

LS11

CENTRONICS LINE PRINTER
MD-11-DZLSA-B

EP-DZLSA-B-DL-A
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FICHE 1 OF 1

NOV 1976
digital
MADE IN USA

Frame 1	Frame 2	Frame 3	Frame 4	Frame 5	Frame 6
Frame 7	Frame 8	Frame 9	Frame 10	Frame 11	Frame 12
Frame 13	Frame 14	Frame 15	Frame 16	Frame 17	Frame 18
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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

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MAYNARD, MASSACHUSETTS 01754

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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.

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4. STARTING PROCEDURE

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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:

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SW<15>=1....HALT ON ERROR

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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<7THRU>.....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.

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

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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

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RESTART AT 600

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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				CORE MOS BIP		
	15/20	05/10	/40	/45			
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

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PROCEEDS TO THE NEXT TEST.

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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

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PRIORITY LEVEL OF 4 IS IN 'INTLVL'.

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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.

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132 CHARS./LINE RELATIVE TIMING

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- 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

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

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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. S?S?S?.....
 ?S?S?S?.....

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
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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.

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REGULAR COUNTER CLOCKWISE ROTATING

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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. !"#%&'()*#.....
- !"#%&'()*#.....
†- !"#%&'()*#.....
]†- !"#%&'()*#.....
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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.

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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.

J02

MAINDEC-11-DZLSA-B
DZLSAB.P11

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645
646

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

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(OCTAL).

(B) 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

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675

⋮


```

676      ;
677      ;
678      ;
679      000200 000200 001074      . =200      JMP      BEGIN      ;JMP TO INITIAL START OF PROGRAM
680      000600 000600      . =600
681      000600 005067 000450      CLR      PCNT      ;CLEAR PROGRAM PASS COUNT
682      000604 000167 001024      JMP      RSTART    ;GO TO RESTART OF PROGRAM
683      000020 000020      . =20
684      000020 006144      TYP
685      000022 000340      340      ;IOT TRAP VECTOR
686      000030 000030      . =30      ;START LOCATION OF IOT HANDLER
687      000030 006412      ERROR      ;NEW PROCESSOR LEVEL OF 7
688      000032 000340      340      ;EMT TRAP VECTOR
689      000034 006254      SCOPEC      ;START LOC. OF EMT HANDLER
690      000036 000000      0          ;NEW PROCESSOR LEVEL OF 7
691      ;
692      ;
693      001200      . =1200
694      ;*****
695      ;
696      ;
697      ;
698      ;
699      001200 177514      LSCS: 177514      ;CENTRONICS STATUS REGISTER ADDRESS
700      001202 177516      LSDB: 177516      ;CENTRONICS DATA BUFFER ADDRESS
701      001204 177776      PSW: 177776      ;PROCESSOR STATUS REGISTER ADDRESS
702      001206 177566      TPB: 177566      ;TELETYPE DATA BUFFER ADDRESS
703      001210 177564      TPS: 177564      ;TELETYPE STATUS REGISTER ADDRESS
704      001212 000200      LSINT: 200      ;CENTRONICS PRINTER INTERRUPT VECTOR
705      001214 000202      LSPR: 202      ;CONTAINS PSW FOR PRINTER INTERRUPTS
706      001216 000200      INTLVL: 200      ;CONTAINS PRINTER INTERRUPT LEVEL
707      ;
708      ;
709      ;
710      ;
711      ;
712      ;*****
713      001220 000000      LFNO: 0          ;NO. OF LINE FEEDS ISSUED
714      001222 000000      CHARS: 0        ;NO. OF PRINTABLE CHARS. ON A LINE
715      001224 000000      CHRGEN: 0      ;CHARACTER TO BE LOADED INTO BUFFER
716      001226 000000      CNTR: 0        ;LINE REPEAT COUNTER
717      001230 000000      TIMER: 0      ;RELATIVE TIME COUNT HOLDER
718      001232 000000      WAREA: 0      ;DECODING WORK AREA
719      001234 000000      WORK: 0       ;CHARS./LINE HOLDER
720      001236 000000      TYPDAT: 0     ;CHARACTER TO BE OUTPUTTED ON TELETYPE
721      001240 000000      CYCLE: 0     ;1000 TIME LOOP COUNTER FOR RELATIVE TIME
722      001242 000000      ELONG: 0     ;DETERMINES REGULAR OR ELONGATED CHARS.
723      001244 000000      SAVESP: 0    ;NO. OF SPACES=NO. OF E'S IN WEDGE
724      001246 000000      LINCNT: 0    ;LINE COUNTER
725      001250 000000      CHARNO: 0    ;NO. OF AVAILABLE CHARS. AT A TIME
726      ;
727      001252 000000      TEST: 0      ;IN ROTATING PATTERNS
728      001254 000000      PCNT: 0      ;CHARS./LINE TIME TEST INDICATOR
729      001256 000310      ICNT: 310    ;PROGRAM PASS COUNT HOLDER
730      001260 000310      REICNT: 310  ;WORKING AREA FOR ITERATION COUNT (200 DECIMAL)
731      001262 000000      ICOUNT: 0    ;USED FOR RESTORING OF ICNT
;ICOUNT=0 INDICATES DON'T ITERATE

```

```

732
733 001264 000000
734
735
736 001266 000000
737 001270 000000
738 001272 000000
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740 001274 000204
741 001276 000007
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744
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746
747 000240
748 000004
749 104000
750 104400
751 177570
752 000004
753 000000
754 000001
755 000002
756 000003
757 000004
758 000005
759 000006
760 000007
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762
763
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ERRIND: 0
DELAY: 0
ADDERR: 0
SAVEPC: 0
COLCNT: 204
RING: 7
*****
: EQUIVALENCES
*****
NOP=240
TYPE=IOT
HLT=EMT
SCOPE=TRAP
SWR=177570
BUSERR=4
R0=%0
R1=%1
R2=%2
R3=%3
R4=%4
R5=%5
R6=%6
R7=%7
*****
: MACRO DEFINITION FOR PRINTING OUT TEST NOS. ON CENTRONICS PRINTER
*****
.V: .MACRO TYPTST V,W
.ASCIZ /W/
MOV #V,R1
JSR R7,TSTTAG
.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
X=X+1
.LIST
.ENDM UPDATE
*****

```

```

:USED FOR MANUAL INTERVENTION TEST
:SCOPE INDICATOR TO STOP ITERATIONS
:BECAUSE AN ERROR HAS OCCURRED
:ERRIND=1 SET IN ERROR ROUTINE
:VARIABLE DELAY FOR WAITING ON PRINTER FLAGS
:CONTAINS PC OF ADDRESS FAILURE
:CONTAINS PC TO BE DECODED ON
:ERROR PRINTOUTS
:COLUMN WIDTH DESIRED FOR TESTING (OCTAL VALUE)
:TELETYPE BELL CODE
*****
:USED FOR ACT-11 OVERLAY
:TTY MESSAGE PRINTOUT CALL
:TTY ERROR MESSAGE PRINTOUT CALL
:LOOP ON TEST CALL
:ADDRESS OF CONSOLE SWITCH REGISTER
:BUS ERROR TIME OUT VECTOR
*****
:GENERAL PURPOSE
:REGISTERS
*****
:TEST NO. TO BE PRINTED OUT
:MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
:GO TO PRINT OUT TEST NO.
*****
:DON'T LIST NEXT LINE DURING MACRO EXPANSION
:BEGIN LISTING AGAIN
*****

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001300 005067 177750
001304 012706 001100
001310 112777 000021 177664

001316 005067 177744
001322 004467 004560
001326 000005
001330 036727 176234 000400
001336 001536
001340 012767 001346 005030
001346 005067 177710
001352 005067 177706
001356 000004
001360 006752
001362 000004
001364 007002
001366 000000
001370 112777 000023 177604
001376 005777 177576
001402 100402
001404 104007
001406 104400
001410 012767 017777 177616
001416 005367 177612
001422 001375
001424 112777 000021 177550
001432 005067 177630
001436 004457 004444
001442 005777 177532
001446 100002
001450 104006
001452 104400
001454 112777 000023 177520
001462 005777 177512
001466 100402
001470 104007
001472 104400
001474 012767 017777 177532
001502 005367 177526
001506 001375
001510 000004

```
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.
*****
BEGIN: CLR PCNT ;CLEAR PASS COUNT INDICATOR
MOV #1100,R6 ;SET UP STACK POINTER
MOVB #21,ALSDB ;SELECT PRINTER ON LINE IN CASE IT
;IS INITIALLY DESELECTED
;WAIT FOR EXECUTION
CLR DELAY
JSR R4,WAITON
RESET ;INITIALIZE
BIT SWR,#400 ;DO WE WANT MANUAL INTERVENTION TESTS?
BEQ RSTART ;NO!
MOV #TST0,RETURN ;YES!
TST0: CLR ICOUNT ;ICOUNT=0 INDICATING DON'T ITERATE
CLR ERRIND ;RESET ERROR INDICATOR
TYPE ;PRINT OUT
MES2 ;"SELECT PRINTER ON LINE"
TYPE ;PRINT OUT "HIT CONTINUE SWITCH
MES3 ;TO RESUME OPERATION"
HALT ;WAIT FOR CONTINUE SWITCH
MOVB #23,ALSDB ;ISSUE A DESELECT CODE
TST ALSCS ;IS ERROR BIT SET?
BMI SEL1 ;YES - SHOULD BE
HLT +7 ;NO
SCOPE
SEL1: MOV #17777,WORK ;GIVE PLENTY OF TIME
DEC WORK ;FOR LIGHT TO
BNE .-4 ;TURN OFF
MOVB #21,ALSDB ;ISSUE A SELECT CODE
CLR DELAY ;SELECT CODE NEEDS A MIN. OF 3 MSEC TO SET
JSR R4,WAITON ;WAIT FOR LOADING
TST ALSCS ;IS ERROR BIT SET?
BPL DESEL1 ;NO - SHOULDN'T BE
HLT +6 ;YES
SCOPE
DESEL1: MOVB #23,ALSDB ;ISSUE A DESELECT CODE
TST ALSCS ;IS ERROR BIT SET?
BMI SEL2 ;YES - IT SHOULD BE
HLT +7 ;NO
SCOPE
SEL2: MOV #17777,WORK ;GIVE PLENTY OF TIME
DEC WORK ;FOR LIGHT TO
BNE .-4 ;TURN OFF
TYPE ;PRINT OUT "OPEN FRONT PANEL & HIT TOP
```



```

844 001512 007052      MES4      ;OF FORM - PAPER SHOULDN'T ADVANCE"
845 001514 000004      TYPE      ;PRINT OUT "HIT CONTINUE SWITCH TO
846 001516 007002      MES3      ;RESUME OPERATION"
847 001520 000000      HALT      ;WAIT FOR CONTINUE SWITCH
848 001522 112777 000021 177452  MOVB      #21,ALSDB ;ISSUE A SELECT CODE
849 001530 005067 177532      CLR      DELAY      ;SELECT CODE NEEDS A MIN. OF 3 MSEC TO SET
850 001534 004467 004346      JSR      R4,WAITON ;WAIT FOR LOADING
851 001540 005777 177434      TST      ALSCS      ;IS ERROR BIT CLEAR?
852 001544 100002      BPL      SEL3      ;YES - IT SHOULD BE
853 001546 104006      HLT      +6      ;NO
854 001550 104400      SCOPE
855 001552 000004      SEL3:  TYPE      ;PRINT OUT "REMOVE PAPER"
856 001554 007150      MESS      ;
857 001556 000004      TYPE      ;PRINT OUT "HIT CONTINUE SWITCH TO
858 001560 007002      MES3      ;RESUME OPERATION"
859 001562 000000      HALT
860 001564 005777 177410      TST      ALSCS      ;IS ERROR BIT SET?
861 001570 100402      BMI      SEL4      ;YES - IT SHOULD BE
862 001572 104010      HLT      +10     ;NO
863 001574 104400      SCOPE
864 001576 000004      SEL4:  TYPE      ;PRINT OUT "PUT PAPER BACK"
865 001600 007166      MES6      ;
866 001602 000004      TYPE      ;PRINT OUT "HIT CONTINUE SWITCH TO
867 001604 007002      MES3      ;RESUME OPERATION"
868 001606 000000      HALT      ;WAIT FOR CONTINUE SWITCH
869 001610 005777 177364      TST      ALSCS      ;IS ERROR BIT CLEAR?
870 001614 100002      BPL      SEL5      ;YES - IT SHOULD BE
871 001616 104000      HLT      +0      ;NO
872 001620 104400      SCOPE
873 001622 105777 177352      SEL5:  TSTB     ALSCS      ;IS DONE BIT SET?
874 001626 100402      BMI      RSTART     ;YES
875 001630 104001      HLT      +1      ;NO
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883 001632 104400      ;*****
884 001634 012706 001100  RSTART:  MOV      #1100,R6 ;INITIALIZE STACK POINTER
885 001640 000004      TYPE      ;PRINT OUT
886 001642 006730      MESS      ;"MAINDEC-11-DZLSAB"
887 001644 062767 000001 177410  ADD      #1,ICOUNT ;ICOUNT=1 INDICATING ITERATIONS
888 001652 005067 177406      CLR      ERRIND   ;RESET ERROR INDICATOR
889 001656 036727 175706 001000  BIT      SWR,#1000 ;DO WE WANT A PARTICULAR TEST?
890 001664 001405      BEQ      TST1     ;NO - START FROM TEST #1
891 001666 116701 175676      MOVB     SWR,R1   ;MOVE THE TEST NO. TO REGISTER 1
892 001672 006301      ASL      R1      ;SHIFT TEST NO. TO GET PROPER WORD COUNT
893 001674 000171 014270      JMP      @TABLE(R1);JUMP TO SELECTED TEST
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;*****
;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,RO ;PC TO 'ADDERR' FROM RO
903 001716 005077 177256 CLR @LSCS ;ADDRESS USED ADDRESS 177514
904 001722 010700 MOV R7,RO ;PC TO 'ADDERR' FROM RO
905 001724 005277 177252 INC @LSDB ;ADDRESS USED ADDRESS 177516
906 001730 000403 BR .+10 ;ADDRESSES OK! - PROCEED
907 001732 104011 ERRRA: 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 CLR 6
912 001752 000404 BR SCO
913
914
915
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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
931 002000 104400 RDY1: SCOPE ;IS DONE BIT SET?
932 002002 105777 177172 TSTB @LSCS ;YES
933 002006 100402 BMI ERBIT2 ;NO
934 002010 104001 HLT +1
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
945 002026 104400 RDY2: SCOPE ;IS MODE BIT (BIT0) SET?
946 002030 032777 000001 177142 BIT #1,@LSCS ;NO
947 002036 001402 BEQ RDY3 ;YES
948 002040 104015 HLT +15
949
950
951 002042 104400 RDY3: SCOPE ;LOAD BUFFER WITH AN 'A'
952 002044 112777 000101 177130 MOVB #101,@LSDB ;SET A DELAY FOR DONE FLAG BACK UP
953 002052 012767 177754 177206 MOV #-20,DELAY ;WAIT FOR DONE FLAG
954 002060 004467 004022 JSR R4,WAITON ;IS DONE BIT SET?
955 002064 105777 177110 TSTB @LSCS ;YES
956 002070 100402 BMI RDY4

```

SECTION TO TEST THAT THE DONE BIT
FUNCTIONS PROPERLY
ALSO THAT THE INTERRUPT ENABLE BIT & MODE BIT
NEVER SET ON A RESET INSTRUCTION

```

956 002072 104005          HLT      +5          ;NO - IT NEVER SET!
957
958
959 002074 104400          SCOPE
960 002076 112777 000177 177076 RDY4:  MOVB    #177,2LSDB      ;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   2LSCS        ;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
970
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          SCOPE
976 002140 012777 000340 177036 IEBIT:  MOV    #340,2PSW   ;LOOP ON IE BIT TEST?
977 002146 052777 000100 177024          BIS    #100,2LSCS   ;SET PROCESSOR STATUS AT LEVEL 7
978 002154 032777 000100 177016          BIT    #100,2LSCS   ;SET IE BIT
979 002162 001002          BNE    +6          ;IS IE BIT SET?
980 002164 104012          HLT    +12         ;YES
981
982
983
984 002166 104400          SCOPE
985 002170 042777 000100 177002          BIC    #100,2LSCS   ;CLEAR IE BIT
986 002176 032777 000100 176774          BIT    #100,2LSCS   ;IS IE BIT CLEAR?
987 002204 001403          BEQ    +10         ;YES
988 002206 104013          HLT    +13         ;NO
989
990
991 002210 104400          SCOPE
992 002212 000411          BR     IEBIT1       ;IE BIT NOT CLEAR - SEE IF RESET CLEARS IT
993 002214 052777 000100 176756          BIS    #100,2LSCS   ;SET IE BIT AGAIN
994 002222 032777 000100 176750          BIT    #100,2LSCS   ;IS IE BIT SET?
995 002230 001002          BNE    +6          ;YES
996 002232 104012          HLT    +12         ;NO
997
998
999 002234 104400          SCOPE
1000 002236 000005          IEBIT1: RESET
1001 002240 032777 000100 176732          BIT    #100,2LSCS   ;CLEAR THE IE BIT!
1002 002246 001406          BEQ    SC1         ;IS IE BIT CLEAR?
1003 002250 104013          HLT    +13         ;YES
1004 002252 000404          BR     SC1         ;NO
1005
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```

SECTION TO TEST THAT THE INTERRUPT ENABLE BIT CAN BE SET AND CLEARED

SECTION TO TEST THAT THE PRINTER WHICH HAS A NORMAL PRIORITY LEVEL OF 4 WILL NOT INTERRUPT TILL THE PROCESSOR IS AT A PRIORITY LEVEL OF 3 ALSO, THAT IT WILL NOT INTERRUPT EVEN IF THE PROCESSOR IS AT LEVEL 3 AS LONG AS THE INTERRUPT ENABLE BIT IS NOT SET!

```

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

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1074 002534 104003
1075 002536 022626
1076 002540 000771
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1080
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1085 002542 104020
1086 002544 022626
1087 002546 012777 000340 176430
1088 002554 000404
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1097 002556 012767 002570 003612
1098 002564 000401
1099 002566 104400
1100 002570 012777 003044 176414
1101 002576 012777 000340 176410
1102 002604 005777 176370
1103 002610 100002
1104 002612 104000
1105
1106
1107 002614 104400
1108 002616 012777 000140 176360
1109 002624 052777 000100 176346
1110
1111 002632 012767 000002 176374
1112 002640 005367 176370
1113 002644 001375
1114 002646 012777 000340 176330
1115 002654 042777 000100 176316
1116 002662 104004
1117 002664 104400
1118 002666 000403
1119
1120
1121
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1123

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*****
: INTERRUPT HANDLER IF PRINTER INTERRUPTS WHILE
: PROCESSOR IS AT PRIORITY LEVEL 4 THRU 7
*****
INTVEC: HLT      +3          ;PRINT ERROR MESSAGE - INTERRUPT OCCURRED!
        CMP      (R6)+,(R6)+ ;POP STACK BACK 2 FROM INTERRUPT
        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
*****
INVEC:  HLT      +20         ;PRINT ERROR MESSAGE - INTERRUPT OCCURRED!
        CMP      (R6)+,(R6)+ ;POP STACK BACK 2 FROM INTERRUPT
        MOV      #340,PSW    ;GIVE PROCESSOR CONTROL AGAIN
        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
*****
TSTS:  MOV      #IENAB3,RETURN ;SET RETURN ADDRESS FOR SCOPE
        BR       IENAB3        ;IF SELECTING THIS TEST
SC2:   SCOPE
IENAB3: MOV      #INVEC1,ALSINT ;LOOP ON INTERRUPT NOT OCCURRING
        MOV      #340,ALSPR    ;NEW 'PC' IF INTERRUPT OCCURS
        TST     ALSCS         ;NEW 'PS' IF INTERRUPT OCCURS
        BPL     IENAB4        ;IS ERROR BIT SET?
        HLT     +0            ;NO
        ;YES
*****

IENAB4: MOV      #140,PSW      ;SET PROCESSOR AT LEVEL 3
        BIS     #100,ALSCS    ;SET PRINTER IE BIT
        ;AN INTERRUPT SHOULD OCCUR
        MOV     #2,WORK       ;SET UP FOR APPROX. 20 MICROSEC. WAIT
        DEC     WORK          ;TO SEE IF INTERRUPT OCCURS
        BNE     -4
        MOV     #340,PSW     ;GIVE PROCESSOR CONTROL
        BIC     #100,ALSCS   ;CLEAR IE BIT
        HLT     +4           ;NO INTERRUPT OCCURRED! - IT SHOULD HAVE
IECHK1: SCOPE
        BR      IENAB5        ;GO TO NEXT TEST
*****

: SECTION TO TEST THE DESELECT INTERRUPT FEATURE
*****

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1124 002670 012767 002676 003500 TST6:  MOV      #IENAB5,RETURN ;SET RETURN ADDRESS FOR SCOPE
1125 002676 112777 000023 176276 IENAB5: MOVB    #23,ALSDB  ;ISSUE A DESELECT CODE
1126 002704 005777 176270          TST      ALSCS    ;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,ALSINT ;NEW 'PC' IF INTERRUPT OCCURS
1134 002740 012777 000340 176246          MOV      #340,ALSPPR  ;NEW 'PS' IF INTERRUPT OCCURS
1135 002746 005077 176232          CLR      APSW     ;MAKE PROCESSOR INACTIVE
1136 002752 052777 000100 176220          BIS      #100,ALSCS  ;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,APSW  ;GIVE PROCESSOR CONTROL
1141 003002 042777 000100 176170          BIC      #100,ALSCS ;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,ALSDB  ;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     ALSCS    ;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,ALSCS ;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,ALSCS ;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 ;*****

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

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1236 003310 104400
1237 003312 005777 175662 ERBITS: SCOPE ;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 ALSCS ;PRINTER BUSY?
1244 003332 100743 BMI LFEED1 ;NO
1245 003334 000734 BR ERBIT4 ;YES - WAIT
1246
1247 003336 105777 175636 CRCHK: TSTB ALSCS ;PRINTER BUSY?
1248 003342 100405 BMI SCS ;NO
1249 003344 000762 BR ERBITS ;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,ALSOB ;ISSUE A LINE FEED
1259 003366 105777 175606 TSTB ALSCS ;IS DONE BIT CLEAR?
1260 003372 100002 BPL ERBIT6 ;YES
1261 003374 104002 HLT +2 ;NO
1262
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1264
1265
1266 003376 104400
1267 003400 005777 175574 ERBIT6: SCOPE ;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 DELETE: MOVB #'BB,ALSOB ;LOAD BUFFER WITH 'B'
1275 ;ONLY LOWER BYTE LOADED
1276 003422 105777 175552 TSTB ALSCS
1277 003426 100375 BPL -4
1278 003430 112777 000177 175544 MOVB #177,ALSOB ;ISSUE A DELETE COMMAND
1279 003436 105777 175536 TSTB ALSCS ;IS DONE BIT CLEAR?
1280 003442 100002 BPL ERBIT7 ;YES
1281 003444 104002 HLT +2 ;NO
1282
1283
1284 003446 104400
1285 003450 005777 175524 ERBIT7: SCOPE ;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
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1292 003464 105777 175510 LFCMK1: 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 ERBIT8: SCOPE
1319 003570 005777 175404 TST  @LSCS ;ERROR BIT SET?
1320 003574 100002 BPL  CRCHK1 ;NO
1321 003576 104000 HLT  +0 ;YES
1322
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1327 003600 104400 ERBIT8: SCOPE
1328 003602 105777 175372 CRCHK1: TSTB  @LSCS ;PRINTER BUSY?
1329 003606 100405 BMI  SC6 ;NO
1330 003610 000767 BR  ERBIT8 ;YES-WAIT
1331
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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  ERBITS ;YES
1343 003646 104002 HLT  +2
1344
1345
1346 003650 104400 ERBITS: SCOPE
1347 003652 005777 175322 TST  @LSCS ;ANY ERROR?

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1348 003656 100002          BPL      VTCHK      ;NO
1349 003660 104000          HLT      +0          ;YES
1350
1351
1352 003662 104400          ;
1353 003664 105777 175310  VTCHK:  SCOPE      ;PRINTER BUSY?
1354 003670 100401          TSTB     @LSCS     ;NO
1355 003672 000767          BMI      VTAB2     ;YES-WAIT
1356          BR        ERBITS
1357
1358 003674 112777 000126 175300  VTAB2:  MOV      #126,@LSDB ;LOAD PRINTER DATA
1359 003702 105777 175272          TSTB     @LSCS
1360 003706 100375          BPL      -4
1361 003710 112777 000124 175264  MOV      #124,@LSDB ;BUFFER WITH 'VT'
1362 003716 105777 175256          TSTB     @LSCS
1363 003722 100375          BPL      -4
1364 003724 112777 000015 175250  MOV      #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          ;
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          ;
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
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1393 004002 012767 004014 002366  TST13:  MOV      #FFFEED,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: MOV      #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

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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 ;
1410 004054 105777 175120 FFCHK: TSTB SCOPE ;PRINTER BUSY?
1411 004060 100401 BMI FFEED2 ;NO
1412 004062 000767 BR ERR10 ;YES-WAIT
1413 ;
1414 ;
1415 004064 112777 000106 175110 FFEED2: MOV B #'F,@LSDB ;PUT 'FF' INTO DATA BUFFER
1416 004072 105777 175102 TSTB @LSCS
1417 004076 100375 BPL .-4
1418 004100 112777 000106 175074 MOV B #'F,@LSDB
1419 004106 105777 175066 TSTB @LSCS
1420 004112 100375 BPL .-4
1421 004114 112777 000015 175060 MOV B #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 ;
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 ;
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 SCB ;YES - GO ON
1443 ;*****
1444 ;BELL CHECKED NEXT
1445 ;*****
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 SCB: SCOPE ;LOOP ON FORM FEED CHECK?
1451 004204 112777 000007 174770 BELL: MOV B #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

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1460	004224	005777	174750	ERR12:	TST	ALSCS	:ERROR?
1461	004230	100002			BPL	BELLT	:NO
1462	004232	104000			HLT	+0	:YES
1463				:			
1464				:			
1465	004234	104400		BELLT:	SCOPE		:SOUND STILL HERE
1466	004236	105777	174736		TSTB	ALSCS	:NO
1467	004242	100401			BMI	BELL1	:YES-WAIT TILL DONE
1468	004244	000767			BR	ERR12	
1469				:			
1470				:			
1471	004246	112777	000012	BELL1:	MOVB	#012,ALSD8	:ISSUE A LINE FEED
1472	004254	105777	174720		TSTB	ALSCS	:DONE BIT CLEAR?
1473	004260	100002			BPL	ERR12A	:YES
1474	004262	104002			HLT	+2	
1475				:			
1476				:			
1477	004264	104400		ERR12A:	SCOPE		:ERROR?
1478	004266	005777	174706		TST	ALSCS	:NO
1479	004272	100002			BPL	LFCHK2	:YES
1480	004274	104000			HLT	+0	
1481				:			
1482				:			
1483	004276	104400		LFCHK2:	SCOPE		:PRINTER STILL BUSY?
1484	004300	105777	174674		TSTB	ALSCS	:NO
1485	004304	100401			BMI	BELL2	:YES-WAIT
1486	004306	000767			BR	ERR12A	
1487				:			
1488				:			
1489	004310	112777	000102	BELL2:	MOVB	#'B,ALSD8	:LOAD BUFFER WITH 'BELL'
1490	004316	105777	174656		TSTB	ALSCS	
1491	004322	100375			BPL	.-4	
1492	004324	112777	000105		MOVB	#'E,ALSD8	
1493	004332	105777	174642		TSTB	ALSCS	
1494	004336	100375			BPL	.-4	
1495	004340	112777	000114		MOVB	#'L,ALSD8	:AND ISSUE A
1496	004346	105777	174626		TSTB	ALSCS	
1497	004352	100375			BPL	.-4	
1498	004354	112777	000114		MOVB	#'L,ALSD8	
1499	004362	105777	174612		TSTB	ALSCS	
1500	004366	100375			BPL	.-4	
1501	004370	112777	000015		MOVB	#15,ALSD8	:CARRIAGE RETURN
1502	004376	105777	174576		TSTB	ALSCS	:DONE BIT CLEAR?
1503	004402	100002			BPL	ERR13	:YES
1504	004404	104002			HLT	+2	:NO
1505				:			
1506				:			
1507	004406	104400		ERR13:	SCOPE		:ERROR?
1508	004410	005777	174564		TST	ALSCS	:NO
1509	004414	100002			BPL	CRCHK4	:YES
1510	004416	104000			HLT	+0	
1511				:			
1512				:			
1513	004420	104400		CRCHK4:	SCOPE		:DONE PRINTING?
1514	004422	105777	174552		TSTB	ALSCS	:YES
1515	004426	100405			BMI	SC9	

1516 004430 000767

BR ERR13 ;NO-WAIT

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004430 000767
004432 012767 004444 001736
004440 000401
004442 104400
004444 012767 000002 174546
004452 112777 000012 174522
004460 105777 174514
004464 100002
004466 104002
004470 104400
004472 005777 174502
004476 100002
004500 104000
004502 104400
004504 105777 174470
004510 100401
004512 000767
004514 005367 174500
004520 001401
004522 000753
004524 012701 007274
004530 004767 001200
004534 000403
004536 051524 030524 000065
004544 012701 004536
004550 004767 001160
004554 005067 174472

SECTION TO TEST PRINTING SPEEDS
TESTS ARE DONE USING A RELATIVE TIMING TECHNIQUE
5 AREAS ARE TESTED, NAMELY:
(A) 131 CHARACTERS/LINE
(B) 100 CHARACTERS/LINE
(C) 80 CHARACTERS/LINE
(D) 40 CHARACTERS/LINE
(E) LINE ADVANCE(SLEW RATE)

NOTE: DEPENDING ON THE VALUE IN 'COLCNT' SOME OF THE ABOVE TIMING TESTS MAY OR MAY NOT BE EXECUTED. IF SOME ARE NOT EXECUTED, HOWEVER, THE TEST NO. WILL STILL BE PRINTED OUT.

TST15: MOV #CH132, RETURN ;SET RETURN ADDRESS FOR SCOPE
BR CH132 ;IF SELECTING THIS TEST
SC9: SCOPE ;LOOP ON BELL CHECK?
CH132: MOV #2, LFNO ;SETUP NO. OF LINE FEEDS COUNTER
AGAIN: MOVB #012, ZLSDB ;ISSUE A LINE FEED
TSTB ZLSCS ;DONE BIT CLEAR?
BPL ERR14 ;YES
HLT +2 ;NO
ERR14: SCOPE
TST ZLSCS ;ERROR BIT SET?
BPL LFCHK3 ;NO
HLT +0 ;YES
LFCHK3: SCOPE
TSTB ZLSCS ;PRINTER BUSY?
BMI RELF ;NO-ISSUE ANOTHER LINE FEED
BR ERR14 ;YES
RELF: DEC LFNO ;DECREASE NO. OF LINE FEEDS BY 1
BEQ CH132A ;MORE LINE FEEDS CALLED FOR?
BR AGAIN ;YES
CH132A: MOV #TITL1, R1 ;MOVE TEST TITLE INTO A BUFFER
JSR R7, TSTTAG ;PRINT THE TITLE
BR +10
A: .ASCIZ /TST15/ ;TEST NO. TO BE PRINTED OUT
MOV #A, R1 ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
JSR R7, TSTTAG ;GO TO PRINT OUT TEST NO.
CLR TEST ;CLEAR CHARS./LINE TEST INDICATOR


```

1628
1629 005036 104400
1630 005040 005777 174134
1631 005044 100002
1632 005046 104000
1633
1634
1635 005050 104400
1636 005052 105777 174122
1637 005056 100401
1638 005060 000767
1639
1640
1641
1642 005062 022767 000000 174162
1643 005070 001416
1644 005072 022767 000001 174152
1645 005100 001443
1646 005102 022767 000002 174142
1647 005110 001470
1648 005112 000167 000236
1649
1650
1651
1652
1653
1654 005116 012767 005130 001252
1655 005124 000401
1656 005126 104400
1657 005130 000403
1658 005132 051524 030524 000066
1659 005140 012701 005132
1660 005144 004767 000564
1661 005150 012767 000001 174074
1662 005156 012767 000144 174050
1663 005164 026767 174104 174042
1664 005172 002407
1665 005174 000167 177376
1666
1667
1668
1669
1670
1671 005200 012767 005212 001170
1672 005206 000401
1673 005210 104400
1674 005212 000403
1675 005214 051524 030524 000067
1676 005222 012701 005214
1677 005226 004767 000502
1678 005232 012767 000002 174012
1679 005240 012767 000120 173766
1680 005246 026767 174022 173760
1681 005254 002407
1682 005256 000167 177314
1683

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;
ERR18: SCOPE
TST #LSCS ;ERROR?
BPL CRCHK6 ;NO
HLT +0 ;YES
;
;
CRCHK6: SCOPE
TSTB #LSCS ;PRINTER BUSY PRINTING?
BMI MORE ;NO
BR ERR18 ;YES
;
;
MORE: CMP #0,TEST
BEQ SC10 ;DO 100 CHARS/LINE
CMP #1,TEST ;DO 80 CHARS/LINE
BEQ SC11
CMP #2,TEST ;DO 40 CHARS/LINE
BEQ SC12 ;CHARS./LINE TEST ALL DONE - GO TO NEXT TEST
JMP SC13
;*****
;RELATIVE TIME OF 100 CHARS./LINE CHECKED NEXT
;*****
TST16: MOV #CH100,RETURN ;SET RETURN ADDRESS FOR SCOPE
BR CH100 ;IF SELECTING THIS TEST
SC10: SCOPE ;LOOP ON 132 CHARS./LINE TIMING CHECK?
CH100: BR .+10
B: .ASCIZ /TST16/ ;TEST NO. TO BE PRINTED OUT
MOV #B,R1 ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
JSR R7,TSTTAG ;GO TO PRINT OUT TEST NO.
MOV #1,TEST
MOV #144,WORK ;SET UP LINE FOR 100 CHARS.
CMP COLCNT,WORK ;IS 100 COLS. ACCESSIBLE?
BLT CH80 ;NO
JMP RPEAT ;GO BACK TO TIME 100 CHARS./LINE
;*****
;RELATIVE TIME OF 80 CHARS./LINE CHECKED NEXT
;*****
TST17: MOV #CH80,RETURN ;SET RETURN ADDRESS FOR SCOPE
BR CH80 ;IF SELECTING THIS TEST
SC11: SCOPE ;LOOP ON 100 CHARS./LINE TIMING CHECK?
CH80: BR .+10
C: .ASCIZ /TST17/ ;TEST NO. TO BE PRINTED OUT
MOV #C,R1 ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
JSR R7,TSTTAG ;GO TO PRINT OUT TEST NO.
MOV #2,TEST
MOV #120,WORK ;SET UP LINE FOR 80 CHARS.
CMP COLCNT,WORK ;IS 80 COLS. ACCESSIBLE?
BLT CH40 ;NO
JMP RPEAT ;GO BACK TO TIME 80 CHARS./LINE
;*****

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1684
1685
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 ;
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 REPEAT ;GO BACK TO TIME 40 CHARS./LINE
1700
1701
1702
1703
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 ;
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)+,ALSDB ;NO-LOAD CHAR.
1718 005412 105777 173562 TSTB ALSCS ;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,ALSDB ;ISSUE A CARRIAGE RETURN
1722 005430 105777 173544 TSTB ALSCS ;WAIT FOR EXECUTION
1723 005434 100375 BPL .-4
1724 005436 112777 000012 173536 MOVB #12,ALSDB ;ISSUE A LINE FEED-80MS
1725 005444 004467 000364 JSR R4,WOFLAG ;KEEP A RELATIVE TIME COUNT
1726 005450 112777 000012 173524 MOVB #12,ALSDB ;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,ALSDB ;ISSUE A LINE FEED
1730 005474 105777 173500 TSTB ALSCS ;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 ALSCS ;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)+,ALSDB ;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 173430 CONT: JSR      R3, OCTDEC ;DECODE TIME COUNT
1742 005544 112777 000012          MOVB   #12, ALSDB ;ISSUE A LINE FEED TO PRINT RESULT
1743 005552 105777 173422          TSTB   ALSCS   ;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          ;
1749 005564 005777 173410 ERR19: TST    SCOPE ;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          ;
1755 005576 105777 173376 CRCHK7: TSTB  SCOPE ;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, ALSDB ;MOVE DIGIT INTO PRINTER BUFFER
1782 005710 105777 173264          TSTB  ALSCS   ;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          ;
1788 005722 000000          CNVCTR: 0 ;CONVERSION COUNTER
1789 005724 000000          DIGIT: 0 ;CONVERTED ANSWER/DIGIT
1790 005726 000144          TENPWR: 0 ;TENS POWER FOR CONVERSION
1791 005730 000012          ADTENP: 100. ;TEN TO THE 2 POWER
1792 005732 000001          ;10. ;TEN TO THE 1 POWER
1793 ;1. ;TEN TO THE 0 POWER
1794 *****
1795 ;SUBROUTINE TO PRINT OUT TEST NOS. & TEST TITLES

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1796
1797
1798 005734 112777 000012 173240 TSTTAG: MOVB #12,ALSDB ;ISSUE A LINE FEED
1799 005742 105777 173232 TSTB ALSCS ;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)+,ALSDB ;OTHERWISE, LOAD INTO PRINTER BUFFER
1804 005760 105777 173214 TSTB ALSCS ;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,ALSDB ;ISSUE A LINE FEED TO PRINT TEST NO.
1808 005776 105777 173176 TSTB ALSCS ;DONE BIT CLEAR?
1809 006002 100002 BPL ERR20 ;YES
1810 006004 104002 HLT +2 ;NO
1811
1812
1813 006006 104400
1814 006010 005777 173164 ERR20: TST ALSCS ;ERROR BIT SET?
1815 006014 100002 BPL TAG3 ;NO
1816 006016 104000 HLT +0 ;YES
1817
1818
1819 006020 104400
1820 006022 105777 173152 TAG3: TSTB ALSCS ;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
1829
1830
1831 006034 005067 173200 NOFLAG: CLR CYCLE ;CLEAR 1000X LOOP COUNTER
1832 006040 005267 173164 SLEWT: INC TIMER ;INCREMENT THE TIME COUNT
1833 006044 105777 173130 TSTB ALSCS ;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 NOFLAG ;YES - GO BACK TO INCREMENT TIME COUNT
1838
1839 006066 105777 173106 TSTB ALSCS ;AND TEST THE DONE BIT
1840 006072 100762 BMI SLEWT ;NO - IS PRINTER DONE?
1841 006074 005777 173100 TST ALSCS ;YES - INCREMENT TIME COUNT
1842 006100 100364 BPL CYCLE1 ;DID ANY ERROR OCCUR?
1843 006102 104000 HLT +0 ;NO - KEEP WITHIN 1000X LOOP COUNT
1844 006104 000204 SECLF: RTS R4 ;YES - AN ERROR OCCURRED
1845
1846
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1850
1851

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1852
1853
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1856 006106 016767 173154 173120
1857 006114 005267 173114
1858 006120 005767 173110
1859 006124 001405
1860 006126 105777 173046
1861 006132 100401
1862 006134 000767
1863 006136 000204
1864 006140 104005
1865 006142 000204
1866
1867
1868
1869
1870
1871 006144 011600
1872 006146 062716 000002
1873
1874 006152 011000
1875 006154 112777 000015 173024
1876 006162 105777 173022
1877 006166 100375
1878 006170 112777 000012 173010
1879 006176 105777 173006
1880 006202 100375
1881 006204 112067 173026
1882 006210 122767 000000 173020
1883 006216 001007
1884 006220 012777 177777 172760
1885 006226 105777 172756
1886 006232 100375
1887 006234 000002
1888 006236 116777 172774 172742
1889 006244 105777 172740
1890 006250 100375
1891 006252 000754
1892
1893
1894
1895
1896
1897 006254 005767 173002
1898 006260 001420
1899 006262 005767 172776
1900 006266 001015
1901 006270 021627 003102
1902
1903 006274 101012
1904 006276 005367 172754
1905
1906 006302 016700 172750
1907 006306 005767 172744

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;MESSAGE WILL BE TYPED OUT ON THE TTY INDICATING
;A PROBLEM E.G. DONE BIT NEVER SET
;*****
WAITON: MOV     DELAY,WORK      ;SET A WAIT VALUE OF X'TIMES THRU LOOP
INCR1:  INC     WORK            ;INCREMENT THE PASS THRU LOOP
        TST     WORK            ;DID WE LOOP X'TIMES WITHOUT DONE RESETTING?
        BEQ     ALMOST          ;YES
        TSTB    @LSCS           ;NO - STILL OK!
        BMI     FINI            ;RETURN IF DONE BIT SET
        BR      INCR1           ;IF NOT READY INCREMENT LOOP
FINI:   RTS     R4              ;OK - RETURN WHERE LEFT OFF
ALMOST: HLT     +5              ;NOT QUITE! TOOK TOO LONG
        RTS     R4              ;RETURN
;*****
;SUBROUTINE TO OUTPUT ASCII MESSAGES ON TELETYPE
;*****
TYP:    MOV     @R6,R0          ;GET MESSAGE ADDRESS
        ADD     #2,@R6          ;SET UP EXIT LOCATION
        MOV     @R0,R0          ;I.E. - LOCATION AFTER MESSAGE ADDRESS
        MOVB   #15,@TPB        ;SET UP FOR 1ST CHAR. OF MESSAGE
        TSTB   @TPS            ;ISSUE A CARRIAGE RETURN
        BPL    .-4             ;WAIT FOR EXECUTION
        MOVB   #12,@TPB        ;ISSUE A LINE FEED
        TSTB   @TPS            ;WAIT FOR EXECUTION
        BPL    .-4
TYPA:   MOVB   (R0)+,TYPDAT     ;GET A CHARACTER
        CMPB   #0,TYPDAT       ;IS IT A 0?
        BNE   TYPB             ;NO - GO AND PRINT IT
        MOV    #-1,@TPB        ;ISSUE A -1 FOR DOUBLE BUFFERED UART
        TSTB   @TPS            ;WAIT FOR EXECUTION
        BPL    .-4
        RTI                    ;YES - RETURN FROM EMT CALL
TYPB:   MOVB   TYPDAT,@TPB     ;MOVE CHARACTER INTO TTY BUFFER
        TSTB   @TPS            ;WAIT FOR EXECUTION
        BPL    .-4
        BR     TYPA           ;GET ANOTHER CHARACTER
;*****
;SCOPE ROUTINE TO LOOP ON TEST
;*****
SCOPEC: TST     ICOUNT          ;DO WE WANT ITERATIONS?
        BEQ     SCOPEF         ;NO - SEE IF WE WANT TO LOOP!
        TST     ERRIND         ;YES - SEE IF ERROR OCCURRED PREVIOUSLY
        BNE     SCOPEF         ;IT DID! DON'T ITERATE
        CMP     (R6),#CARRET    ;NO ERROR OCCURRED - SEE IF WE WANT TO
        BHI     SCOPEF         ;ITERATE 1X OR X'TIMES
        DEC     ICNT           ;ITERATE 1X
        BEQ     SCOPEF         ;BEGIN ITERATING X'TIMES OR TILL
        MOV     ICNT,R0        ;AN ERROR OCCURS
        TST     ICNT           ;FLASH SOME LIGHTS
        BEQ     SCOPEF         ;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   ERRORM      ;TYPE THE ERROR MESSAGE
1946 006446 010252          ERRORM
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:  MOV     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          MOV    R2,-(R1)     ;SAVE THE CONVERTED DIGIT
1961
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)+,ATPB   ;MOVE CONVERTED PC INTO TELETYPE BUFFER
1974                                     ;STARTING WITH THE LEFTMOST DIGIT
1975 006562 105777 172422   TSTB     ATPS        ;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,ATPB   ;ISSUE A CARRIAGE RETURN
1981 006606 105777 172376   TSTB     ATPS        ;WAIT FOR EXECUTION
1982 006612 100375          BPL      .-4
1983 006614 112777 000012 172364   MOVB     #12,ATPB   ;ISSUE A LINE FEED
1984 006622 105777 172362   TSTB     ATPS        ;WAIT FOR EXECUTION
1985 006626 100375          BPL      .-4
1986 006630 012777 177777 172350   MOV      #-1,ATPB   ;ISSUE A -1 FOR DOUBLE BUFFERED UART
1987 006636 105777 172346   TSTB     ATPS        ;WAIT FOR EXECUTION
1988 006642 100375          BPL      .-4
1989 006644 000204          RTS      R4          ;RETURN
1990 006646 010567 000054          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,ATPB ;MOVE CHAR. INTO TELETYPE BUFFER
2000 006716 105777 172266   TSTB     ATPS        ;WAIT FOR EXECUTION
2001 006722 100375          BPL      .-4
2002 006724 000762          BR       MSGA       ;LOOK AT NEXT CHARACTER
2003
2004
2005 006726 000000          ;ALTADD: 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
2015 006752 042523 042514 052103  MES2:   .EVEN
2016 006760 050040 044522 052116   .ASCIZ  /SELECT PRINTER ON LINE/
2017 006766 051105 047440 020116
2018 006774 044514 042516      000
2019
.EVEN

```


2020	007002	044510	020124	047503
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				
2028	007052	050117	047105	043040
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				
2040	007150	042522	047515	042526
2041	007156	050040	050101	051105
2042	007164	000		
2043		007166		
2044	007166	052520	020124	040520
2045	007174	042520	020122	040502
2046	007202	045503	000	
2047		007206		
2048	007206	047111	042523	052122
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		
2058				
2059				
2060				
2061				
2062				
2063	007274	042522	040514	044524
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		
2073	007356	042522	040514	044524
2074	007364	042526	052040	046511
2075	007372	047111	020107	020075

MES3: .ASCIZ /HIT CONTINUE SWITCH TO RESUME OPERATION/

MES4: .EVEN
.ASCIZ /OPEN FRONT PANEL & HIT TOP OF FORM - PAPER SHOULD NOT ADVANCE/

MES5: .EVEN
.ASCIZ /REMOVE PAPER/

MES6: .EVEN
.ASCIZ /PUT PAPER BACK/

MES7: .EVEN
.ASCIZ /INSERT CODE FOR DESIRED CHARACTER IN SWITCH REGISTER/

.EVEN
:*****
:CENTRONICS TEST TITLES
:*****
TITL1: .ASCIZ /RELATIVE TIMING TESTS FOR DIFFERENT LINE LENGTHS/

TITL2: .EVEN
.ASCIZ /RELATIVE TIMING = /

2076	007400	000		
2077		007402		
2078	007402	042522	040514	044524
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		
2085	007444	040504	040524	052040
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				
2092	007510	050123	041501	047111
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		
2105	007620	044103	051101	041501
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		
2115	007706	047522	040524	044524
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		
2125	007770	042524	052123	052040
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

TITL3: .EVEN .ASCIZ /RELATIVE TIMING TEST FOR SLEWING/

TITL4: .EVEN .ASCIZ /DATA TRANSFER LINES FUNCTIONAL TEST/

TITL5: .EVEN .ASCIZ /SPACING, CARRIAGE RETURN, AND LINE FEED EXERCISE TEST (WITH OVERPRINT)/

TITL6: .EVEN .ASCIZ /CHARACTER GENERATION TEST - REGULAR (WITH OVERPRINT)/

TITL7: .EVEN .ASCIZ /ROTATING COUNTERCLOCKWISE PATTERN ENDURANCE TEST/

TITL8: .EVEN .ASCIZ /TEST THAT LOWER CASE ALPHABET CODES PRINT OUT AS UPPER CASE/

2188	010420	051120	047111	042524	
2189	010426	020122	042514	042526	
2190	010434	000114			
2191					
2192	010436	050040	044522	052116	MSG4: .EVEN
2193	010444	051105	042040	042111	.ASCIZ / PRINTER DIDN'T INTERRUPT WHEN PROCESSOR BELOW PRINTER LEVEL/
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			
2204	010534	042040	047117	020105	MSG5: .EVEN
2205	010542	044502	020124	042516	.ASCIZ / DONE BIT NEVER SET/
2206	010550	042526	020122	042523	
2207	010556	000124			
2208					
2209	010560	051440	046105	041505	MSG6: .EVEN
2210	010566	020124	047503	042504	.ASCIZ / SELECT CODE NOT RECOGNIZED/
2211	010574	047040	052117	051040	
2212	010602	041505	043517	044516	
2213	010610	042532	000104		
2214					
2215	010614	042040	051505	046105	MSG7: .EVEN
2216	010622	041505	020124	047503	.ASCIZ / DESELECT CODE NOT RECOGNIZED - IF MODEL DOESN'T HAVE FEATURE-OK/
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			
2227	010716	042440	051122	051117	MSG10: .EVEN
2228	010724	041040	052111	047040	.ASCIZ / ERROR BIT NOT SET/
2229	010732	052117	051440	052105	
2230	010740	000			
2231		010742			
2232	010742	040440	042104	042522	MSG11: .EVEN
2233	010750	051523	043040	044501	.ASCIZ / ADDRESS FAILURE! - 'ADDERR' CONTAINS PC OF ERROR/
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					
2242	011024	044440	020105	044502	MSG12: .EVEN
2243	011032	020124	047516	020124	.ASCIZ / IE BIT NOT SET/


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2244 011040 042523 000124
2245
2246 011044 044440 020105 044502
2247 011052 020124 047516 020124
2248 011060 046103 040505 000122
2249
2250 011066 044440 020105 044502
2251 011074 020124 042523 020124
2252 011102 020055 044123 052517
2253 011110 042114 023516 020124
2254 011116 042502 000
2255
2256 011122 046440 042117 020105
2257 011130 044502 020124 041050
2258 011137 052111 024460 051440
2259 011144 052105 026440 051440
2260 011152 047510 046125 047104
2261 011160 052047 041040 000105
2262
2263 011166 050040 044522 052116
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
2273 011254 042040 047117 020105
2274 011262 044502 020124 042516
2275 011270 042526 020122 046103
2276 011276 040505 042522 000104
2277
2278 011304 050040 044522 052116
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
2291
2292
2293
2294
2295
2296
2297
2298 011414 012767 011426 174754
2299 011422 000401

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MSG13: .EVEN .ASCIZ / IE BIT NOT CLEAR/

MSG14: .EVEN .ASCIZ / IE BIT SET - SHOULDN'T BE/

MSG15: .EVEN .ASCIZ / MODE BIT (BIT0) SET - SHOULDN'T BE/

MSG16: .EVEN .ASCIZ / PRINTER DIDN'T INTERRUPT - IF NO DESELECT FEATURE-OK/

MSG17: .EVEN .ASCIZ / DONE BIT NEVER CLEARED/

MSG20: .EVEN .ASCIZ / PRINTER INTERRUPTED WITH PROCESSOR BELOW PRINTER LEVEL & IE BIT CLEAR/

.EVEN

```

:*****
:THIS SECTION WILL CHECK THAT THE DATA
:TRANSFER LINES ARE FUNCTIONING PROPERLY
:*****
TST2: MOV #DATAL,RETURN ;SET RETURN ADDRESS FOR SCOPE
      BR DATAL ;IF SELECTING THIS TEST

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2356 ;EACH LINE OF THE WEDGE IS INITIALLY SPACED OVER WITH
2357 ;A '/' APPEARING IN THE LAST APPROPRIATE COLUMN POSITION.
2358 ;THEN, A LINE OF E'S IS PRINTED OVER THE SPACES (2X) UP
2359 ;TO THE SLASH. SPACING, OVER PRINTING, CARRIAGE RETURNING,
2360 ;AND LINE FEEDING ARE RIGOROUSLY CHECKED
2361 ;*****
2362 *****
2363 011660 012767 011672 174510 TST23: MOV #WEDGE,RETURN ;SET RETURN ADDRESS FOR SCOPE
2364 011666 000401 BR WEDGE ;IF SELECTING THIS TEST
2365 011670 104400 SC15: SCOPE ;LOOP ON DATA LINES CHECK?
2366 011672 000403 WEDGE: BR ;
2367 011674 051524 031124 000063 G: .ASCIZ /TST23/ ;TEST NO. TO BE PRINTED OUT
2368 011702 012701 011674 MOV #G,R1 ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
2369 011706 004767 174022 JSR R7,TSTTAG ;GO TO PRINT OUT TEST NO.
2370 011712 012701 007510 MOV #TITL5,R1 ;MOVE TEST TITLE INTO A BUFFER
2371 011716 004767 174012 JSR R7,TSTTAG ;PRINT TEST TITLE
2372 011722 016767 167346 167304 MOV COLCNT,WORK ;SET UP 1ST LINE SPACING
2373 011730 005367 167300 DEC WORK ;NEED 1 LESS FOR THIS TEST
2374 011734 016767 167274 167270 MOV WORK,WAREA ;MOVE CURRENT SPACING INTO A WORK AREA
2375 011742 016767 167266 167274 MOV WORK,SAVEP ;MOVE CURRENT SPACING INTO A SAVED AREA
2376 ;FOR SUBSEQUENT LINE USAGE
2377 011750 016767 167256 167256 WEDGE1: MOV WAREA,WORK ;MOVE NEW SPACING VALUE BACK FOR USE
2378 011756 022767 000000 167246 CMP #0,WAREA ;ARE WE ABOUT TO PRINT THE LAST LINE OF THE WEDGE?
2379 011764 001534 BEQ LASTIN ;YES - SET UP FOR PRINTING A '/'
2380 011766 112777 000040 167206 WEDGE2: MOVB #40,ALSDB ;NO - MOVE A SPACE INTO PRINTER BUFFER
2381 011774 105777 167200 TSTB ALSCS ;WAIT FOR LOADING
2382 012000 100375 BPL .-4 ;
2383 012002 005367 167226 DEC WORK ;INCREMENT SPACING COUNT
2384 012006 005767 167222 TST WORK ;DO WE HAVE NO. OF SPACES DESIRED?
2385 012012 001401 BEQ WEDGE3 ;YES - GO TO LOAD A '/'
2386 012014 000764 BR WEDGE2 ;NO - LOAD ANOTHER SPACE
2387 012016 005367 167210 WEDGE3: DEC WAREA ;DECREASE LINE SPACING BY 1
2388 012022 112777 000057 167152 MOVB #057,ALSDB ;MOVE A SLASH IN AS LAST
2389 012030 105777 167144 TSTB ALSCS ;CHARACTER ON A LINE
2390 012034 100375 BPL .-4 ;AND WAIT FOR IT TO BE LOADED
2391 012036 112777 000015 167136 MOVB #15,ALSDB ;ISSUE A CARRIAGE RETURN TO PRINT SPACES & '/'
2392 012044 105777 167130 TSTB ALSCS ;IS DONE BIT CLEAR?
2393 012050 100002 BPL ERR23 ;YES
2394 012052 104002 HLT +2 ;NO
2395 ;
2396 ;
2397 012054 104400 ;
2398 012056 005777 167116 ERR23: TST ALSCS ;ERROR BIT SET?
2399 012062 100002 BPL CRCHK8 ;NO
2400 012064 104000 HLT +0 ;YES
2401 ;
2402 ;
2403 012066 104400 ;
2404 012070 105777 167104 CRCHK8: TSTB ALSCS ;PRINTER STILL BUSY?
2405 012074 100401 BHI WEDGE4 ;NO-GO ON TO E'S PRINTING
2406 012076 000767 BR ERR23 ;YES-WAIT
2407 ;
2408 ;
2409 012100 012767 177777 167120 WEDGE4: MOV #-1,CNTR ;SET LINE REPEAT COUNTER
2410 012106 016767 167132 167120 MOV SAVESP,WORK ;SET LINE LENGTH FOR E'S
2411 ;=NO. OF SPACES JUST EXECUTED

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2412 012114 112777 000105 167060 WEDGES: MOVB #105,ALSDB ;LOAD AN 'E' INTO PRINTER BUFFER
2413 012122 105777 167052 TSTB ALSCS ;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 WEDGES ;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,ALSDB ;YES - ISSUE A CARRIAGE RETURN
2422 012160 105777 167014 WEDG6A: TSTB ALSCS ;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,ALSDB ;ISSUE A LINE FEED
2428 012202 000766 BR WEDG6A
2429
2430 012204 005777 166770 ERR24: TST ALSCS ;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 ALSCS ;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 WEDGES ;GO BACK TO OVERPRINT E'S
2448
2449
2450
2451
2452 012256 112777 000057 166716 LASTIN: MOVB #' / ALSDB ;LAST LINE OF WEDGE=/
2453 012264 105777 166710 TSTB ALSCS ;WAIT FOR LOADING
2454 012270 100375 BPL .-4
2455 012272 112777 000012 166702 MOVB #12,ALSDB ;ISSUE A LINE FEED
2456 012300 105777 166674 TSTB ALSCS ;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 ALSCS ;ERROR BIT SET?
2463 012316 100002 BPL LFCHK9 ;NO
2464 012320 104000 HLT +0 ;YES
2465
2466
2467 012322 104400 SCOPE

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2468 012324 105777 166650
2469 012330 100405
2470 012332 000767
2471
2472
2473
2474
2475
2476
2477
2478 012334 012767 012346 174034
2479 012342 000401
2480 012344 104400
2481
2482
2483
2484
2485
2486 012346 000403
2487 012350 051524 031124 000064
2488 012356 012701 012350
2489 012362 004767 173346
2490 012366 012701 007620
2491 012372 004767 173336
2492 012376 012767 177777 166636
2493 012404 012767 000040 166612
2494 012412 005067 166610
2495 012416 016767 166652 166606
2496 012424 016767 166602 166602
2497 012432 012767 177600 166562
2498 012440 005767 166576
2499 012444 100403
2500 012446 112777 000016 166526
2501 012454 105777 166520
2502 012460 100375
2503 012462 116777 166536 166512
2504 012470 005367 166540
2505 012474 005767 166534
2506 012500 001401
2507 012502 000764
2508 012504 005267 166512
2509
2510 012510 005767 166506
2511 012514 100404
2512 012516 005767 166520
2513 012522 100127
2514
2515
2516 012524 000457
2517 012526 022767 000001 166472
2518 012534 001443
2519 012536 112777 000015 166436
2520 012544 105777 166430
2521 012550 100002
2522 012552 104002
2523

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LFCHK9: TSTB 2LSCS ;PRINTER STILL BUSY?
          BMI SC16 ;NO-PROCEED TO NEXT TEST - WEDGE DONE
          BR ERR25 ;YES-WAIT
;*****
;SECTION TO PRINT A BLOCK PATTERN CONSISTING
;OF A FULL LINE OF EACH OF THE 64 PRINTABLE
;CHARACTERS. EACH LINE IS PRINTED 2X FOR BOTH THE
;REGULAR AND ELONGATED CHARACTER OPTIONS.
;*****
TST24: MOV #BP1,RETURN ;SET RETURN ADDRESS FOR SCOPE
        BR BP1 ;IF SELECTING THIS TEST
SC16: SCOPE ;LOOP ON WEDGE PATTERN?
;*****
;REGULAR BLOCK PATTERN EXECUTED NEXT WITH OVERPRINT
;*****
BP1: BR .+10
H: .ASCIZ /TST24/ ;TEST NO. TO BE PRINTED OUT
    MOV #H,R1 ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
    JSR R7,TSTTAG ;GO TO PRINT OUT TEST NO.
    MOV #TITL6,R1 ;MOVE TEST TITLE INTO A BUFFER
    JSR R7,TSTTAG ;PRINT TEST TITLE
    MOV #-1,ELONG ;ELONG=-1 INDICATING REGULAR CHARS.
    MOV #40,CHRGEN ;SET 1ST PRINTABLE CHAR. = SPACE
    CLR CNTR ;CLEAR LINE REPEAT COUNTER
    MOV COLCNT,WARA ;SET LINE LENGTH
    MOV WAREA,WORK ;PUT LINE LENGTH INTO A WORK AREA
    BP1CA: MOV #-128,CHARS ;SET UP NO. OF CHARS. (INCLUDES OVERPRINT)
    BP1D: TST ELONG ;DO WE WANT ELONGATED CHARS.?
          BMI BP1DA ;NO
          MOV #16,2LSDB ;YES - ISSUE ELONGATION CODE
          BPL -4 ;WAIT FOR LOADING
          MOV #CHRGEN,2LSDB ;LOAD CHAR. INTO BUFFER
          DEC WORK ;DECREASE LINE LENGTH
          TST WORK ;IS LINE FULL?
          BEQ BP1E ;YES-PRINT IT
          BR BP1DA ;LOAD ANOTHER CHAR.
          INC CHARS ;DECREASE NO. OF CHARS. LEFT
          TST CHARS ;(INCLUDES OVERPRINT) CHARS.=2/LINE
          BMI BP1EA ;HAVE WE FINISHED 1ST BLOCK PATTERN?
          TST ELONG ;YES - IS ELONGATION BLOCK PATTERN NEXT?
          BPL SC18 ;YES-SET UP FOR ELONGATED
          ;BLOCK PATTERN OF EACH
          ;OF THE 64 PRINTABLE CHARS.
          BR SC17
          CMP #1,CNTR ;HAVE WE OVERPRINTED YET?
          BEQ TIMER2 ;YES - SET UP FOR NEXT LINE OF BLOCK PATTERN
          MOV #15,2LSDB ;NO - ISSUE A CARRIAGE RETURN TO PRINT
          TSTB 2LSCS ;DONE BIT CLEAR?
          BPL ERR27 ;YES
          HLT +2 ;NO

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012554 104400
012556 005777 166416
012562 100002
012564 104000

012566 104400
012570 105777 166404
012574 100401
012576 000767

012600 005767 166422
012604 001401
012606 000406
012610 005267 166412
012614 016767 166412 166412
012622 000706

012624 005067 166376
012630 005267 166370
012634 016767 166372 166372
012642 000676

012644 112777 000012 166330
012652 000734

012654 012767 012666 173514
012662 000401
012664 104400

012666 112777 000012 166306
012674 105777 166300
012700 100375
012702 000403
012704 051524 031124 000065
012712 012701 012704
012716 004767 173012
012722 012701 010064
012726 004767 173002
012732 005267 166304
012736 016767 166332 166266
012744 006267 166262
012750 005067 166252
012754 012767 000040 166242
012762 016767 166244 166244

;
ERR27: SCOPE
TST 2LSCS
BPL LFCK11
HLT +0
;
;
LFCK11: SCOPE
TSTB 2LSCS
BMI BPIG
BR ERR27
;
BPIG: TST CNTR
BEQ BPIH
BR BPIJ
BPIH: INC CNTR
MOV WAREA,WORK
BR BPID
;
BPIJ: CLR CNTR
INC CHRGEN
MOV WAREA,WORK
BR BPID
;
TIMER2: MOVB #012,2LSDB
BR BPIF
;
TST25: MOV #BP2,RETURN
BR BP2
SC17: SCOPE

ELONGATED BLOCK PATTERN EXECUTED NEXT WITH OVERPRINT

BP2: MOVB #12,2LSDB
TSTB 2LSCS
BPL -4
BR +10
I: .ASCIZ /TST25/
MOV #I,R1
JSR R7,TSTTAG
MOV #TITL10,R1
JSR R7,TSTTAG
INC ELONG
MOV COLCNT,WAREA
ASR WAREA
CLR CNTR
MOV #40,CHRGEN
MOV WAREA,WORK

:ERROR BIT SET?
:NO
:YES

:PRINTER STILL BUSY?
:NO-CONTINUE
:YES-WAIT

:1ST OR 2ND TIME PRINTING?
:1ST TIME
:2ND TIME-SET UP FOR NEXT LINE
:2ND TIME PRINT COUNTER
:RESET LINE LENGTH
:GO BACK TO PRINT AGAIN

:RESET LINE REPEAT COUNTER
:GET NEXT CHAR.
:RESET LINE LENGTH
:GO BACK TO PRINT NEXT LINE

:ISSUE A LINE FEED FOR 2ND PRINT
:GO BACK TO WAIT FOR PRINTING

:SET RETURN ADDRESS FOR SCOPE
:IF SELECTING THIS TEST
:LOOP ON REGULAR BLOCK PATTERN?

ELONGATED BLOCK PATTERN EXECUTED NEXT WITH OVERPRINT

:ISSUE A LINE FEED
:WAIT FOR EXECUTION

:TEST NO. TO BE PRINTED OUT
:MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
:GO TO PRINT OUT TEST NO.
:MOVE TEST TITLE INTO A BUFFER
:GO TO PRINT IT
:ELONG=0 INDICATING ELONGATION
:RESET NEW LINE LENGTH
:NEED HALVE THE VALUE FOR THIS TEST
:CLEAR LINE REPEAT COUNTER
:SET 1ST PRINTABLE CHAR. = SPACE
:PUT LINE LENGTH INTO A WORK AREA


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2580 012770 000620          BR      BP1CA          ;GO BACK TO EXECUTE ELONGATED BLOCK PATTERN
2581          ;*****
2582          ;SECTION TO PRINT A COUNTER CLOCKWISE ROTATING PATTERN
2583          ;THIS TEST IS DESIGNED TO PICK UP SPURIOUS PRINTING
2584          ;AND CHECK PRINTER ENDURANCE
2585          ;*****
2586          ;*****
2587          ;*****
2588 012772 012767 013004 173376 TST26: MOV      #ROTOR,RETURN ;SET RETURN ADDRESS FOR SCOPE
2589 013000 000401          BR      ROTOR          ;IF SELECTING THIS TEST
2590 013002 104400          SC18:  SCOPE          ;LOOP ON ELONGATED BLOCK PATTERN?
2591          ;*****
2592          ;*****
2593          ;REGULAR ROTATING PATTERN EXECUTED NEXT
2594          ;*****
2595          ;*****
2596 013004 112777 000012 166170 ROTOR:  MOVB    #12,ALSDB ;ISSUE A LINE FEED
2597 013012 105777 166162          TSTB    ALSCS          ;WAIT FOR EXECUTION
2598 013016 100375          BPL     .-4
2599 013020 000403          BR      .+10
2600 013022 051524 031124 000066 J:      .ASCIZ  /TST26/ ;TEST NO. TO BE PRINTED OUT
2601 013030 012701 013022          MOV     #J,R1          ;MOVE ADDRESS OF TEST NO. PRINTOUT TO R1
2602 013034 004767 172674          JSR    R7,TSTTAG      ;GO TO PRINT OUT TEST NO.
2603 013040 012701 007706          MOV     #TITL7,R1     ;MOVE TEST TITLE INTO A BUFFER
2604 013044 004767 172664          JSR    R7,TSTTAG      ;PRINT TEST TITLE
2605 013050 012767 000140 166166          MOV     #140,SAVESP   ;LINE STANDOFF
2606 013056 005067 166166          CLR    CHARNO         ;CLEAR SECONDARY PRINTABLE CHARS. LENGTH
2607 013062 012767 177777 166152          MOV     #-1,ELONG     ;ELONG=-1 INDICATING REGULAR
2608 013070 012767 177677 166150          MOV     #-65.,LINCNT ;CHARACTER PRINT
2609 013076 012767 000040 166120          MOV     #40,CHGEN     ;SET 1ST PRINTABLE CHAR. = SPACE
2610 013104 016767 166164 166120          MOV     COLCNT,WAREA ;SET UP LINE LENGTH
2611 013112 016767 166114 166114          MOV     WAREA,WORK    ;MOVE LINE LENGTH INTO A WORK AREA
2612 013120 012767 177700 166074          MOV     #-64.,CHARS   ;SET UP NO. OF PRINTABLE CHARS.
2613 013126 005767 166110          ROTR3A: TST    ELONG    ;REGULAR OR ELONGATED PATTERN?
2614 013132 100406          BMI    ROTORS        ;REGULAR
2615 013134 112777 000016 166040          MOVB   #16,ALSDB     ;ELONGATED - ISSUE ELONGATION CODE
2616 013142 105777 166032          TSTB   ALSCS        ;WAIT FOR LOADING!
2617 013146 100375          BPL    .-4
2618 013150 116777 166050 166024 ROTORS: MOVB   CHGEN,ALSDB ;LOAD CHAR. INTO BUFFER
2619 013156 105777 166016          TSTB   ALSCS        ;WAIT FOR EXECUTION
2620 013162 100375          BPL    .-4
2621 013164 022767 000001 166042          CMP    #1,WORK       ;END OF LINE?
2622 013172 001424          BEQ    ROTOR7        ;YES - GO TO PRINT IT
2623 013174 022767 177777 166020          CMP    #-1,CHARS     ;NO-START CHARS. OVER?
2624 013202 001407          BEQ    ROTOR6        ;YES
2625 013204 005367 166024          DEC    WORK          ;NO-DECREASE LINE BY 1 CHAR.
2626 013210 005267 166006          INC    CHARS        ;DECREASE NO. OF AVAILABLE
2627          ;CHARACTERS BY 1
2628 013214 005267 166004          INC    CHGEN        ;GET NEXT AVAILABLE CHAR.
2629 013220 000753          BR     ROTORS        ;GO BACK TO LOAD
2630          ;
2631          ;
2632 013222 012767 177700 165772 ROTOR6: MOV    #-64.,CHARS ;RESET NO. OF PRINTABLE CHARS.
2633 013230 012767 000040 165766          MOV    #40,CHGEN     ;START WITH SPACE AGAIN
2634 013236 005367 165772          DEC    WORK          ;DECREASE LINE LENGTH
2635 013242 000731          BR     ROTR3A        ;GO BACK TO KEEP LOADING

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2638 013244 112777 000012 165730 ROTOR7: MOVB #12,ALSDB ;ISSUE A LINE FEED TO PRINT
2639 013252 105777 165722 TSTB ALSCS ;DONE BIT CLEAR
2640 013256 100002 BPL ERR29 ;YES
2641 013260 104002 HLT +2 ;NO
2642
2643
2644 013262 104400
2645 013264 005777 165710 ERR29: SCOPE TST ALSCS ;ERROR BIT SET?
2646 013270 100002 BPL LFCK13 ;NO
2647 013272 104000 HLT +0 ;YES
2648
2649
2650 013274 104400
2651 013276 105777 165676 LFCK13: SCOPE TSTB ALSCS ;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
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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 ;ELONGATED ROTATING PATTERN EXECUTED NEXT
2679 ;*****
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

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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      CHARN0         ;CLEAR SECONDARY PRINTABLE CHARS. LENGTH
2696 013502 012767 000040 165514      MOV      #40, CHGEN     ;SET 1ST PRINTABLE CHAR. = SPACE
2697 013510 000606      BR      ROTR3A         ;GO BACK TO EXECUTE ELONGATED ROTATING PATTERN
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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
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, CHGEN   ;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: MOVVB   CHGEN, ALSDB ;MOVE CHAR. INTO PRINTER BUFFER
2719 013610 105777 165364      TSTB   ALSCS          ;WAIT FOR EXECUTION
2720 013614 100375      BPL    -4
2721 013616 112777 000040 165356      UCASE5: MOVVB   #40, ALSDB ;MOVE A SPACE INTO PRINTER BUFFER
2722 013624 105777 165350      TSTB   ALSCS          ;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    CHGEN          ;NO - GET NEXT LETTER OF ALPHABET
2728 013652 000753      BR     UCASE4        ;GO TO LOAD IT INTO BUFFER
2729 013654 112777 000012 165320      UCASE6: MOVVB   #12, ALSDB ;ISSUE A LINE FEED TO PRINT LINE
2730
2731 013662 105777 165312      TSTB   ALSCS          ;DONE BIT CLEAR?
2732 013666 100002      BPL    ERR32         ;YES
2733 013670 104002      HLT    +2            ;NO
2734
2735
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2737 013672 104400      ERR32: SCOPE         ;DID ANY ERROR OCCUR?
2738 013674 005777 165300      TST    ALSCS         ;NO
2739 013700 100002      BPL    LFCK16        ;YES
2740 013702 104000      HLT    +0
2741
2742
2743 013704 104400      LFCK16: SCOPE        ;IS PRINTER STILL BUSY?
2744 013706 105777 165266      TSTB   ALSCS         ;NO - PROCEED TESTING
2745 013712 100401      BMI    UCASE7        ;YES - WAIT
2746 013714 000767      BR     ERR32
2747

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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 OPPRTO ;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 OPPRTO1 ;REGULAR
2799 014026 012767 177676 165200 MOV #-66, WORK ;ELONGATED
2800 014034 112777 000016 165140 MOVB #16, ZLSD8 ;ISSUE ELONGATION CODE
2801 014042 105777 TSTB ZLSD5 ;WAIT FOR LOADING
2802 014046 100375 BPL -4
2803 014050 000403 BR OPPRTO2 ;START LOADING THE LINE

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; (USED WHEN SW<09> SET TO A 1)

2860			
2861	014270	001346	TST0
2862	014272	001700	TST1
2863	014274	001754	TST2
2864	014276	002126	TST3
2865	014300	002254	TST4
2866	014302	002556	TST5
2867	014304	002670	TST6
2868	014306	003070	TST7
2869	014310	003174	TST10
2870	014312	002346	TST11
2871	014314	003612	TST12
2872	014316	004002	TST13
2873	014320	004172	TST14
2874	014322	004432	TST15
2875	014324	005116	TST16
2876	014326	005200	TST17
2877	014330	005262	TST20
2878	014332	005344	TST21
2879	014334	011414	TST22
2880	014336	011660	TST23
2881	014340	012334	TST24
2882	014342	012654	TST25
2883	014344	012772	TST26
2884	014346	013366	TST27
2885	014350	013512	TST30
2886	014352	013756	TST31
2887			
2888			
2889		000000	
2890	014354		MSGTAB: X=0
2891			
2892	014354	010260	EMSG0
2893	014356	010300	EMSG1
2894	014360	010322	EMSG2
2895	014362	010346	EMSG3
2896	014364	010436	EMSG4
2897	014366	010534	EMSG5
2898	014370	010560	EMSG6
2899	014372	010614	EMSG7
2900	014374	010716	EMSG10
2901	014376	010742	EMSG11
2902	014400	011024	EMSG12
2903	014402	011044	EMSG13
2904	014404	011066	EMSG14
2905	014406	011122	EMSG15
2906	014410	011166	EMSG16
2907	014412	011254	EMSG17
2908	014414	011304	EMSG20
2909			
2910		000001	.END

; TABLE OF ERROR MESSAGE ADDRESSES
; (USED WHEN HLT EXECUTED)

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	2257#	2905							
EMSG16	011166	2263#	2906							
EMSG17	011254	2273#	2907							
EMSG2	010322	2176#	2994							
EMSG20	011304	2278#	2908							
EMSG3	010346	2181#	2975							
EMSG4	010436	2192#	2996							
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						

OPPR3	014072	2806	2808#	2809															
OPPR4	014102	2807	2810#																
OPPR5	014132	2815	2817#																
OPPR6	014174	2795	2835#																
PCNT	001254	681*	728#	803*	2847*														
PSM	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	006504	1957#	1970																
RELF	004514	1556	1560#																
RECHK	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					

TITL2	007356	1612	1728	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							
TSTAG	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*						

WEDGE	011672	2576*	2579	2610*	2611	2665	2689*	2690*	2691	2712*	2717	2753*	2758	
WEDGE1	011750	2363	2364	2366#										
WEDGE2	011766	2377#	2443											
WEDGE3	012016	2380#	2386											
WEDGE4	012100	2385	2387#											
WEDGE5	012114	2405	2409#											
WEDGE6	012144	2412#	2418	2447										
WEDGE7	012226	2417	2419#											
WEDGE8	012236	2437	2441#											
WEDGE9	012160	2442	2444#											
WOFLAG	006034	2422#	2428											
WORK	001234	1725	1831#	1837										
		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*
X	= 000021	2799*	2804*	2813*	2814									
		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	2837	2841	2850			

MESSNO	792#	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905
TESTNO	2906	2907	2908												
	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	2872	2873	2874	2875
	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2893	2894	2895
	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	

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
	1354	1378	1411	1435	1467	1485	1515	1556	1597	1603	1637	1756	1821	1834	1840
	1861	2344	2405	2437	2442	2469	2499	2511	2533	2614	2652	2658	2744	2831	
BNE	827	842	979	994	1058	1065	1113	1132	1139	1384	1441	1772	1883	1900	1908
	1911	1997	2795	2809											
BPL	832	852	870	926	1019	1103	1148	1186	1189	1192	1197	1216	1221	1227	1230
	1233	1238	1260	1268	1277	1280	1286	1304	1307	1311	1314	1320	1342	1348	1360
	1363	1366	1372	1399	1405	1417	1420	1423	1429	1453	1461	1473	1479	1491	1494
	1497	1500	1503	1509	1544	1550	1579	1605	1617	1625	1631	1719	1723	1731	1736
	1744	1750	1783	1800	1805	1809	1815	1842	1877	1880	1886	1890	1944	1976	1982
	1985	1988	2001	2310	2319	2332	2338	2349	2382	2390	2393	2399	2414	2423	2431
	2454	2457	2463	2502	2513	2521	2527	2567	2598	2617	2620	2640	2646	2660	2720
	2723	2732	2738	2749	2802	2812	2819	2825	2837	2841	2850				
BR	906	909	912	922	966	974	991	1003	1013	1076	1088	1098	1118	1150	1159
	1168	1177	1205	1212	1224	1241	1245	1249	1256	1271	1289	1294	1299	1330	1337
	1355	1379	1385	1394	1412	1436	1442	1449	1468	1486	1516	1539	1557	1562	1567
	1587	1590	1618	1638	1655	1657	1672	1674	1689	1691	1708	1710	1720	1740	1757
	1778	1806	1822	1862	1891	1912	1970	1979	1998	2002	2299	2301	2312	2323	2325
	2345	2352	2364	2366	2386	2406	2418	2426	2428	2438	2443	2447	2470	2479	2486
	2507	2516	2534	2539	2542	2548	2554	2568	2580	2589	2599	2629	2635	2653	2653
	2661	2669	2675	2682	2697	2705	2708	2728	2745	2750	2759	2763	2803	2807	2816
	2832	2842													
CLC	1962	1964	1966												
CLR	681	803	807	813	814	829	849	888	903	911	961	1135	1145	1571	1594
	1620	1733	1734	1774	1831	1922	2494	2545	2577	2606	2695	2707			
CMP	908	1075	1086	1158	1167	1573	1599	1642	1644	1646	1663	1680	1697	1836	1901
	1968	1977	2320	2378	2517	2621	2623								
CMPB	1037	1042	1047	1882	1996	2805	2808								
DEC	826	841	1057	1064	1112	1131	1138	1382	1439	1560	1580	1771	1904	2316	2373
	2383	2387	2415	2446	2504	2625	2634	2662	2756						
EMT	749														
HALT	678	819	847	859	868	1952	2793								
INC	905	1585	1586	1595	1598	1777	1832	1835	1857	2350	2444	2508	2540	2546	2574
	2626	2628	2656	2688	2727	2813	2847								
IOT	748														
JMP	679	682	893	1059	1648	1665	1682	1699	1758	1928	2765	2857			
JSR	808	830	850	953	962	1034	1039	1044	1049	1146	1566	1570	1621	1660	1677
	1694	1713	1725	1727	1741	1770	1949	2304	2306	2369	2371	2489	2491	2571	2573
	2602	2604	2685	2687	2711	2715	2853								
MOV	804	812	825	840	884	900	901	902	904	910	921	952	973	976	1012
	1016	1017	1033	1036	1041	1046	1053	1054	1055	1056	1063	1087	1097	1100	1101
	1108	1111	1114	1124	1130	1133	1134	1137	1140	1176	1211	1255	1336	1339	1393
	1396	1448	1538	1541	1565	1569	1572	1575	1576	1588	1589	1612	1619	1654	1659
	1661	1662	1671	1676	1678	1679	1688	1693	1695	1696	1707	1712	1714	1728	1732

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DZLSAB.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

* DZLSAB.SEG/SOL/CRF/PAGNUM/NL:TOC=DZLSAB
RUN-TIME: 9 19 4 SECONDS
RUN-TIME RATIO: 175/33=5.2
CORE USED: 9K (17 PAGES)

