOV     #TITL10,R1      ;MOVE TEST TITLE INTO A BUFFER
2573  012726  004767  173002            JSR     R7,TSTTAG       ;GO TO PRINT IT
2574  012732  005267  166304            INC     ELONG           ;ELONG=0 INDICATING ELONGATION
2575  012736  016767  166332  166266    MOV     COLCNT,WAREA    ;RESET NEW LINE LENGTH
2576  012744  006267  166262            ASR     WAREA           ;NEED HALVE THE VALUE FOR THIS TEST
2577  012750  005067  166252            CLR     CNTR            ;CLEAR LINE REPEAT COUNTER
2578  012754  012767  000040  166242    MOV     #40,CHRGEN      ;SET 1ST PRINTABLE CHAR. = SPACE
2579  012762  016767  166244  166244    MOV     WAREA,WORK      ;PUT LINE LENGTH INTO A WORK AREA
```

```
                                        BR      BP1CA           ;GO BACK TO EXECUTE ELONGATED BLOCK PATTERN
                                ;*******************************************************************
                                ;
                                ;SECTION TO PRINT A COUNTER CLOCKWISE ROTATING PATTERN
                                ;THIS TEST IS DESIGNED TO PICK UP SPURIOUS PRINTING
                                ;AND CHECK PRINTER ENDURANCE
                                ;
                                ;*******************************************************************
012772  012767  013004  173376  TST26:  MOV     #ROTOR,RETURN   ;SET RETURN ADDRESS FOR SCOPE
013000  000401                          BR      ROTOR           ;IF SELECTING THIS TEST
013002  104400                  SC18:   SCOPE                   ;LOOP ON ELONGATED BLOCK PATTERN?
                                ;*******************************************************************
                                ;
                                ;REGULAR ROTATING PATTERN EXECUTED NEXT
                                ;
                                ;*******************************************************************
013004  112777  000012  166170  ROTOR:  MOVB    #12,@LSDB       ;ISSUE A LINE FEED
013012  105777  166162                  TSTB    @LSCS           ;WAIT FOR EXECUTION
013016  100375                          BPL     .-4
013020  000403                          BR      .+10
013022  051524  031124  000066  J:      .ASCIZ  /TST26/         ;TEST NO. TO BE PRINTED OUT
013030  012701  013022                  MOV     #J,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
013034  004767  172674                  JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
013040  012701  007706                  MOV     #TITL7,R1       ;MOVE TEST TITLE INTO A BUFFER
013044  004767  172664                  JSR     R7,TSTTAG       ;PRINT TEST TITLE
013050  012767  000140  166166          MOV     #140,SAVESP     ;LINE STANDOFF
013056  005067  166166                  CLR     CHARNO          ;CLEAR SECONDARY PRINTABLE CHARS. LENGTH
013062  012767  177777  166152          MOV     #-1,ELONG       ;ELONG=-1 INDICATING REGULAR
013070  012767  177677  166150          MOV     #-65.,LINCNT    ;CHARACTER PRINT
013076  012767  000040  166120          MOV     #40,CHRGEN      ;SET 1ST PRINTABLE CHAR. = SPACE
013104  016767  166164  166120          MOV     COLCNT,WAREA    ;SET UP LINE LENGTH
013112  016767  166114  166114          MOV     WAREA,WORK      ;MOVE LINE LENGTH INTO A WORK AREA
013120  012767  177700  166074          MOV     #-64.,CHARS     ;SET UP NO. OF PRINTABLE CHARS.
013126  005767  166110          ROTR3A: TST     ELONG           ;REGULAR OR ELONGATED PATTERN?
013132  100406                          BMI     ROTOR5          ;REGULAR
013134  112777  000016  166040          MOVB    #16,@LSDB       ;ELONGATED - ISSUE ELONGATION CODE
013142  105777  166032                  TSTB    @LSCS           ;WAIT FOR LOADING!
013146  100375                          BPL     .-4
013150  116777  166050  166024  ROTOR5: MOVB    CHRGEN,@LSDB    ;LOAD CHAR. INTO BUFFER
013156  105777  166016                  TSTB    @LSCS           ;WAIT FOR EXECUTION
013162  100375                          BPL     .-4
013164  022767  000001  166042          CMP     #1,WORK         ;END OF LINE?
013172  001424                          BEQ     ROTOR7          ;YES - GO TO PRINT IT
013174  022767  177777  166020          CMP     #-1,CHARS       ;NO-START CHARS. OVER?
013202  001407                          BEQ     ROTOR6          ;YES
013204  005367  166024                  DEC     WORK            ;NO-DECREASE LINE BY 1 CHAR.
013210  005267  166006                  INC     CHARS           ;DECREASE NO. OF AVAILABLE
                                                                ;CHARACTERS BY 1
013214  005267  166004                  INC     CHRGEN          ;GET NEXT AVAILABLE CHAR.
013220  000753                          BR      ROTOR5          ;GO BACK TO LOAD
                                ;
                                ;
013222  012767  177700  165772  ROTOR6: MOV     #-64.,CHARS     ;RESET NO. OF PRINTABLE CHARS.
013230  012767  000040  165766          MOV     #40,CHRGEN      ;START WITH SPACE AGAIN
013236  005367  165772                  DEC     WORK            ;DECREASE LINE LENGTH
013242  000731                          BR      ROTR3A          ;GO BACK TO KEEP LOADING
```

```
2636                                            ;
2637                                            ;
2638  013244  112777  000012  165730  ROTOR7:   MOVB    #12,@LSDB       ;ISSUE A LINE FEED TO PRINT
2639  013252  105777  165722                    TSTB    @LSCS           ;DONE BIT CLEAR
2640  013256  100002                            BPL     ERR29           ;YES
2641  013260  104002                            HLT     +2              ;NO
2642                                            ;
2643                                            ;
2644  013262  104400                            SCOPE
2645  013264  005777  165710            ERR29:  TST     @LSCS           ;ERROR BIT SET?
2646  013270  100002                            BPL     LFCK13          ;NO
2647  013272  104000                            HLT     +0              ;YES
2648                                            ;
2649                                            ;
2650  013274  104400                            SCOPE
2651  013276  105777  165676            LFCK13: TSTB    @LSCS           ;PRINTER STILL BUSY?
2652  013302  100401                            BMI     ROTOR8          ;NO
2653  013304  000767                            BR      ERR29           ;YES-WAIT
2654                                            ;
2655                                            ;
2656  013306  005267  165734            ROTOR8: INC     LINCNT          ;INCREASE LINE COUNT
2657  013312  005767  165730                    TST     LINCNT          ;DONE REGULAR PATTERN?
2658  013316  100404                            BMI     ROTR8A          ;NO
2659  013320  005767  165716                    TST     ELONG           ;YES - IS ELONGATION PATTERN DONE?
2660  013324  100076                            BPL     SC20            ;YES - PROCEED TO NEXT TEST
2661  013326  000423                            BR      SC19            ;NO-SET UP FOR ELONGATION!
2662  013330  005367  165710            ROTR8A: DEC     SAVESP          ;NO-GO ON WITH REGULAR PATTERN
2663                                                                    ;AND SET STANDOFF FOR NEXT LINE
2664  013334  016767  165704  165662            MOV     SAVESP,CHRGEN   ;SET STARTING CHAR. OF NEXT LINE
2665  013342  016767  165664  165664            MOV     WAREA,WORK      ;RESET LINE LENGTH
2666  013350  062767  177777  165672            ADD     #-1,CHARNO      ;RESET SECONDARY PRINTABLE CHAR. LENGTH
2667  013356  016767  165666  165636            MOV     CHARNO,CHARS    ;INSERT NEW SECONDARY LENGTH
2668                                                                    ;INTO NO. OF AVAILABLE CHARS.
2669  013364  000660                            BR      ROTR3A          ;GO BACK TO FILL ANOTHER LINE
2670
2671
2672                                            ;
2673                                            ;
2674  013366  012767  013400  173002  TST27:   MOV     #ROTOR9,RETURN  ;SET RETURN ADDRESS FOR SCOPE
2675  013374  000401                            BR      ROTOR9          ;IF SELECTING THIS TEST
2676  013376  104400                    SC19:   SCOPE                   ;LOOP ON REGULAR ROTATING PATTERN?
2677                                            ;*******************************************************************
2678                                            ;
2679                                            ;ELONGATED ROTATING PATTERN EXECUTED NEXT
2680                                            ;
2681                                            ;*******************************************************************
2682  013400  000403                    ROTOR9: BR      .+10
2683  013402  051524  031124  000067    K:      .ASCIZ  /TST27/         ;TEST NO. TO BE PRINTED OUT
2684  013410  012701  013402                    MOV     #K,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
2685  013414  004767  172314                    JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
2686  013420  012701  010154                    MOV     #TITL11,R1      ;MOVE TEST TITLE INTO A BUFFER
2687  013424  004767  172304                    JSR     R7,TSTTAG       ;GO TO PRINT IT
2688  013430  005267  165606                    INC     ELONG           ;ELONG=1 INDICATING ELONGATION
2689  013434  016767  165634  165570            MOV     COLCNT,WAREA    ;SET A NEW LINE LENGTH
2690  013442  006267  165564                    ASR     WAREA           ;NEED HALVE THE VALUE FOR THIS TEST
2691  013446  016767  165560  165560            MOV     WAREA,WORK      ;PUT NEW LINE LENGTH INTO A WORK AREA
```

```
2692  013454  012767  177677  165564          MOV     #-65.,LINCNT    ;RESET THE LINE COUNT
2693  013462  012767  000140  165554          MOV     #140,SAVESP     ;RESET LINE STANDOFF
2694  013470  012767  177700  165524          MOV     #-64.,CHARS     ;RESET NO. OF AVAILABLE CHARS
2695  013476  005067  165546                  CLR     CHARNO          ;CLEAR SECONDARY PRINTABLE CHARS. LENGTH
2696  013502  012767  000040  165514          MOV     #40,CHRGEN      ;SET 1ST PRINTABLE CHAR. = SPACE
2697  013510  000606                          BR      ROTR3A          ;GO BACK TO EXECUTE ELONGATED ROTATING PATTERN
2698                                  ;*************************************************************
2699                                  ;
2700                                  ;SECTION TO TEST THAT LOWER CASE ALPHABET CODES
2701                                  ;ARE FORCED TO UPPER CASE EQUIVALENTS WHEN PRINTED
2702                                  ;
2703                                  ;*************************************************************
2704  013512  012767  013524  172656  TST30:  MOV     #UCASE,RETURN   ;SET RETURN ADDRESS FOR SCOPE
2705  013520  000401                          BR      UCASE           ;IF SELECTING THIS TEST
2706  013522  104400                  SC20:   SCOPE                   ;LOOP ON ELONGATED ROTATING PATTERN?
2707  013524  005067  165476          UCASE:  CLR     CNTR            ;CLEAR COUNTER
2708  013530  000403                          BR      .+10
2709  013532  051524  031524  000060  L:      .ASCIZ  /TST30/         ;TEST NO. TO BE PRINTED OUT
2710  013540  012701  013532                  MOV     #L,R1           ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
2711  013544  004767  172164                  JSR     R7,TSTTAG       ;GO TO PRINT OUT TEST NO.
2712  013550  012767  000064  165454          MOV     #64,WAREA       ;SET 1ST LINE LENGTH FOR PRINTING
2713                                                                  ;ALPHABET (NORMAL SIZE)
2714  013556  012701  007770                  MOV     #TITL8,R1       ;MOVE TEST TITLE INTO A BUFFER
2715  013562  004767  172146                  JSR     R7,TSTTAG       ;PRINT TEST TITLE
2716  013566  012767  000101  165430          MOV     #101,CHRGEN     ;SET 1ST CHAR. = 1ST LETTER OF ALPHABET
2717  013574  016767  165432  165432          MOV     WAREA,WORK      ;MOVE LINE LENGTH TO A WORK AREA
2718  013602  116777  165416  165372  UCASE4: MOVB    CHRGEN,@LSDB    ;MOVE CHAR. INTO PRINTER BUFFER
2719  013610  105777  165364                  TSTB    @LSCS           ;WAIT FOR EXECUTION
2720  013614  100375                          BPL     .-4
2721  013616  112777  000040  165356  UCASE5: MOVB    #40,@LSDB       ;MOVE A SPACE INTO PRINTER BUFFER
2722  013624  105777  165350                  TSTB    @LSCS           ;WAIT FOR LOADING
2723  013630  100375                          BPL     .-4
2724  013632  162767  000002  165374          SUB     #2,WORK         ;DECREASE LINE LENGTH BY 2
2725  013640  005767  165370                  TST     WORK            ;IS LINE READY TO BE PRINTED?
2726  013644  001403                          BEQ     UCASE6          ;YES
2727  013646  005267  165352                  INC     CHRGEN          ;NO - GET NEXT LETTER OF ALPHABET
2728  013652  000753                          BR      UCASE4          ;GO TO LOAD IT INTO BUFFER
2729  013654  112777  000012  165320  UCASE6: MOVB    #12,@LSDB       ;ISSUE A LINE FEED TO PRINT LINE
2730
2731  013662  105777  165312                  TSTB    @LSCS           ;DONE BIT CLEAR?
2732  013666  100002                          BPL     ERR32           ;YES
2733  013670  104002                          HLT     +2              ;NO
2734                                  ;
2735                                  ;
2736  013672  104400                          SCOPE
2737  013674  005777  165300          ERR32:  TST     @LSCS           ;DID ANY ERROR OCCUR?
2738  013700  100002                          BPL     LFCK16          ;NO
2739  013702  104000                          HLT     +0              ;YES
2740                                  ;
2741                                  ;
2742  013704  104400                          SCOPE
2743  013706  105777  165266          LFCK16: TSTB    @LSCS           ;IS PRINTER STILL BUSY?
2744  013712  100401                          BMI     UCASE7          ;NO - PROCEED TESTING
2745  013714  000767                          BR      ERR32           ;YES - WAIT
2746                                  ;
2747                                  ;
```

```
2748  013716  005767  165304          UCASE7: TST     CNTR            ;WAS 1ST OR 2ND LINE JUST PRINTED?
2749  013722  100001                          BPL     UCASE8          ;1ST - SET UP FOR 2ND
2750  013724  000420                          BR      SC21            ;2ND - TEST DONE - PROCEED
2751                                  ;
2752                                  ;
2753  013726  012767  000066  165276  UCASE8: MOV     #66,WAREA       ;SET 2ND LINE LENGTH FOR PRINTING
2754                                                                  ;LOWER-CASE ALPHABET WHICH SHOULD
2755                                                                  ;PRINT OUT AS UPPER CASE
2756  013734  005367  165266                  DEC     CNTR            ;DECREMENT COUNTER
2757  013740  012767  000140  165256          MOV     #140,CHRGEN     ;SET 1ST CHAR. = LOWER-CASE 'A'
2758  013746  016767  165260  165260          MOV     WAREA,WORK      ;MOVE LINE LENGTH TO A WORK AREA
2759  013754  000720                          BR      UCASE5          ;GO BACK TO START 2ND LINE WITH A SPACE
2760                                  ;
2761                                  ;
2762  013756  012767  013774  172412  TST31:  MOV     #OPPRTO,RETURN  ;SET RETURN ADDRESS FOR SCOPE
2763  013764  000403                          BR      OPPRTO          ;IF SELECTING THIS TEST
2764  013766  104400                  SC21:   SCOPE                   ;LOOP ON LOWER-CASE ALPHABET TEST?
2765  013770  000167  000232                  JMP     END             ;GO TO END OF PROGRAM!
2766                                  ;*******************************************************************************
2767                                  ;
2768                                  ;TEST 31 IS A COMBINATION OF 2 ROUTINES - - - -
2769                                  ;
2770                                  ;ROUTINE (OPTIONAL) TO PROVIDE A "PRINT TIME FREE" CHARACTER PULSE
2771                                  ;GENERATION FOR MAINTENANCE PURPOSES.  THIS ROUTINE CAN ONLY BE
2772                                  ;ACCESSED BY SETTING BIT09 TO A 1 AND SELECTING TEST 31.  BIT12
2773                                  ;MUST ALSO BE SET.  WHEN THESE CONDITIONS ARE MET A "PRINT TIME
2774                                  ;FREE" PULSE STRING IS PROVIDED BY SELECTING THE CHARACTER WANTED
2775                                  ;IN THE SWITCH REGISTER.  THE SECTION OF CODE WILL HANDLE THE REST.
2776                                  ;A PARTICULAR PULSE STRING IS PROVIDED UNTIL THE TEST IS HALTED
2777                                  ;BY THE USER OR UNTIL ANOTHER DIFFERENT CHARACTER IS INSERTED IN
2778                                  ;THE SWITCH REGISTER.
2779                                  ;
2780                                  ;ROUTINE (OPTIONAL) TO INPUT A LINE OF SOME PRINTABLE CHARACTER
2781                                  ;ONTO THE CENTRONICS PRINTER INDEFINATELY UNTIL HALTED BY THE
2782                                  ;USER.  THIS ROUTINE CAN ONLY BE ACCESSED BY SETTING BIT09 TO A 1
2783                                  ;AND SELECTING TEST 31.  BIT10 SET INDICATES TO PRINT LINES
2784                                  ;OF THE SPECIFIED CHARACTER ELONGATED.  A CHAR. WILL BE PRINTED OUT
2785                                  ;UNTIL THE TEST IS HALTED BY THE USER OR UNTIL ANOTHER DIFFERENT
2786                                  ;CHARACTER IS INSERTED INTO THE SWITCH REGISTER.
2787                                  ;
2788                                  ;*******************************************************************************
2789  013774  000004                  OPPRTO: TYPE                    ;PRINT OUT MESSAGE
2790  013776  007206                          MES7                    ;TELLING USER TO INSERT A CHARACTER
2791  014000  000004                          TYPE                    ;PRINT OUT "HIT CONTINUE SWITCH TO
2792  014002  007002                          MES3                    ;RESUME OPERATION"
2793  014004  000000                          HALT
2794  014006  036727  163556  010000  NOMSGS: BIT     SWR,#10000      ;DO WE WANT PULSE GENERATION?
2795  014014  001067                          BNE     OPPRT6          ;YES WE DO
2796  014016  036727  163546  002000          BIT     SWR,#2000       ;NO - WE WANT LINES OF A CHARACTER PRINTOUT
2797                                                                  ;REGULAR OR ELONGATED?
2798  014024  001412                          BEQ     OPPRT1          ;REGULAR
2799  014026  012767  177676  165200          MOV     #-66.,WORK      ;ELONGATED
2800  014034  112777  000016  165140          MOVB    #16,@LSDB       ;ISSUE ELONGATION CODE
2801  014042  105777  165132                  TSTB    @LSCS           ;WAIT FOR LOADING
2802  014046  100375                          BPL     .-4
2803  014050  000403                          BR      OPPRT2          ;START LOADING THE LINE
```

```
2804  014052  012767  177574  165154  OPPRT1: MOV     #-132.,WORK     ;SET UP FOR A FULL LINE OF THE CHARACTER
2805  014060  122767  000023  163502  OPPRT2: CMPB    #23,SWR         ;HAVE WE GIVEN A DESELECT CODE?
2806  014066  001401                          BEQ     OPPRT3          ;YES - DON'T PROCEED TILL SELECT CODE GIVEN
2807  014070  000404                          BR      OPPRT4          ;NO - PROCEED
2808  014072  122767  000021  163470  OPPRT3: CMPB    #21,SWR         ;HAS SELECT CODE BEEN ISSUED YET?
2809  014100  001374                          BNE     OPPRT3          ;NO - DON'T GO ON TILL IT HAS!
2810  014102  116777  163462  165072  OPPRT4: MOVB    SWR,@LSDB       ;YES - GET THE CHARACTER
2811  014110  105777  165064                  TSTB    @LSCS           ;WAIT FOR LOADING
2812  014114  100375                          BPL     .-4
2813  014116  005267  165112                  INC     WORK            ;INCREASE CHARACTER COUNT
2814  014122  005767  165106                  TST     WORK            ;FULL LINE YET?
2815  014126  001401                          BEQ     OPPRT5          ;YES - PRINT IT
2816  014130  000753                          BR      OPPRT2          ;NO - GET ANOTHER CHARACTER
2817  014132  112777  000012  165042  OPPRT5: MOVB    #12,@LSDB       ;PRINT THE LINE OF THE CHARACTER WANTED
2818  014140  105777  165034                  TSTB    @LSCS           ;DONE BIT CLEAR?
2819  014144  100002                          BPL     ERR30           ;YES - CHECK FOR ANY ERROR
2820  014146  104002                          HLT     +2              ;NO
2821                                  ;
2822                                  ;
2823  014150  104400                          SCOPE
2824  014152  005777  165022          ERR30:  TST     @LSCS           ;ERROR BIT SET?
2825  014156  100002                          BPL     LFCK14          ;NO
2826  014160  104000                          HLT     +0              ;YES
2827                                  ;
2828                                  ;
2829  014162  104400                          SCOPE
2830  014164  105777  165010          LFCK14: TSTB    @LSCS           ;PRINTER STILL BUSY?
2831  014170  100706                          BMI     NOMSGS          ;NO -  SET UP TO PRINT  ANOTHER LINE
2832  014172  000767                          BR      ERR30           ;YES - WAIT
2833                                  ;
2834                                  ;
2835  014174  116777  163370  165000  OPPRT6: MOVB    SWR,@LSDB       ;MOVE CHAR. INTO PRINTER BUFFER
2836  014202  105777  164772                  TSTB    @LSCS           ;WAIT FOR LOADING
2837  014206  100375                          BPL     .-4
2838  014210  112777  000177  164764          MOVB    #177,@LSDB      ;FOLLOWED BY A DELETE CODE
2839                                                                  ;TO KILL PRINT TIME
2840  014216  105777  164756                  TSTB    @LSCS           ;WAIT FOR LOADING
2841  014222  100375                          BPL     .-4
2842  014224  000670                          BR      NOMSGS          ;GO BACK TO SEE IF CHAR. CHANGED OR IF
2843                                                                  ;BIT12 HAS BEEN CLEARED INDICATING WE
2844                                                                  ;NOW WANT TO PRINT LINES OF CHARS.
2845                                  ;
2846                                  ;
2847  014226  005267  165022          END:    INC     PCNT            ;INCREMENT THE PASS COUNT
2848  014232  113777  001276  164746          MOVB    @#RING,@TPB     ;RING THE BELL OR PRINT A CHARACTER
2849  014240  105777  164744                  TSTB    @TPS
2850  014244  100375                          BPL     .-4
2851  014246  013700  000042                  MOV     @#42,R0         ;MOVE CONTENTS OF LOC. 42 TO R0
2852  014252  001404                          BEQ     DONE            ;JUMP TO PROGRAM RESTART
2853  014254  004710                          JSR     R7,(R0)         ;RETURN TO MONITOR - NOT PAPER TAPE LOADED
2854  014256  000240                          NOP
2855  014260  000240                          NOP
2856  014262  000240                          NOP
2857  014264  000167  165344          DONE:   JMP     RSTART          ;JUMP TO RESTART OF PROGRAM
2858           000000                         X=0
2859  014270                          TABLE:                          ;TABLE OF TEST ADDRESSES
```

```
                                                                ;(USED WHEN SW(09) SET TO A 1)
014270  001346                            TST0
014272  001700                            TST1
014274  001754                            TST2
014276  002126                            TST3
014300  002254                            TST4
014302  002556                            TST5
014304  002670                            TST6
014306  003070                            TST7
014310  003174                            TST10
014312  003346                            TST11
014314  003612                            TST12
014316  004002                            TST13
014320  004172                            TST14
014322  004432                            TST15
014324  005116                            TST16
014326  005200                            TST17
014330  005262                            TST20
014332  005344                            TST21
014334  011414                            TST22
014336  011660                            TST23
014340  012334                            TST24
014342  012654                            TST25
014344  012772                            TST26
014346  013366                            TST27
014350  013512                            TST30
014352  013756                            TST31
                                ;
                                ;
        000000                  X=0
014354                          MSGTAB:                         ;TABLE OF ERROR MESSAGE ADDRESSES
                                                                ;(USED WHEN HLT EXECUTED)
014354  010260                            EMSG0
014356  010300                            EMSG1
014360  010322                            EMSG2
014362  010346                            EMSG3
014364  010436                            EMSG4
014366  010534                            EMSG5
014370  010560                            EMSG6
014372  010614                            EMSG7
014374  010716                            EMSG10
014376  010742                            EMSG11
014400  011024                            EMSG12
014402  011044                            EMSG13
014404  011066                            EMSG14
014406  011122                            EMSG15
014410  011166                            EMSG16
014412  011254                            EMSG17
014414  011304                            EMSG20

        000001                  .END
```

```
A       004536          1568*   1569
ADDERR  001270           737*   1937*
ADTENP  005726          1767    1790*
AGAIN   004452          1542*   1562
ALMOST  006140          1859    1864*
B       005132          1658*   1659
BDCNVA  005630          1769*   1772
BEGIN   001300           679     803*
BELL    004204          1448    1449    1451*
BELLT   004236          1461    1466*
BELL1   004246          1467    1471*
BELL2   004310          1485    1489*
BP1     012346          2478    2479    2486*
BP1CA   012432          2497*   2580
BP1D    012440          2498*   2542    2548
BP1DA   012454          2499    2501*   2507
BP1E    012504          2506    2508*
BP1EA   012526          2511    2517*
BP1F    012544          2520*   2554
BP1G    012600          2533    2537*
BP1H    012610          2538    2540*
BP1J    012624          2539    2545*
BP2     012666          2557    2558    2565*
BUSERR= 000004           752*    901*    910*
C       005214          1675*   1676
CARRET  003102          1176    1177    1184*   1901
CHARNO  001250           725*   2606*   2666*   2667    2695*
CHARS   001222           714*   1575*   1583    1585*   1588*   2497*   2508*   2510    2612*   2623    2626*   2632*   2667*
                        2694*
CHRGEN  001224           715*   1576*   1577    1586*   1589*   2311*   2313*   2317    2320    2322*   2324*   2493*   2503
                        2546*   2578*   2609*   2618    2628*   2633*   2664*   2696*   2716*   2718    2727*   2757*
CH100   005130          1574    1654    1655    1657*
CH132   004444          1538    1539    1541*
CH132A  004524          1561    1565*
CH132F  004612          1577*   1587    1590
CH40    005274          1681    1688    1689    1691*
CH80    005212          1664    1671    1672    1674*
CLRIE   002524          1066*   1076
CNTR    001226           716*   2307*   2309    2348    2350*   2409*   2419    2441    2444*   2494*   2517    2537    2540*
                        2545*   2577*   2707*   2748    2756*
CNVCTR  005720          1768*   1771*   1787*
COLCNT  001274           740*   1573    1663    1680    1697    2308    2351    2372    2495    2575    2610    2689
CONT    005540          1738    1741*
CRCHK   003336          1238    1241    1247*
CRCHK1  003602          1320    1328*
CRCHK2  003756          1372    1377*
CRCHK3  004146          1429    1434*
CRCHK4  004422          1509    1514*
CRCHK6  005052          1631    1636*
CRCHK7  005576          1750    1755*
CRCHK8  012070          2399    2404*
CRCHK9  012216          2431    2436*
CTST    004762          1613*   1618
CTST1   005002          1614    1619*
CYCLE   001240           721*   1594*   1598*   1599    1733*   1831*   1835*   1836
CYCLE1  006052          1835*   1842
```

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CYCNT   004722          1598*   1605
D       005276          1692*   1693
DATAL   011426          2298    2299    2301*
DATAL4  011472          2309*   2352
DATAL5  011510          2310    2313*
DATAL6  011516          2312    2314*   2323    2325
DATAL7  011564          2321    2324*
DATAPR  011574          2315    2330*
DECPC   006500          1949    1956*
DELAY   001266           736*    807*    829*    849*    952*    961*   1145*   1856
DELCHK  003474          1286    1289    1297*
DELETE  003360          1255    1256    1258*
DESEL1  001454           832     835*
DIGIT   005722          1774*   1777*   1780*   1781    1788*
DLETE   003414          1274*   1293
DLETE1  003504          1298    1302*
DONE    014264          2852    2857*
E       005360          1711*   1712
ELONG   001242           722*   2492*   2498    2512    2574*   2607*   2613    2659    2688*
EMSG0   010260          2168*   2892
EMSG1   010300          2172*   2893
EMSG10  010716          2227*   2900
EMSG11  010742          2232*   2901
EMSG12  011024          2242*   2902
EMSG13  011044          2246*   2903
EMSG14  011066          2250*   2904
EMSG15  011122          2258*   2905
EMSG16  011166          2264*   2906
EMSG17  011254          2273*   2907
EMSG2   010322          2176*   2894
EMSG20  011304          2278*   2908
EMSG3   010346          2181*   2895
EMSG4   010436          2192*   2896
EMSG5   010534          2204*   2897
EMSG6   010560          2209*   2898
EMSG7   010614          2215*   2899
END     014226          2765    2847*
ERBITS  003652          1342    1347*   1355
ERBIT2  002014           932     939*
ERBIT3  003152          1192    1196*   1205
ERBIT4  003226          1216    1220*   1245
ERBIT5  003312          1233    1237*   1249
ERBIT6  003400          1260    1267*   1294
ERBIT7  003450          1280    1285*   1299
ERBIT8  003570          1314    1319*   1330
ERBIT9  003744          1366    1371*   1379
ERRA    001732           901     907*
ERRIND  001264           733*    814*    888*   1899    1922*   1936*
ERROR   006412           687    1936*
ERRORM  010252          1946    2164*
ERROR1  006600          1980*   1998
ERR10   004042          1399    1404*   1412
ERR11   004134          1423    1428*   1436
ERR12   004224          1453    1460*   1468
ERR12A  004266          1473    1478*   1486
ERR13   004410          1503    1508*   1516
```

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ERR14   004472          1544    1549#   1557
ERR18   005040          1625    1630#   1638
ERR19   005564          1744    1749#   1757
ERR20   006010          1809    1814#   1822
ERR21   011614          2332    2337#   2345
ERR23   012056          2393    2398#   2406
ERR24   012204          2423    2426    2430#   2438
ERR25   012312          2457    2462#   2470
ERR27   012556          2521    2526#   2534
ERR29   013264          2640    2645#   2653
ERR30   014152          2819    2824#   2832
ERR32   013674          2732    2737#   2745
F       011430          2302#   2303
FFCHK   004054          1405    1410#
FFEED   004014          1393    1394    1396#
FFEED1  004022          1397#   1441
FFEED2  004064          1411    1415#
FINI    006136          1861    1863#
G       011674          2367#   2368
H       012350          2487#   2488
HLT   = 104000           749#    823     833     838     853     862     871     875     907     927     933     941     947
                         956     965     980     987     995    1002    1020    1029    1074    1085    1104    1116    1128
                        1142    1149    1193    1198    1217    1222    1234    1239    1261    1269    1281    1287    1315
                        1321    1343    1349    1367    1373    1400    1406    1424    1430    1454    1462    1474    1480
                        1504    1510    1545    1551    1606    1626    1632    1745    1751    1810    1816    1843    1864
                        2333    2339    2394    2400    2424    2432    2458    2464    2522    2528    2641    2647    2733
                        2739    2820    2826
HLTADD  006726          1990*   1991*   1992    2005#
I       012704          2569#   2570
ICNT    001256           729#   1904*   1906    1907    1909*   1923*
ICOUNT  001262           731#    813*    887*   1897
IEBIT   002140           973     974     976#
IEBIT1  002236           991     999#
IECHK   002502          1034    1039    1044    1049    1062#
IECHK1  002664          1117#   1159
IECHK2  003012          1143#   1168
IENAB   002266          1012    1013    1015#
IENAB1  002316          1019    1027#
IENAB2  002330          1028    1033#
IENABB  002570          1097    1098    1100#
IENAB4  002616          1103    1108#
IENAB5  002676          1118    1124    1125#
IENAB6  002716          1127    1130#
IENOGO  002436          1038    1043    1048    1052#
INCR1   006114          1857#   1862
INTLVL  001216           706#   1037    1042    1047
INTVEC  002534          1016    1074#
INVEC   002542          1053    1085#
INVEC1  003044          1100    1157#
INVEC2  003056          1133    1166#
J       013022          2600#   2601
K       013402          2683#   2684
L       013532          2709#   2710
LASTIN  012256          2379    2452#
LFCHK   003326          1221    1224    1243#
LFCHK1  003464          1268    1271    1292#
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LFCHK2  004300          1479    1484#
LFCHK3  004504          1550    1555#
LFCHK7  011626          2338    2343#
LFCHK9  012324          2463    2468#
LFCK11  012570          2527    2532#
LFCK13  013276          2646    2651#
LFCK14  014164          2825    2830#
LFCK16  013706          2738    2743#
LFEED   003206          1211    1212    1214#
LFEED1  003242          1225#   1244
LFNO    001220           713#   1541*   1560*
LFRATE  005356          1707    1708    1710#
LFRAT1  005402          1715#   1720
LFRAT2  005422          1716    1721#
LINCNT  001246           724#   2608*   2656*   2657    2692*
LSCS    001200           699#    821     831     836     851     860     869     873     903*    925     931     939     945
                         954     963     977*    978     984*    985     992*    993     1000    1018    1027    1062*   1066*
                        1102    1109*   1115*   1126    1136*   1141*   1147    1157*   1166*   1185    1188    1191    1196
                        1201    1215    1220    1226    1229    1232    1237    1243    1247    1259    1267    1276    1279
                        1285    1292    1297    1303    1306    1310    1313    1319    1328    1341    1347    1353    1359
                        1362    1365    1371    1377    1398    1404    1410    1416    1419    1422    1428    1434    1452
                        1460    1466    1472    1478    1484    1490    1493    1496    1499    1502    1508    1514    1543
                        1549    1555    1578    1596    1602    1604    1616    1624    1630    1636    1718    1722    1730
                        1735    1743    1749    1755    1782    1799    1804    1808    1814    1820    1833    1839    1841
                        1860    2318    2331    2337    2343    2381    2389    2392    2398    2404    2413    2422    2430
                        2436    2453    2456    2462    2468    2501    2520    2526    2532    2566    2597    2616    2619
                        2639    2645    2651    2719    2722    2731    2737    2743    2801    2811    2818    2824    2830
                        2836    2840
LSD8    001202           700#    805*    820*    828*    835*    848*    905*    951*    960*    1125*   1144*   1184*   1187*
                        1190*   1214*   1225*   1228*   1231*   1258*   1274*   1278*   1302*   1305*   1308*   1312*   1340*
                        1358*   1361*   1364*   1397*   1413*   1418*   1421*   1451*   1471*   1489*   1492*   1495*   1498*
                        1501*   1542*   1577*   1593*   1615*   1623*   1717*   1721*   1724*   1726*   1729*   1739*   1742*
                        1781*   1798*   1803*   1807*   2317*   2330*   2380*   2388*   2391*   2412*   2421*   2427*   2452*
                        2455*   2500*   2503*   2519*   2553*   2565*   2596*   2615*   2618*   2638*   2718*   2721*   2729*
                        2800*   2810*   2817*   2835*   2836*
LSINT   001212           704#   1016*   1053*   1100*   1133*
LSPR    001214           705#   1017*   1054*   1101*   1134*
MES1    006730           886    2011#
MES2    006752           816    2015#
MES3    007002           818     846     858     867    2020#   2792
MES4    007052           844    2028#
MES5    007150           856    2040#
MES6    007166           865    2044#
MES7    007206          2048#   2790
MORE    005062          1637    1642#
MOREFF  004156          1435    1439#
MOREVT  003766          1378    1382#
MSGA    006672          1995#   2002
MSGB    006710          1997    1999#
MSGTAB  014354          1994    2890#
NOMSGS  014006          2794#   2831    2842
NOP   = 000240           747#
OCTDEC  005612          1621    1741    1766#
OPPRT0  013774          2762    2763    2789#
OPPRT1  014052          2798    2804#
OPPRT2  014060          2803    2805#   2816
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OPPRT3  014072          2806    2808#   2809
OPPRT4  014102          2807    2810#
OPPRT5  014132          2815    2817#
OPPRT6  014174          2795    2835#
PCNT    001254           681*    728#    803*   2847*
PSW     001204           701#    976*   1033*   1036*   1037    1041*   1042    1046*   1047    1055*   1087*   1108*   1114*
                        1135*   1140*   1927*
RDY0    001766           921     922     924#
RDY1    002002           926     931#
RDY2    002030           940     945#
RDY3    002044           946     951#
RDY4    002076           955     960#
REICNT  001260           730#   1909    1923
REIT    005504          1957#   1970
RELF    004514          1556    1560#
RETCHK  003164          1197    1201#
RETURN  006376           812*    900*    921*    973*   1012*   1097*   1124*   1176*   1211*   1255*   1336*   1393*   1448*
                        1538*   1654*   1671*   1688*   1707*   1921*   1925#   1928    2298*   2363*   2478*   2557*   2588*
                        2674*   2704*   2762*
RING    001276           741#   2848
RLOAD   005520          1735#   1740
ROTOR   013004          2588    2589    2596#
ROTOR5  013150          2614    2618#   2629
ROTOR6  013222          2624    2632#
ROTOR7  013244          2622    2638#
ROTOR8  013306          2652    2656#
ROTOR9  013400          2674    2675    2682#
ROTR3A  013126          2613#   2635    2669    2697
ROTR8A  013330          2658    2662#
RPEAT   004576          1575#   1665    1682    1699
RPEAT1  011636          2344    2348#
RSTART  001634           682     811     874     884#   2857
RTTYP   004756          1597    1612#
R0      =%000000         753#    902*    904*   1871*   1874*   1881    1906*   1937    2851*   2853
R1      =%000001         754#    891*    892*    893    1565*   1569*   1612*   1613    1615    1659*   1676*   1693*   1712*
                        1714*   1715    1717    1728*   1737    1739    1801    1803    1956*   1960*   1973    1977    1994*
                        1995    2303*   2305*   2368*   2370*   2488*   2490*   2570*   2572*   2601*   2603*   2684*   2686*
                        2710*   2714*
R2      =%000002         755#   1766*   1775*   1779*   1957*   1958*   1959*   1960
R3      =%000003         756#   1621*   1741*   1773*   1992*   1993*   1994
R4      =%000004         757#    808*    830*    850*    953*    962*   1034*   1039*   1044*   1049*   1067*   1146*   1725*
                        1727*   1767*   1769    1844*   1863*   1865*   1949*   1989*
R5      =%000005         758#   1948*   1990
R6      =%000006         759#    804*    884*    908    1075    1086    1158    1167    1871    1872*   1901    1915*   1918
                        1921    1926    1927    1947
R7      =%000007         760#    902     904    1566*   1570*   1660*   1677*   1694*   1713*   1770*   1784*   1825*   2304*
                        2306*   2369*   2371*   2489*   2491*   2571*   2573*   2602*   2604*   2685*   2687*   2711*   2715*
                        2853*
SAVEPC  001272           738#   1947*   1948    1957    1963*   1965*   1967*   1968
SAVESP  001244           723#   2375*   2410    2445    2446*   2605*   2662*   2664    2693*
SCOPE = 104400           750#    824     834     839     854     863     872     883     923     930     934     944     950
                         959     975     983     990     998    1014    1026    1032    1035    1040    1045    1052    1099
                        1107    1117    1129    1143    1178    1195    1200    1213    1219    1223    1236    1240    1257
                        1266    1270    1284    1288    1318    1327    1338    1346    1352    1370    1376    1395    1403
                        1409    1427    1433    1450    1459    1465    1477    1483    1507    1513    1540    1548    1554
                        1611    1629    1635    1656    1673    1690    1709    1748    1754    1813    1819    2300    2336
```

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                        2342    2365    2397    2403    2425    2435    2461    2467    2480    2525    2531    2559    2590
                        2644    2650    2676    2706    2736    2742    2764    2823    2829
SCOPEB  006400          1908    1911    1916    1926#
SCOPEC  006254           689    1897#
SCOPEF  006322          1898    1900    1903    1910#
SCOPEG  006356          1912    1921#
SCO     001764           912     923#
SCOO    002136           964     966     975#
SC1     002264          1001    1003    1014#
SC10    005126          1643    1656#
SC11    005210          1645    1673#
SC12    005272          1647    1690#
SC13    005354          1648    1698    1709#
SC14    011424          1758    2300#
SC15    011670          2349    2365#
SC16    012344          2469    2480#
SC17    012664          2516    2559#
SC18    013002          2513    2590#
SC19    013376          2661    2676#
SC2     002566          1059    1088    1099#
SC20    013522          2660    2706#
SC21    013766          2750    2764#
SC3     003100          1148    1150    1178#
SC4     003204          1204    1213#
SC5     003356          1248    1257#
SC6     003622          1329    1338#
SC7     004012          1385    1395#
SC8     004202          1442    1450#
SC9     004442          1515    1540#
SECLF   006104          1834    1844#
SEL1    001410           822     825#
SEL2    001474           837     840#
SEL3    001552           852     855#
SEL4    001576           861     864#
SEL5    001622           870     873#
SLEWT   006040          1727    1832#   1840
STOVER  004660          1584    1588#
SUBTEN  005650          1770    1774#
SUBTNA  005654          1775#   1778
SUBTNB  005670          1776    1779#
SWR   = 177570           751#    810     889     891     1910    1940    1950    2794    2796    2805    2808    2810    2835
TABLE   014270           893    2859#
TAG1    005750          1801#   1806
TAG2    005770          1802    1807#
TAG3    006022          1815    1820#
TAG4    006032          1821    1825#
TEMPWR  005724          1769#   1775    1779    1789#
TEST    001252           727#   1571#   1642    1644    1646    1661#   1678#   1695#
TIMER   001230           717#   1595#   1619    1620#   1732    1734#   1832#
TIMER2  012644          2518    2553#
TIME2   012174          2420    2427#
TIMING  004676          1582    1593#
TIM132  004704          1594#   1600    1603
TITL1   007274          1565    2063#
TITL10  010064          2136#   2572
TITL11  010154          2147#   2686
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TITL2   007356            1612    1726    2073#
TITL3   007402            1714    2078#
TITL4   007444            2085#   2305
TITL5   007510            2092#   2370
TITL6   007620            2105#   2490
TITL7   007706            2115#   2603
TITL8   007770            2125#   2714
TPB     001206             702#   1875*   1878*   1884*   1888*   1973*   1980*   1983*   1986*   1999*   2848*
TPS     001210             703#   1876    1879    1885    1889    1943    1975    1981    1984    1987    2000    2849
TSTTAG  005734            1566    1570    1660    1677    1694    1713    1798#   2304    2306    2369    2371    2489    2491
                          2571    2573    2602    2604    2685    2687    2711    2715
TST0    001346             812     813#   2861
TST1    001700             890     900#    909    2862
TST10   003174            1211#   2869
TST11   003346            1255#   2870
TST12   003612            1336#   2871
TST13   004002            1393#   2872
TST14   004172            1448#   2873
TST15   004432            1538#   2874
TST16   005116            1654#   2875
TST17   005200            1671#   2876
TST2    001754             921#   2863
TST20   005262            1688#   2877
TST21   005344            1707#   2878
TST22   011414            2298#   2879
TST23   011660            2363#   2880
TST24   012334            2478#   2881
TST25   012654            2557#   2882
TST26   012772            2588#   2883
TST27   013366            2674#   2884
TST3    002126             973#   2864
TST30   013512            2704#   2885
TST31   013756            2762#   2886
TST4    002254            1012#   2865
TST5    002556            1097#   2866
TST6    002670            1124#   2867
TST7    003070            1176#   2868
TTYLD   006556            1969    1973#   1979
TTYMSG  006646            1978    1990#
TYP     006144             684    1871#
TYPA    006204            1881#   1891
TYPB    006236            1883    1888#
TYPDAT  001236             720#   1881*   1882    1888    1995*   1996    1999
TYPE  = 000004             748#    815     817     843     845     855     857     864     866     885    1945    2789    2791
UCASE   013524            2704    2705    2707#
UCASE4  013602            2718#   2728
UCASE5  013616            2721#   2759
UCASE6  013654            2726    2729#
UCASE7  013716            2744    2748#
UCASE8  013726            2749    2753#
VERTAB  003624            1336    1337    1339#
VTAB1   003632            1340#   1384
VTAB2   003674            1354    1358#
VTCHK   003664            1348    1353#
WAITON  006106             808     830     850     953     962    1146    1856#
WAREA   001232             718#   1619*   1732*   1766    2374*   2377    2378    2387*   2495*   2496    2541    2547    2575*
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                    2576*  2579   2610*  2611   2665   2689*  2690*  2691   2712*  2717   2753*  2758
WEDGE   011672      2363   2364   2366*
WEDGE1  011750      2377*  2443
WEDGE2  011766      2380*  2386
WEDGE3  012016      2385   2387*
WEDGE4  012100      2405   2409*
WEDGE5  012114      2412*  2418   2447
WEDGE6  012144      2417   2419*
WEDGE7  012226      2437   2441*
WEDGE8  012236      2442   2444*
WEDG6A  012160      2422*  2428
WOFLAG  006034      1725   1831*  1837
WORK    001234       719*   825*   826*   840*   841*  1056*  1057*  1063*  1064*  1111*  1112*  1130*  1131*
                    1137*  1138*  1339*  1382*  1383   1396*  1439*  1440   1572*  1573   1580*  1581   1662*
                    1663   1679*  1680   1696*  1697   1856*  1857*  1858   2308*  2314   2316*  2351*  2372*
                    2373*  2374   2375   2377*  2383*  2384   2410*  2415*  2416   2445*  2496*  2504*  2505
                    2541*  2547*  2579*  2611*  2621   2625*  2634*  2665*  2691*  2717*  2724*  2725   2758*
                    2799*  2804*  2813*  2814
X       = 000021    2858*  2861   2862*  2863*  2864*  2865*  2866*  2867*  2868*  2869*  2870*  2871*  2872*
                    2873*  2874*  2875*  2876*  2877*  2878*  2879*  2880*  2881*  2882*  2883*  2884*  2885*
                    2886*  2887*  2889*  2892   2893*  2894*  2895*  2896*  2897*  2898*  2899*  2900*  2901*
                    2902*  2903*  2904*  2905*  2906*  2907*  2908*  2909*
XERSIZ  005606      1756   1758*
.       = 014416     678*   680*   683*   686*   693*   827    842    906    979    986    994    1058   1065
                    1113   1132   1139   1186   1189   1227   1230   1277   1304   1307   1311   1360   1363
                    1417   1420   1491   1494   1497   1500   1567   1579   1617   1657   1674   1691   1710
                    1719   1723   1731   1736   1783   1800   1805   1877   1880   1886   1890   1941   1944
                    1951   1976   1982   1985   1988   2001   2019*  2043*  2047*  2057*  2072*  2077*  2084*
                    2104*  2114*  2124*  2146*  2158*  2167*  2171*  2203*  2226*  2231*  2255*  2290*  2301
                    2319   2366   2382   2390   2414   2454   2486   2502   2567   2568   2598   2599   2617
                    2620   2682   2708   2720   2723   2802   2812   2637   2841   2850
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MESSNO	792#	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905
	2906	2907	2908												
TESTNO	777#	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874
	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886			
TYPTST	766#	1568	1658	1675	1692	1711	2302	2367	2487	2569	2600	2683	2709		
UPDATE	782#	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2672	2873	2874	2875
	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2893	2694	2895
	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	

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ADD      887  1779  1780  1872  1959  2666
ASL      892  1993
ASR     2576  2690
BCS     1776
BEQ      811   890   940   946   986  1001  1561  1582  1584  1600  1614  1643  1645  1647  1716
        1738  1802  1837  1859  1898  1941  1951  1969  1978  2315  2321  2379  2385  2417  2420
        2506  2518  2538  2622  2624  2726  2798  2806  2815  2852
BHI     1903
BIC      984  1066  1115  1141  1157  1166  1958
BIS      977   992  1062  1109  1136
BIT      810   889   939   945   978   985   993  1000  1910  1940  1950  2794  2796
BLT     1038  1043  1048  1574  1664  1681  1698
BMI      822   837   861   874   932   955   964  1028  1127  1204  1244  1248  1293  1298  1329
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