IDENTIFICATION
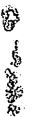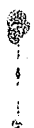
PRODUCT CODE: MAINDEC-08-DILAC-B-D

PRODUCT NAME: LA180 PRINTER DIAGNOSTIC

DATE: JULY 1976

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: ROBERT BAKER/BRUCE HANSEN

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1.0 ABSTRACT

THE DIAGNOSTICS FOR THE LA180 PRINTER ARE DESIGNED TO EXERCISE ALL AREAS OF THE PRINTER, SIMULATING WORSE CASE CONDITIONS TO DETECT BOTH MECHANICAL AND ELECTRICAL FAULTS. ADDITIONAL FACILITIES WITHIN THE DIAGNOSTIC PROGRAM WILL AID IN ISOLATION OF ANY FAULT CONDITIONS DETECTED.

OPERATION OF THE DIAGNOSTIC PROGRAM WILL BE CONTROLLED FROM THE PROCESSOR SWITCH REGISTER OR FROM AN AVAILABLE CONSOLE DEVICE. THE OPERATOR WILL BE GIVEN AS MUCH CONTROL OVER THE OPERATION OF THE PROGRAM AS POSSIBLE WHILE TRYING TO KEEP THE CONTROL SCHEME SIMPLE.

THIS DIAGNOSTIC PROGRAM WAS DESIGNED TO RUN IN 4K OR LESS OF MEMORY.

2.0 REQUIREMENTS

2.1 EQUIPMENT

THIS DIAGNOSTIC WAS WRITTEN TO RUN ON ALL MODELS OF THE PDP-8 PROCESSOR WITH A LA180 PRINTER USING THE STANDARD LA180 PARALLEL INTERFACE. THE PROGRAM WILL USE A STANDARD CONSOLE DEVICE, IF AVAILABLE, FOR OPERATOR INSTRUCTIONS AND ERROR REPORTING. IT IS SUGGESTED THAT A CONSOLE DEVICE BE USED WHEN RUNNING THIS DIAGNOSTIC BUT IT IS NOT REQUIRED IF THE CPU HAS A HARDWARE SWITCH REGISTER. IF ANY NON-STANDARD IOT CODES ARE USED FOR EITHER THE LA180 OR THE CONSOLE DEVICE, CHANGE THE IOT CODES AT PTRIOT AND IOTSEL BEFORE STARTING THE PROGRAM.

THE DIAGNOSTIC WAS MADE CAPABLE OF RUNNING WITH EITHER OF TWO INTERFACES IN JUNE OF 1976. THE FIRST BEING THE STANDARD LA180 PARALLEL INTERFACE, AND THE SECOND BEING THE PDP-8A OPTION BOARD 1'S 12 BIT PARALLEL I/O INTERFACE.

2.2 STORAGE

THIS PROGRAM USES MOST OF 4K OF MEMORY WITHOUT AFFECTING THE AREA USED BY THE BINARY LOADER.

2.3 PRELIMINARY PROGRAMS

ALL APPLICABLE PDP-08 DIAGNOSTICS SHOULD BE RUN SUCCESSFULLY ON THE PROCESSOR.

3.0 LOADING PROCEDURE & INITIALIZATION

LOAD THE LA180 DIAGNOSTIC PROGRAM FOLLOWING NORMAL PROCEDURES.

IF A HARDWARE SWITCH REGISTER DOES NOT EXIST OR TO USE THE SOFTWARE SWITCH REGISTER CONTROL WHEN A HARDWARE SWITCH REGISTER IS AVAILABLE, SET BIT 0 OF LOCATION 21 TO 0 BEFORE STARTING THE DIAGNOSTIC. LOCATION 20 WILL THEN BE USED AS THE SOFTWARE SWITCH REGISTER (SSR). MAKE SURE THE SSR IS SET AS DESIRED BEFORE STARTING THE PROGRAM. REFER TO SECTION 5.3 FOR A DESCRIPTION OF THE DYNAMIC SSR ROUTINE OPERATION.

IF THE PDP-8A OPTION BOARD 1'S 12 BIT PARALLEL I/O INTERFACE IS TO BE USED INSTEAD OF THE STANDARD LA180 PARALLEL INTERFACE, SET BIT 1 OF LOCATION 21 TO 1 BEFORE STARTING THE DIAGNOSTIC. IF THE PDP-8A OPTION BOARD 1'S 12 BIT PARALLEL I/O INTERFACE IS TO BE USED, SET SWITCH S1-9 ON THE PDP-8A OPTION BOARD 1 TO THE "ON" POSITION.

REFER TO THE TEST ADDRESS TABLE IN THE PROGRAM LISTING FOR DETAILS ON CHANGING THE PRINTING TEST SEQUENCE OR DELETING TESTS FROM THE DIAGNOSTIC.

4.0 STARTING PROCEDURES

STARTING ADDRESSES:

>   200 = GENERAL START:
>   RUN OPERATOR INTERVENTION TESTS THEN ENTER PRINTING TEST SEQUENCE.
>
>   201 = RESTART:
>   ENTER PRINTING TEST SEQUENCE DIRECTLY SKIPPING OPERATOR INTERVENTION TESTS.
>
>   202 = GO DIRECTLY TO CONSOLE TERMINAL KEYBOARD CONTROL - SELECT TEST.

STARTING AT 200 WILL RUN THE ENTIRE DIAGNOSTIC PACKAGE. THE PROGRAM WILL FIRST EXECUTE THE OPERATOR INTERVENTION TESTS AND THEN ENTER THE PRINTING TEST SEQUENCE WHERE IT WILL LOOP CONTINUOUSLY. STARTING AT 201 (THE RESTART) WILL SKIP THE OPERATOR INTERVENTION TESTS AND ENTER THE PRINTING TEST SEQUENCE DIRECTLY. STARTING AT 202 WILL CAUSE THE PROGRAM TO GO DIRECTLY TO CONSOLE KEYBOARD CONTROL IF A CONSOLE DEVICE EXISTS, OTHERWISE, THE PROGRAM WILL HALT WAITING FOR A TEST SELECTION FROM THE PROCESSOR SWITCH REGISTER. ALSO, BY PLACING THE HALT AND SELECT TEST SWITCH UP (1) BEFORE STARTING THE DIAGNOSTIC, THE DIAGNOSTIC WILL HALT WAITING FOR A TEST SELECTION FROM THE PROCESSOR SWITCH REGISTER AFTER INITIALIZATION OF THE PROGRAM.

TO START THE DIAGNOSTIC PROGRAM, SET THE DESIRED STARTING ADDRESS IN THE SWITCH REGISTER AND DEPRESS LOAD ADDRESS, SET THE PROCESSOR SWITCH REGISTER OPTIONS AS DESIRED (SEE SECTION 5.1), AND DEPRESS START. THE DIAGNOSTIC PROGRAM WILL NOW RUN IN THE MANNER SELECTED.

5.0 OPERATING PROCEDURES

5.1 SWITCH REGISTER CONTROLS

THE FOLLOWING, BASIC CONTROL FUNCTIONS ARE AVAILABLE THROUGH THE USE OF THE SWITCH REGISTER.

SWITCH	POSITION	FUNCTION
00	1 (UP)	STOP ON ERROR
	0 (DWN)	CONTINUE ON ERROR
01	1 (UP)	INHIBIT ERROR TYPEOUT
	0 (DWN)	NORMAL OPERATION
02	1 (UP)	LOOP ON TEST
	0 (DWN)	NORMAL OPERATION
03	1 (UP)	HALT & SELECT TEST
	0 (DWN)	NORMAL OPERATION
04		MANUAL TIMING - OVERALL PRINT SPEED TIMING
04	1 (UP)	SINGLE CHAR - SCOPE ROUTINE
	0 (DWN)	FULL LINES

04-11   # COLUMNS AT START UP.

06-11   TEST SELECTION DURING DIAG.

05-11   CHAR SELECTION FOR SCOPE ROUTINE

5.1.1   SWITCH 0 - STOP ON ERROR

WITH THIS SWITCH UP (1), THE PROGRAM WILL HALT OR WAIT FOR A KEYBOARD ON ANY DETECTED ERROR. WHEN DOWN (0), THE PROGRAM WILL CONTINUE ON ERROR IF POSSIBLE.

5.1.2   SWITCH 1 - INHIBIT ERROR TYPEOUT

WHENEVER THIS SWITCH IS IN THE UP (1) POSITION, ERROR TYPEOUTS WILL NOT OCCUR.

5.1.3   SWITCH 2 - LOOP ON TEST

WITH THIS SWITCH UP (1), THE PROGRAM WILL CONTINUE TO LOOP ON THE CURRENT TEST UNTIL THIS SWITCH IS PLACED DOWN (0). AFTER RETURNING THIS SWITCH TO THE DOWN (0) POSITION, THE TEST WILL CONTINUE NORMAL OPERATION AT THE COMPLETION OF THE CURRENT TEST. THUS, WHENEVER THIS SWITCH IS DOWN (0), THE PROGRAM WILL CONTINUE NORMAL OPERATION.

5.1.4   SWITCH 3 - HALT & SELECT TEST

THE PROGRAM WILL HALT WHENEVER THIS SWITCH IS PLACED IN THE UP (1) POSITION. AT THAT TIME, SET THE DESIRED TEST NUMBER IN THE PROPER POSITION IN THE PROCESSOR SWITCH REGISTER.

TO START THE NORMAL TEST SEQUENCE WITH THE SELECTED TEST, PLACE THE HALT AND SELECT TEST SWITCH DOWN (0) THEN DEPRESS THE CONTINUE SWITCH.

TO RUN A SELECTED TEST ONCE AND HALT, LEAVE THE HALT AND SELECT TEST SWITCH UP (1) AND DEPRESS CONTINUE. THE PROGRAM WILL EXECUTE ONE COMPLETE PASS OF THE SELECTED TEST, THEN HALT WAITING FOR ANOTHER TEST SELECTION. TO HALT THE PROGRAM DURING EXECUTION OF THE SELECTED TEST, PLACE THE HALT & SELECT TEST SWITCH DOWN (0) AT ANY TIME. THE PROGRAM WILL HALT AT THE COMPLETION OF THE CURRENT OPERATION AND WAIT FOR ANOTHER TEST SELECTION.

5.1.5 SWITCH 4 - MANUAL TIMING

THIS SWITCH WILL BE USED TO MANUALLY TIME THE OVERALL PRINT SPEED OF
THE LA180 PRINTER IF A CLOCK OPTION DOES NOT EXIST.

5.1.6 SWITCH 4 - SINGLE CHAR/FULL LINES CHAR

THIS SWITCH WILL BE USED TO SELECT WHETHER TO SEND ONLY A SINGLE
CHARACTER OR FULL LINES OF CHARACTERS TO THE LA180 PRINTER DURING TEST
61 ONLY.

5.1.7 SELECTION OF NUMBER OF COLUMNS

THESE SWITCHES WILL BE USED WHEN THE PROGRAM IS FIRST STARTED TO INPUT
THE DESIRED, MAXIMUM NUMBER OF COLUMNS THE DIAGNOSTIC IS TO TEST. THE
NUMBER SET MUST BE IN OCTAL AND BE EQUAL TO OR GREATER THAN 2 AND LESS
THAN OR EQUAL TO 132(10). IF THE SWITCHES ARE NOT SET WITHIN THESE
SET LIMITS, THE PROGRAM WILL DEFAULT TO TESTING 132(10) COLUMNS.
THUS, LEAVING THESE SWITCHES DOWN (000) THE PROGRAM WILL AUTOMATICALLY
TEST THE FULL 132(10) COLUMNS.

5.1.8 TEST SELECTION

THESE SWITCHES WILL BE USED TO SELECT A DESIRED TEST WHENEVER THE HALT
AND SELECT TEST SWITCH IS USED TO HALT THE DIAGNOSTIC PROGRAM.

5.2 CONSOLE TERMINAL - KEYBOARD CONTROL

WHENEVER A CONSOLE TERMINAL IS DETERMINED TO BE AVAILABLE BY THE PROGRAM, THE DIAGNOSTIC WILL BE CAPABLE OF BEING CONTROLLED FROM THE KEYBOARD OF THE CONSOLE DEVICE. TYPING A RUBOUT (DEL) ON THE CONSOLE KEYBOARD AT ANY TIME WILL CAUSE THE PROGRAM TO STOP AND PRINT THE FOLLOWING MESSAGE ON THE CONSOLE DEVICE:

SELECT TEST #:

TYPE ANY LEGAL TEST NUMBER FOLLOWED BY ONE OF THE FOLLOWING CONTROL CHARACTERS AND A CARRIAGE RETURN:

CHARACTER	FUNCTION
. (PERIOD)	RUN TEST ONCE & RETURN TO TEST SELECTION
L	LOOP ON SELECTED TEST
S	START SEQUENCE WITH SELECTED TEST

THE L AND S MAY BE EITHER UPPER OR LOWER CASE BUT TEST NUMBERS MUST ALWAYS BE ENTERED AS 2 DIGIT NUMBERS.

TO RESET THE DESIRED MAXIMUM NUMBER OF COLUMNS, TYPE A CONTROL-C ($\overline{}$C) ON THE CONSOLE TERMINAL KEYBOARD AT ANY TIME, THE FOLLOWING MESSAGE WILL BE TYPED ON THE CONSOLE DEVICE:

COLUMNS =

TYPE IN THE DESIRED NUMBER OF COLUMNS (IN DECIMAL) ON THE CONSOLE KEYBOARD FOLLOWED BY A CARRIAGE-RETURN. IF THE SELECTED NUMBER IS LESS THAN 2 OR GREATER THAN 132(10) THE MESSAGE WILL BE REPEATED AND YOU MUST RENTER THE NUMBER OF COLUMNS. WHEN A CORRECT NUMBER IS ENTERED, THE PROGRAM WILL THEN ASK FOR A TEST SELECTION AS DESCRIBED PREVIOUSLY IN THIS SECTION.

TO CHANGE THE NUMBER OF COLUMNS WHEN WAITING FOR A TEST SELECTION, TYPE A CONTROL-C FOLLOWED BY A CARRIAGE RETURN. WHILE INPUTTING A TEST SELECTION OR COLUMN NUMBER THE RUBOUT (DEL) KEY MAY BE USED TO DELETE INCORRECT ENTRIES. AT ALL TIMES SWITCH REGISTER CONTROL WILL STILL BE EFFECTIVE, EVEN IF USING CONSOLE TERMINAL KEYBOARD CONTROL.

5.3 DYNAMIC SOFTWARE SWITCH REGISTER CONTROL

WHENEVER A CONSOLE TERMINAL IS AVAILABLE AND A HARDWARE SWITCH REGISTER IS NOT AVAILABLE (OR IT IS DESIRED TO USE THE SOFTWARE SWITCH REGISTER INSTEAD) SET BIT ZERO OF LOCATION 20 TO 0 AND THE PROGRAM WILL RECOGNIZE THE FOLLOWING DYNAMIC SOFTWARE SWITCH REGISTER CONTROL:

TYPING A CONTROL-G (BEL) AT ANY TIME DURING PROGRAM EXECUTION, EXCEPT WHEN WAITING FOR A TEST OR COLUMN NUMBER SELECTION, WILL CAUSE THE DIAGNOSTIC TO STOP THE CURRENT TEST AND TYPE THE FOLLOWING MESSAGE ON THE CONSOLE DEVICE:

        SWR = XXXX   NEW =

WHERE XXXX IS THE CURRENT CONTENTS OF THE SOFTWARE SWITCH REGISTER (SSR) IN OCTAL. THE SOFTWARE CONTROL ROUTINE WILL THEN AWAIT OPERATOR ACTION. THE OPERATOR IS THEN REQUIRED TO TYPE ONE OR MORE OF THE LEGAL CHARACTERS 1) 0-7, 2) LINE FEED <LF>, 3) CARRIAGE RETURN <CR>, 4) CONTROL-U <^U>. NO CHECK IS MADE FOR CHARACTER LEGALITY. IF THE INPUT CHARACTER IS NOT A LF, CR, OR ^U IT IS ASSUMED TO BE AN OCTAL DIGIT AND WILL BE ECHOED AS THE DIGIT THAT IS GOING TO BE STORED IN THE SWITCHES.

TO CHANGE THE CONTENTS OF THE SSR, THE OPERATOR SIMPLY TYPES THE NEW DESIRED VALUE IN OCTAL, LEADING ZEROS NEED NOT BE TYPED. AND TERMINATES THE INPUT STRING WITH A <CR> OR <LF> DEPENDING ON THE PROGRAM ACTION DESIRED AS DESCRIBED BELOW. THE INPUT VALUE WILL BE TRUNCATED TO THE LAST 6 DIGITS TYPED. AT LEAST ONE DIGIT MUST BE TYPED ON ANY GIVEN INPUT STRING PRIOR TO THE TERMINATOR BEFORE A CHANGE TO THE SSR WILL OCCUR.

WHEN THE INPUT STRING IS TERMINATED WITH A <CR>, THE DIAGNOTSIC WILL CONTINUE EXECUTION FROM THE POINT AT WHICH IT WAS INTERRUPTED. IF A <CR> IS THE ONLY THING TYPED, THE PROGRAM WILL CONTINUE WITHOUT CHANGING THE SSR. IF A LINE FEED <LF> IS USED TO TERMINATE THE INPUT STRING, THE PROGRAM WILL THEN ASK FOR A TEST SELECTION AS DESCRIBED IN SECTION 5.2.

IF A ^U IS TYPED AT ANY POINT IN THE INPUT STRING PRIOR TO THE TERMINATOR, THE INPUT VALUE WILL BE DISREGARDED AND THE PROMPT MESSAGE WILL BE RETYPED.

5.4 ERROR REPORTING

IF A CONSOLE TERMINAL EXISTS AND THE INHIBIT ERROR TYPEOUT SWITCH IS DOWN (0), WHENEVER AN ERROR IS DETECTED THE FOLLOWING ERROR MESSAGE WILL BE PRINTED ON THE CONSOLE DEVICE:

TEST #XX, PC=XXXX, ERROR #XXX, MESSAGE >>>>>>>>>>

THE ERROR MESSAGE INDICATES THE TEST NUMBER, THE LOCATION WHERE THE ERROR OCCURRED, THE ERROR NUMBER, AND THE TYPE OF ERROR THAT OCCURRED. FOR ADDITIONAL INFORMATION ON ANY ERROR CONDITION, REFER TO THE PROGRAM LISTING.

WHENEVER A CONSOLE TERMINAL IS NOT AVAILABLE THE HALT ON ERROR SWITCH SHOULD BE USED. AFTER AN ERROR OCCURS AND THE PROGRAM HALTS, EXAMINE THE CONTENTS OF ERRPC TO FIND THE ADDRESS WHERE THE ERROR OCCURRED AND ERRNM TO FIND THE ERROR NUMBER. THE TEST NUMBER WILL BE LOCATED IN EITHER THE HARDWARE OR SOFTWARE DISPLAY DEPENDING ON CPU TYPE. THEN REFER TO THE PROGRAM LISTING TO DETERMINE THE TYPE OF ERROR THAT OCCURRED AND TO FIND ANY ADDITIONAL INFORMATION REGARDING THAT ERROR, IF NEEDED. THE ERROR MESSAGES ARE LOCATED NEAR THE END OF THE PROGRAM LISTING.

6.0 TEST DESCRIPTIONS

6.1 OPERATOR INTERVENTION TESTS

THIS SERIES OF TESTS CONSISTS OF ALL TESTS NORMALLY EXECUTED WHICH COULD POSSIBLE REQUIRE OPERATOR INTERVENTION. THESE TESTS ARE EXECUTED ONLY ONCE EACH WHEN THE DIAGNOSTIC IS FIRST STARTED UP. A DETAILED DESCRIPTION OF EACH TEST FOLLOWS:

6.1.1   TEST 00 - INTERFACE & CONTROL TESTS

THIS TEST IS DESIGNED AS A COMMAND DECODE AND CONTROL INTERFACE TEST AND INCLUDES CHECKOUT OF THE PRINTER INTERRUPT FACILITY. MANUAL INTERVENTION IS REQUIRED TO TEST THE VARIOUS TESTABLE NON-READY CONDITIONS OF THE PRINTER. OPERATOR INSTRUCTIONS WILL BE PRINTED ON THE CONSOLE DEVICE IF AVAILABLE THEN THE PROGRAM WILL WAIT FOR THE OPERATOR TO COMPLETE THE ACTION. DEPRESS THE SPACE BAR ON THE CONSOLE KEYBOARD OR THE CONTINUE SWITCH ON THE CPU IF NO CONSOLE DEVICE IS AVAILABLE TO TEST THE NEXT CONDITION WHEN READY. IF ANY UNEXPECTED RESULTS ARE ENCOUNTERED, AN ERROR MESSAGE WILL BE PRINTED ON THE CONSOLE DEVICE IF AVAILABLE. (REFER TO SECTION 5.3 ON ERROR REPORTING.)

POWER SHOULD BE OFF ON THE LA180 BEFORE STARTING THIS TEST. THE PROGRAM WILL FIRST TEST THAT THE PRINTER IS NOT READY WITH POWER OFF. AN INSTRUCTION WILL THEN ASK FOR THE PRINTER POWER TO BE TURNED ON. TURN POWER ON AND MAKE SURE THERE IS PAPER IN THE PRINTER AND THE PRINTER IS OFF LINE. THE DIAGNOSTIC WILL AGAIN CHECK THAT THE PRINTER IS NOT READY. AN INSTRUCTION ON THE CONSOLE DEVICE WILL NEXT INFORM THE OPERATOR TO TURN THE LA180 ON LINE. THE PROGRAM WILL NOW CHECK THAT THE PRINTER IS READY. THE NEXT PRINTED INSTRUCTION WILL HAVE THE OPERATOR FORCE A PAPER OUT CONDITION BY OPENING THE PAPER FEED TRACTORS AND REMOVING THE PAPER FROM THE PRINTER. THE DIAGNOSTIC WILL CHECK THAT THE PRINTER IS NOT READY. THE LAST INSTRUCTION WILL ASK TO RESTORE THE PRINTER TO ON-LINE BY RE-INSERTING PAPER AND CLEARING THE ERROR CONDITION. MAKE SURE THE PRINTER IS SET TO ON-LINE BEFORE CONTINUING. THE PROGRAM WILL TEST TO SEE THAT THE PRINTER IS AGAIN READY.

THE LAST HALF OF THIS TEST WILL BE PERFORMED AUTOMATICALLY WITHOUT FURTHER MANUAL INTERVENTION REQUIRED. FIRST, A CHECK WILL BE MADE TO SEE THAT THE PCLF INSTRUCTION CLEARS THE READY FLAG. A RUBOUT (DEL) WILL THEN BE LOADED TWICE TO THE PRINTER, ONCE USING A PSTB INSTRUCTION AND AGAIN USING A PCLP INSTRUCTION, TO SEE IF LOADING THE CHARACTER BUFFER WILL CLEAR THE READY BIT. THE TEST WILL CHECK THAT THE PRINTER READY BIT SETS WITHIN A REASONABLE AMOUNT OF TIME. THE FINAL TESTS WILL CHECK THE PRINTER INTERRUPT SYSTEM. A CHECK WILL BE MADE FOR UNEXPECTED INTERRUPTS, AND IF AN INTERRUPT OCCURS WITH THE PRINTER READY BIT SET. THEN A CHECK WILL BE MADE TO SEE THAT NO INTERRUPT OCCURS WITH THE PRINTER INTERRUPT ENABLED AND THE READY BIT SET, BUT THE CPU INTERRUPT SYSTEM OFF.

6.1.2   TEST 01 - TOP OF FORM SWITCH TEST

THIS TEST CHECKS ALL POSITIONS OF THE TOP OF FORM SWITCH. THE PROGRAM
WILL PRINT INSTRUCTIONS FOR THE NEXT SETTING OF THE TOP OF FORM SWITCH
ON THE CONSOLE TERMINAL (IF AVAILABLE) AND THEN WAIT FOR THE OPERATOR
TO COMPLETE THE ACTION. AFTER SETTING THE SWITCH, DEPRESS THE SPACE
BAR OF THE CONSOLE DEVICE (OR CONTINUE ON THE PROCESSOR IF NO CONSOLE
DEVICE EXISTS) TO TEST THAT SWITCH POSITION. AFTER CHECKING ALL
POSITIONS, THE PRINTER OUTPUT CAN BE VISUALLY VERIFIED. A LINE OF ALL
DASHES IS PRINTED AS A STARTING POINT AND THEN LINES ARE PRINTED TO
INDICATE THE PROPER SPACING (IN INCHES) FROM THE PREVIOUS LINE TO THAT
LINE.

EXAMPLE:

```
    ----------------------------------

    ----- 4.0 INCH FORM FEED -----
```

6.1.3   TEST 02 - PRINT SPEED TIMING TEST

THIS TEST IS DESIGNED TO TIME THE LA180 FOR ONE FULL MINUTE WHILE A
SWIRL PATTERN IS PRINTED TO THE SELECTED MAXIMUM NUMBER OF COLUMNS.
IF A LINE CLOCK OR A PROGRAMMABLE CLOCK OPTION IS DETERMINED TO BE
AVAILABLE BY THE PROGRAM, IT WILL BE USED TO AUTOMATICALLY TIME THE
PRINTER. WHEN NEITHER CLOCK OPTION IS AVAILABLE, MANUAL TIMING WILL
BE USED AND OPERATING INSTRUCTIONS WILL BE TYPED ON THE CONSOLE DEVICE
IF IT IS AVAILABLE. WHICHEVER METHOD OF TIMING IS USED, AT THE END OF
ONE FULL MINUTE THE APPROXIMATE PRINT SPEED WILL BE PRINTED ON THE
LA180 AND ALSO ON THE CONSOLE DEVICE (IF AVAILABLE). REMEMBER, THE
PRINT SPEED IS DIRECTLY RELATED TO THE NUMBER OF COLUMNS BEING
PRINTED. ALSO, THE CONTENTS OF ONE LOCATION IN MEMORY WILL HAVE TO BE
CHANGED IF THE LINE FREQUENCY IS 50 HZ. AND A CLOCK OPTION IS BEING
USED FOR TIMING.

6.2   PRINTING TESTS

THESE TESTS ARE DESIGNED AS A TEST OF THE PRINTING MECHANISM AND THE
ASSOCIATED CONTROL LOGIC.   AT THE BEGINNING OF EACH TEST, A TEST
HEADER WILL INDICATE THE TEST NUMBER BEING EXECUTED. THE TEST PROGRAM
CONTINUALLY MONITORS FOR PROPER OPERATION OF THE LINE PRINTER AFTER
EACH PRINTER OPERATION HAS BEEN COMPLETED, THROUGH THE PRINTER "READY"
LINE AND THE SETTING OF THE "DEMAND" FLAG. IT SHOULD BE NOTED,
HOWEVER, THAT THE "DEMAND" RETURN FROM THE PRINTER IS CONDITIONAL UPON
THE PRINTER "READY". SINCE THE PROCESSOR CAN ONLY DETECT THE CURRENT
CONDITION OF THE "READY" AND "DEMAND" RETURN LINES IT IS NECESSARY TO
EXAMIME THE PRINT PATTERNS PRODUCED BY THE VARIOUS TEST ROUTINES.
EACH PATTERN HAS BEEN CHOSEN FOR EASE OF VISUAL VERIFICATION.
DETAILED DESCRIPTIONS OF EACH TEST PATTERN APPEARS IN THE DESCRIPTION
OF THE FOLLOWING TEST ROUTINES.

6.2.1 TEST 20 - DATA TRANSFER PATHS TEST

THIS TEST IS DESIGNED TO TEST THE DATA LINES TO AND THROUGH THE INTERFACE AND TO THE LA180 PRINTER. AN ALTERNATING BIT PATTERN IS SENT WHICH WILL PRINT ALTERNATING *'S AND U'S IN A CHECKERBOARD PATTERN TO THE MAXIMUM COLUMN WIDTH. THE STARTING CHARACTER FOR EACH LINE IS ALTERNATED AND A TOTAL OF 16 LINES ARE PRINTED.

EXAMPLE:

```
*U*U*U*U   .....      *U*U
U*U*U*U*   .....      U*U*
*U*U*U*U   .....      *U*U
U*U*U*U*   .....      U*U*
```

6.2.2 TEST 21 - HEAD POSITIONING TEST

THIS TEST CHECKS THE CARRIAGE RETURN FROM ALL EVEN NUMBERED COLUMNS AND THE SPACING OF THE SOLENOID HEAD FROM THE LEFT MARGIN. HOWEVER, THE PRIMARY PURPOSE OF THIS TEST IS TO TEST THE SOLENOID HEAD POSITION DECODER FOR PROPER OPERATION.

THE TEST PRINTS A FULL LINE OF ALTERNATING 0'S AND SPACES, STARTING WITH A 0. AT THE END OF THE LINE THE PRINT HEAD IS RETURNED TO THE LEFT MARGIN WITH A CARRIAGE RETURN. THE SPACES ARE THEN FILLED IN BY SPACING THE PRINT HEAD OUT FROM THE LEFT MARGIN TO THE FIRST SPACE, PRINTING AN "X", AND EXECUTING A CARRIAGE RETURN. THIS PATTERN IS REPEATED UNTIL THE LINE IS COMPLETED. CHECK TO SEE THAT ALL X'S ARE IN THE MIDDLE OF THE SPACE BETWEEN THE TWO ADJACENT ZEROES.

EXAMPLE:

```
0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X
```

6.2.3 TEST 22 - BACKSPACE TEST

THIS TEST IS DESIGNED TO CHECK THE BACKSPACE FEATURE OF THE LA180 PRINTER. TWO LINES OF X'S INTERSPACED WITH DASHES WILL BE PRINTED BY PRINTING A SLASH, EXECUTING A BACKSPACE, AND THEN PRINTING A BACKSLASH TO COMPLETE EACH X CHARACTER. A MAXIMUM OF 127 COLUMNS WILL BE PRINTED BY THIS TEST.

EXAMPLE:

```
X-X-X-X-X-X-X-X
X-X-X-X-X-X-X-X
```

6.2.4   TEST 23 - CHARACTER GENERATOR TEST

THIS TEST CHECKS THE SPACE AND ALL 94 PRINTABLE CHARACTERS (ASCII CODES 040 TO 176) BY PRINTING A SINGLE LINE, 30 CHARACTERS LONG, OF EACH CHARACTER.

EXAMPLE:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
   .
   .
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
```

6.2.5   TEST 24 - NON-PRINTABLE CHARACTER TEST

THIS TEST IS DESIGNED TO TEST THE LA180 HANDLING OF NON-PRINTABLE CHARACTERS AND TO EXERCISE THE FULL RANGE OF THE CHARACTER STORAGE BUFFER. THE TEST PATTERN PRODUCED WILL BE A 30 LINE SWIRL PATTERN, CONSISTING OF FULL LINES OF THE ENTIRE PRINTABLE CHARACTER SET. IF THIS TEST IS LOOPED ON, THE PATTERN WILL CONTINUE A FULL SWIRL, RATHER THAN ONLY 30 LINES AND THEN REPEATING. AS THE SWIRL PATTERN IS PRODUCED, A GROUP OF PRINTABLE CHARACTERS WILL BE SHIFTED (IN INCREMENTS DEPENDING ON THE NUMBER OF COLUMNS BEING TESTED) THROUGH THE FULL RANGE OF THE CHARACTER BUFFER, STARTING AT THE END OF THE BUFFER. NON-PRINTABLE CHARACTERS WILL BE USED TO FILL THE CHARACTER BUFFER BEFORE AND AFTER THE GROUP OF PRINTABLE CHARACTERS FOR EACH PRINTED LINE. ALL NON-PRINTABLE CHARACTERS HAVING NO CONTROL FUNCTION WITHIN THE LA180 WILL BE USED.

EXAMPLE:

```
!"#$%&'()*+,-./0123456789:;<=>?@ABC....
"#$%&'()*+,-./0123456789:;<=>?@ABCD....
#$%&'()*+,-./0122456789:;<=>?@ABCDE....
```

6.2.6   TEST 25 - BUFFER TEST

THIS TEST IS DESIGNED TO TEST THE CHARACTER STORAGE BUFFER IN THE LA180 FOR PROPER OPERATION. THIS TEST WILL PRODUCE FOUR LINES OF PRINT WITH 2 BLANK LINES BETWEEN THE FIRST AND SECOND LINES. THE LINES PRINTED WILL ALSO SERVE AS A CHECK OF PRINTING THE CORRECT COLUMN WIDTH. THE PATTERNS ARE DESCRIBED FOR 132 COLUMNS BUT WILL BE SHORTENED ACCORDINGLY FOR NARROWER TEST WIDTHS. BEFORE THE FIRST LINE IS STORED, 16 E'S WILL BE LOADED INTO THE BUFFER. THEN A RUBOUT (177) WILL BE SENT TO CHECK THAT A RUBOUT WILL CLEAR THE BUFFER. BEFORE EACH OF THE LAST THREE LINES IS PRINTED AND BEFORE THE BLANK LINES BETWEEN THE FIRST AND SECOND PRINTED LINES, THE CHARACTER BUFFER WILL BE FILLED WITH ALL E'S. THUS, AN E PRINTED ANYWHERE IN THE TEST PATTERN INDICATES AN ERROR.

THE FIRST LINE WILL CONTAIN 100 ONES, 30 THREES, AND 2 TWOS. THE
SECOND PRINTED LINE WILL CONTAIN 99 ZEROES AND 33 ONES. THE THIRD
LINE WILL CONSIST OF THE NUMBERS 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1,
2, AND 3 IN GROUPS OF 10 CHARACTERS EACH (EXCEPT THE FIRST GROUP OF
ZEROES WILL CONTAIN ONLY 9 CHARACTERS). THE LAST LINE WILL CONTAIN
THE NUMBERS 1 TO 9 THEN 0 IN SUCCESSION, REPEATED TO THE MAXIMUM
COLUMN.

THUS, THE COLUMN NUMBER MAY BE READ DIRECTLY BY READING THE NUMBERS IN
ANY GIVEN COLUMN ON THE LAST THREE LINES, FROM TOP TO BOTTOM.

    COLUMN 30 WOULD BE   0
                                  3
                                  0

    COLUMN 132 WOULD BE   1
                                  3
                                  2

EXAMPLE:

```
1111111111111111111111111111111111111.....322


0000000000000000000000000000000000,.....111
0000000000111111111112222222222233.....333
1234567890123456789012345678901.....012
```

6.2.7 TEST 26 - OVERPRINT TEST

THIS TEST IS DESIGNED TO CHECK THE SPACING AND REPEATABLE PRINTING
CHARACTERISTICS OF THE PRINTER. FOUR LINES OF CHARACTERS ARE EACH
OVERPRINTED TWO TIMES. THE ROWS CONSIST OF THE FOLLOWING CHARACTERS
ALTERNATED ACROSS THE LINE.

    ROW 1   E - SP
    ROW 2   SP - @
    ROW 3   M - SP
    ROW 4   SP - #

THE RESULTING PATTERN WILL BE A CHECKERBOARD PATTERN AND THE
OVERPRINTED CHARACTERS SHOULD BE ALIGNED PROPERLY WITH THE INITIAL
CHARACTERS.

EXAMPLE:

```
E E E E E E E E E
 @ @ @ @ @ @ @ @ @
M M M M M M M M M
 # # # # # # # # #
```

6.2.8   TEST 27 - MULTIPLE LINE FEED TEST

THIS TEST CHECKS THE LINE FEED CAPABILITY OF THE PRINTER BY SENDING
VARIOUS GROUPS OF LINE FEEDS INTERSPACED WITH REFERENCE LINES. THE
NUMBER PRINTED AT THE LEFT MARGIN OF THE REFERENCE LINE INDICATES THE
NUMBER OF LINE FEEDS THAT FOLLOW. EACH LINE WILL CONTAIN A STRING OF
DASHES AS REFERENCE POINTS FOR MEASURING, THE FIRST AND LAST BEING 132
CHARACTERS LONG (MAXIMUM) AND THE MIDDLE LINES BEING 30 CHARACTERS
LONG.

EXAMPLE:

01--
02-----------------------------

04---------------------------

08---------------------------
      \
       \
        > 7 BLANK LINES
       /
      /
16---------------------------
      \
       \
        > 15 BLANK LINES
       /
      /
32---------------------------
      \
       \
        > 31 BLANK LINES
       /
      /
00--

6.2.9 TEST 30 - RIBBON FEED TEST

THIS TEST CHECKS THE RIBBON FEED MECHANISM BY PRINTING A SINGLE COLUMN
OF 24 LINES OF X'S DOWN THE LEFT HAND MARGIN OF THE PAGE. VISUALLY
CHECK FOR PROPER OPERATION OF THE RIBBON FEED MECHANISM DURING THIS
TEST.

EXAMPLE:

```
X
X
X
.
.
.
X
X
X
```

6.2.10 TEST 31 - BELL TEST

THIS TEST IS DESIGNED TO CHECK THE BELL CODE LOGIC AND THE TIMING
SEQUENCE OF THE MICRO LOGIC. THE TEST WILL PRINT "BELL TEST"
INTERSPACED WITH BELL CODES BETWEEN CHARACTERS AND THE FOLLOWING
CARRIAGE RETURN AND LINE FEED FUNCTIONS. A TOTAL OF FIVE BELLS WILL
BE SOUNDED. THIS TEST WILL ALSO AUDIBLY INDICATE AN END OF A COMPLETE
PASS THROUGH THE PRINTING TEST SEQUENCE.

EXAMPLE:

```
<BEL>  BELL  <BEL>  <SP>  TEST  <BEL>  <CR>

<BEL>  <LF>  <BEL>  <CR>
```

6.3 MAINTANANCE AIDS

THESE TESTS ARE PROVIDED AS ADDITIONAL DEBUGGING AND EXERCISING AIDS FOR THE LA180 PRINTER. A DETAILED DESCRIPTION OF EACH TEST FOLLOWS.

6.3.1 TEST 60 - LIFE TEST

THIS TEST RUNS CONTINUOUSLY AND IS RUN AS AN INDIVIDUAL, SPECIAL TEST, AND IS NOT PART OF THE STANDARD PRINTING TEST SEQUENCE. THIS TEST PRINTS 2 LINES OF EACH PRINTABLE CHARACTER AND THEN REPEATS CONTINUOUSLY. THE SECOND LINE OF EACH CHARACTER IS OVERPRINTED 4 TIMES TO CONSERVE PAPER. AT THE COMPLETION OF EACH PASS THROUGH THE ENTIRE PRINTABLE CHARACTER SET, THE PASS COUNT WILL BE PRINTED ON THE LA180.

TIME FOR A COMPLETE PASS, WITH 132 COLUMNS IS APPROXIMATELY 10 MINUTES.

EXAMPLE:

```
AAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBB
BBBBBBBBBBBBBBBBBBBB
```

6.3.2 TEST 61 - SCOPE DRIVE ROUTINE

THE PURPOSE OF THIS TEST IS TO PROVIDE THE OPERATOR WITH A SHORT BUT COMPREHENSIVE SCOPE DRIVER ROUTINE FOR USE IN TROUBLE SHOOTING THE PRINTER AND INTERFACE CONTROL LOGIC WITH AN OSCILLISCOPE.

DEPENDING ON THE SETTING OF THE SINGLE CHAR/FULL LINE SWITCH OF THE SWITCH REGISTER (SWITCH 04) THIS TEST WILL EITHER CONTINUALLY SEND WHATEVER CHARACTER IS SET IN THE SWITCH REGISTER TO THE LINE PRINTER, OR ONLY SEND IT ONCE AND HALT. WHEN CONTINUOUSLY SENDING CHARACTERS, A LINE FEED WILL BE INSERTED AFTER THE MAXIMUM COLUMN COUNT IS REACHED TO PRINT THE LINE. WHEN SENDING SINGLE CHARACTERS, DEPRESS CONTINUE TO SEND THE CHARACTER SET IN THE PROCESSOR SWITCH REGISTER. TO RESUME SENDING CONTINUOUS CHARACTERS, PLACE THE SINGLE CHAR/FULL LINE CONTROL SWITCH DOWN, SET THE DESIRED CHARACTER, AND DEPRESS CONTINUE. TO STOP SENDING CONTINUOUSLY PLACE THE SINGLE CHAR/FULL LINE SWITCH UP AND THE PROGRAM WILL HALT WAITING FOR A CHARACTER SELECTION. WHEN SENDING INDIVIDUAL CHARACTERS OR IF SENDING NON-PRINTABLE CHARACTERS, NO LINE FEEDS OR CARRIAGE RETURNS WILL BE INSERTED BY THE PROGRAM.

6.3.3 TEST 62 - LINE PRINT TEST

THIS TEST CONTINUOUSLY PRINTS FULL LINES OF WHATEVER CHARACTER IS TYPED ON THE CONSOLE KEYBOARD. TO CHANGE CHARACTERS, RESELECT THIS TEST AND TYPE ANOTHER CHARACTER. AN ERROR MESSAGE WILL BE PRINTED ON THE LA180 IF THIS TEST IS SELECTED AND A CONSOLE TERMINAL DOES NOT EXIST.

6.3.4 TEST 63 - CHARACTER PRINT TEST

THIS TEST LOADS WHATEVER CHARACTER IS TYPED ON THE CONSOLE KEYBOARD TO THE LA180, CHARACTER BY CHARACTER. ALL TYPED CHARACTERS ARE ECHOED TO THE CONSOLE DEVICE AS THEY ARE LOADED TO THE LA180. EXTRA CARRIAGE RETURNS OR LINE FEEDS ARE ECHOED TO THE CONSOLE DEVICE TO AVOID OVERPRINTING LINES. IF THIS TEST IS SELECTED AND A CONSOLE TERMINAL DOES NOT EXIST AN ERROR MESSAGE WILL BE PRINTED ON THE LA180.

```
                  /MAINDEC-08-DILAC-B-L

                  /LA180 PRINTER DIAGNOSTIC

                  /COPYRIGHT (C) 1975, 1976, DIGITAL EQUIPMENT CO., MAYNARD, MA.  01754

                  /AUTHOR:       ROBERT BAKER/BRUCE HANSEN




                  /SWITCH REGISTER OPTIONS:

                  /SWITCH NUMBER          DESCRIPTION

                  /       00             STOP ON ERROR

                  /       01             INHIBIT ERROR TYPOUT

                  /       02             LOOP ON TEST

                  /       03             HALT AND SELECT TEST

                  /       04             SINGLE CHAR/FULL LINES - SCOPE ROUTINE
                  /                      MANUAL TIMING - PRINT SPEED TEST

                  /    04 - 11           # COLUMNS AT START UP

                  /    06 - 11           TEST SELECTION

                  /    05 - 11           CHARACTER SELECTION - SCOPE ROUTINE


        0000               *0

0000  0000               0
0001  5402               JMP I    ISRV          /INTERRUPT SERVICE
0002  0347      ISRV,    IERROR

        0010               *10

0010  0000      AUTPTR,  0                       /AUTO INCREMENT POINTER

        0020               *20

0020  0000      SWITCH,  0000                    /SOFTWARE SWITCH REGISTER
0021  4003      PARAM,   4003                    /SET TO 0003 IF NO HARDWARE SWITCH REG IS AVAILABLE
0022  0000               0000

                  /FLAGS, POINTERS, & STORAGE

0023  0000      TSTNM,   0                       /CURRENT TEST NUMBER
0024  0000      ERRNM,   0                       /ERROR NUMBER
```

```
0025  0000      ERRPC,   0                       /ERROR LOCATION
0026  0000      WIDTH,   0                       /NEGATIVE NUMBER OF COLUMNS

0027  0660      PTRIOT,  0660                    /LA180 IOT CODE - 0XX0
0030  0304      IOTSEL,  0304                    /TTY IOT CODES, XMT - RCV

0031  0000      CHAR,    0                       /CHARACTER STORAGE
0032  0000      CHAR2,   0
0033  0000      SAVE,    0                       /TEMP STORAGE
0034  0000      COUNT,   0                       /WORKING COUNTERS
0035  0000      COUNT2,  0
0036  0000      LPCNT,   0
0037  0000      CKCNT,   0
0040  0000      PASCNT,  0
0041  0000      TABPTR,  0                       /TABLE POINTER
0042  0000      TSTPTR,  0                       /TEST ADDRESS FROM TABLE
0043  0000      MSGADR,  0                       /MESSAGE ADDRESS STORAGE

0044  0000      ONES,    0                       /CONVERSION COUNTERS
0045  0000      TENS,    0
0046  0000      HUNDS,   0
0047  0000      THOUS,   0


0050  0000      STRONE,  0                       /ONE RUN FLAG - SW REG CNTRL
0051  0000      TRONE,   0                       /ONE RUN FLAG - KYBD CNTRL
0052  0000      TLOOP,   0                       /LOOP ON TEST FLAG - KYBD CNTRL

0053  0000      TPFLG,   0                       /TERMINAL AVAILABLE FLAG
                                                 /0 = NO, 7777 = YES   ---   (SET BY THE PROGRAM)

0054  0000      CKFLAG,  0                       /CLOCK OPTION FLAG
                                                 /0 = NONE AVAILABLE, OR DO NOT USE AVAILABLE OPTION

                                                 /IF DK8EA OR DK8EC IS AVAILABLE -
                                                 /SET CKFLAG DEPENDING ON CLOCK FREQ.

                                                 /7773 = 50 HZ - DK8EC
                                                 /7766 = 50 HZ LINE FREQ. - DK8EA
                                                 /7764 = 60 HZ LINE FREQ. - DK8EA
                                                 /7716 = 500 HZ - DK8EC
                                                 /7014 = 5 KHZ - DK8EC

                  /TAGS

0055  4000      TTYPE,   RTYPE
0056  4060      TLOAD,   RLOAD
0057  3123      THOLD,   RHOLD
0060  4105      TMLOAD,  RMLOAD
0061  4200      TPRINT,  RPRINT
0062  4262      TPRHDR,  RPRHDR
0063  3600      TERROR,  RERROR
0064  3107      TCHECK,  RCHECK
0065  3017      TEXIT,   REXIT
0066  3405      TKBDST,  KYBDST
```

```
          0067  3054    TSELCT,  SELECT
          0070  4600    TTAT,    TAT
          0071  2716    TMIOT,   MIOT
          0072  2600    TKSF,    RKSF
          0073  2605    TKCC,    RKCC
          0074  2610    TKRS,    RKRS
          0075  2613    TKRB,    RKRB
          0076  2616    TTSF,    RTSF
          0077  2623    TTCF,    RTCF
          0100  2626    TTPC,    RTPC
          0101  2631    TTLS,    RTLS
          0102  2634    TPSKF,   RPSKF
          0103  2646    TPCLF,   RPCLF
          0104  2656    TPSTB,   RPSTB
          0105  2670    TPSIE,   RPSIE
          0106  2702    TPCLP,   RPCLP
          0107  3200    TKSFG,   KYBDF
          0110  3465    TTSEL,   TSEL
          0111  4400    READ,    TREAD
          0112  4451    TREADQ,  READQ
          0113  4510    CHKOCT,  TCKOUT
          0114  4520    CHKNR,   TCHKNR
          0115  4022    GOUT,    OUT
          0116  0333    TDELAY,  DELAY
          0117  3713    TCNVRT,  CNVRT
          0120  3000    TCKSRV,  CKSRV
          0121  0322    TGETSW,  RGETSW
          0122  3660    PDIGIT,  RPDIGT
          0123  3665    TPOCT,   POCT
          0124  4504    LREADT,  READT
          0125  0347    LIERR,   IERROR

                        /CONSTANTS

          0126  0002    P2,      0002
          0127  0007    P7,      0007
          0130  0010    P10,     0010
          0131  0012    P12,     0012
          0132  0015    P15,     0015
          0133  0036    P36,     0036
          0134  0040    P40,     0040
          0135  0041    P41,     0041
          0136  0055    P55,     0055
          0137  0057    P57,     0057
          0140  0060    P60,     0060
          0141  0072    P72,     0072
          0142  0077    P77,     0077
          0143  0100    P100,    0100
          0144  0134    P134,    0134
          0145  0177    P177,    0177
          0146  0200    P200,    0200
          0147  0204    P204,    0204
          0150  0377    P377,    0377
          0151  0400    P400,    0400
          0152  1000    P1000,   1000
```

```
          0153  7777    M1,      7777
          0154  7776    M2,      7776
          0155  7775    M3,      7775
          0156  7774    M4,      7774
          0157  7771    M7,      7771
          0160  7766    M12,     7766
          0161  7763    M15,     7763
          0162  7760    M20,     7760
          0163  7755    M23,     7755
          0164  7753    M25,     7753
          0165  7750    M30,     7750
          0166  7743    M35,     7743
          0167  7742    M36,     7742
          0170  7740    M40,     7740
          0171  7722    M56,     7722
          0172  7700    M100,    7700
          0173  7634    M144,    7634
          0174  7601    M177,    7601

                        /SUBROUTINE CALL EQUATES

          4455            TYPE=JMS I     TTYPE         /TYPE ASCII STRING ON CONSOLE
          5465            EXIT=JMP I     TEXIT         /EXIT TEST
          4456            LOAD=JMS I     TLOAD         /LOAD SINGLE CHAR TO LA180
          4457            HOLD=JMS I     THOLD         /WAIT FOR OPERATOR
          4464            CHECK=JMS I    TCHECK        /CHECK FOR CONTROL
          4463            ERROR=JMS I    TERROR        /ERROR REPORT
          4461            PRINT=JMS I    TPRINT        /PRINT ASCII STRING ON LA180
          4460            MLOAD=JMS I    TMLOAD        /LOAD MULTIPLE CHARS TO LA180
          4521            GETSW=JMS I    TGETSW        /GET SWITCH REGISTER SETTING
          4462            PRTHDR=JMS I   TPRHDR        /PRINT TEST HEADER ON LA180

                        /LINE PRINTER INSTRUCTIONS

          6661            PSKF=6661                    /SKIP ON CHAR FLAG
          6662            PCLF=6662                    /CLEAR CHAR FLAG
          6664            PSTB=6664                    /LOAD BUFFER
          6665            PSIE=6665                    /ENABLE INTERRUPT
          6666            PCLP=6666                    /CLEAR FLAG & LOAD CHAR

                        /DK8-EA & DK8-EC CLOCK INSTRUCTIONS

          6131            CLEI=6131                    /ENABLE CLOCK INTERRUPT
          6132            CLDI=6132                    /DISABLE CLOCK INTERRUPT
          6133            CLSK=6133                    /SKIP ON CLOCK FLAG, AND CLEAR FLAG

                        /PDP-8A OPTION BOARD #1 PARALLEL I/O INSTRUCTIONS

          6570            DBST=6570                    /SKIP ON DATA ACCEPTED AND CLEAR DATA
                                                       /DATA ACCEPTED AND DATA AVAILABLE
          6571            DBSK=6571                    /SKIP ON DATA READY
          6572            DBRD=6572                    /READ DATA INTO AC 0-11
          6573            DBCF=6573                    /CLEAR DATA READY ISSUE DATA ACCEPTED OUT
```

```
                6574                DBTD=6574              /LOAD AC 0=11 INTO BUFFER AND TRANSMIT
                6575                DBSE=6575              /SET PARALLEL I/O INTERRUPT ENABLE
                6576                DBCE=6576              /CLEAR PARALLEL I/O INTERRUPT ENABLE
                6577                DBSS=6577              /ISSUE DATA STROBE PULSE


                    /STARTING ADDRESSES

        0200                        *200

 0200   5210                JMP     START              /GENERAL DIAGNOSTIC STARTING ADR

 0201   5213                JMP     RESTRT             /RESTART, SKIP OPR INTERVENTION TESTS

 0202   5217                JMP     CONTRL             /GO DIRECTLY TO OPERATOR CONTROL

        0210                        *210

 0210   7300        START,  CLA CLL                    /CLEAR
 0211   3023                DCA     TSTNM              /SET TEST NUMBER TO ZERO
 0212   5221                JMP     STARTX             /INITIALIZE
 0213   7300        RESTRT, CLA CLL                    /CLEAR
 0214   1377                TAD     (20                /GET CONSTANT
 0215   3023                DCA     TSTNM              /SET TEST #20
 0216   5221                JMP     STARTX             /INITIALIZE
 0217   7240        CONTRL, CLA CMA                    /SET AC = -1
 0220   3023                DCA     TSTNM              /SET CONTROL FLAG
 0221   6002        STARTX, IOF                        /INTERRUPTS OFF
 0222   6132                CLDI
 0223   7300                CLA CLL
 0224   4505                JMS I   TPSIE
 0225   4521                GETSW                      /GET SW REG
 0226   0150                AND     P377               /SAVE BITS 04=11
 0227   7041                CIA                        /NEGATE VALUE
 0230   3026                DCA     WIDTH              /STORE # COLUMNS
 0231   1126                TAD     P2                 /CHECK COLUMN SELECTION
 0232   1026                TAD     WIDTH
 0233   7740                SMA SZA CLA                /# COLUMNS < 2 ?
 0234   5241                JMP     START2             /YES, SET TO 132(10)
 0235   1147                TAD     P204               /NO, CHECK AGAIN
 0236   1026                TAD     WIDTH
 0237   7700                SMA CLA                    /# COLUMNS > 132(10) ?
 0240   5243                JMP     .+3                /NO, CONTINUE
 0241   1376        START2, TAD     (-204              /SET COLUMN COUNT TO 132(10)
 0242   3026                DCA     WIDTH              /STORE VALUE
 0243   3052                DCA     TLOOP              /CLEAR PROGRAM FLAGS
 0244   3050                DCA     STRONE
 0245   3051                DCA     TRONE
 0246   1125                TAD     LIERR              /RESET INTERRUPT ERROR
 0247   3002                DCA     ISRV
 0250   1145                TAD     P177               /SET LA180 READY FLAG
 0251   4506                JMS I   TPCLP
 0252   4471                JMS I   THIOT              /SET IOTS FOR TTY & PRINTER
 0253   4501                JMS I   TTLS               /CLEAR FLAG
```

```
 0254   4333                JMS     DELAY              /WAIT 150 MILLISECONDS
 0255   4476                JMS I   TTSF               /SKIP IF FLAG IS SET
 0256   7610                SKP CLA                    /AC = 0, NO TERMINAL
 0257   7240                CLA CMA                    /AC = -1, TERMINAL EXISTS
 0260   3053                DCA     TPFLG              /STORE TERMINAL FLAG
 0261   1053                TAD     TPFLG              /CHECK FOR CONSOLE
 0262   7640                SZA CLA                    /SKIP IF NONE
 0263   5266                JMP     STARTB             /CONTINUE
 0264   4461                PRINT                      /PRINT NO CONSOLE MESG ON LA180
 0265   5231                NCMSG
 0266   7410        STARTB, SKP
 0267   5274                JMP     START5
 0270   4455                TYPE                       /TYPE TITLE MESSAGE ON TERMINAL
 0271   4716                HEADER
 0272   1375                TAD     (NOP)              /SKIP TITLE MSG THERE AFTER
 0273   3266                DCA     STARTB
 0274   1023        START5, TAD     TSTNM              /GET TEST #
 0275   7700                SMA CLA                    /WANT CONTROL?
 0276   5306                JMP     START7             /NO, CONTINUE
 0277   1053        START9, TAD     TPFLG              /YES, TERMINAL THERE
 0300   7640                SZA CLA
 0301   5466                JMP I   TKBDST             /YES, GO TO KYBD CONTROL
 0302   5467                JMP I   TSELCT             /NO, DEFAULT TO SW REG CONTROL
 0303   7640        START8, SZA CLA
 0304   5277                JMP     START9             /GO TO CONTROL IF NO TEST IN TABLE
 0305   2023                ISZ     TSTNM              /INC TEST #
 0306   4521        START7, GETSW                      /GET SW REG
 0307   0151                AND     P400               /MASK SW3
 0310   7640                SZA CLA                    /WANT TEST SELECTION?
 0311   5467                JMP I   TSELCT             /YES, GO TO TEST SELECTION HALT
 0312   1070                TAD     TTAT               /GET TABLE ADR
 0313   1023                TAD     TSTNM              /ADD TEST #
 0314   3041                DCA     TABPTR             /STORE POINTER
 0315   1441                TAD I   TABPTR             /GET TEST ADDRESS
 0316   7550                SNA SPA                    /TEST IN TABLE?
 0317   5303                JMP     START8             /NO, INC TEST ADR
 0320   3042                DCA     TSTPTR             /YES, STORE TEST ADR
 0321   5442                JMP I   TSTPTR             /GO TO TEST




                    /ROUTINE TO GET SWITCH SETTINGS

 0322   0000        RGETSW, 0
 0323   7300                CLA CLL                    /CLEAR AC AND LINK
 0324   1021                TAD     PARAM              /CHECK IF HAVE HARDWARE SWR
 0325   7710                SPA CLA                    /SKIP IF NO
 0326   5331                JMP     .+3
 0327   1020                TAD     SWITCH             /GET SOFTWARE SWITCHES
 0330   5722                JMP I   RGETSW             /RETURN
 0331   7604                LAS                        /GET HARDWARE SWITCHES
 0332   5722                JMP I   RGETSW             /RETURN
```

```
                    /ROUTINE TO DELAY ABOUT 150 MILLISECONDS
                    /USING INSTRUCTION TIMING.

0333  0000    DELAY,    0
0334  7300              CLA CLL              /CLEAR
0335  3345              DCA     DELAY0       /SET DELAY COUNT
0336  1374              TAD     (-10
0337  3346              DCA     DELAY1
0340  2345              ISZ     DELAY0       /DELAY
0341  5340              JMP     .-1
0342  2346              ISZ     DELAY1
0343  5340              JMP     .-3
0344  5733              JMP I   DELAY        /RETURN

0345  0000    DELAY0,  0000                  /DELAY COUNTS
0346  7770    DELAY1,  7770



                    /ROUTINE TO REPORT UNEXPECTED INTERRUPTS DURING EXECUTION

0347  0463    IERROR,  ERROR                 /REPORT ERROR
0350  0012             12
0351  5400             JMP I   0             /RETURN & CONTINUE IF POSSIBLE
0374  7770
0375  7000
0376  7574
0377  0020
      0400             PAGE

                    /OPERATOR INTERVENTION TESTS

                    /TEST 0 - INTERFACE & CONTROL TESTS

                    /TEST READY BIT, PRINTER OFF LINE - POWER OFF

0400  4455    TEST0,   TYPE                  /TYPE INSTRUCTIONS
0401  5250             T0MSG0
0402  4457             HOLD                  /WAIT FOR OPERATOR
0403  4464    T0AC,    CHECK                 /CHECK FOR CONTROL
0404  7300             CLA CLL               /CLEAR AC AND LINK
0405  1145             TAD     P177          /SEND RUBOUT
0406  4506             JMS I   TPCLP
0407  4516             JMS I   TDELAY        /DELAY 150 MSEC FOR FLAG
0410  4502             JMS I   TPSKF         /SKIP ON READY
0411  5215             JMP     T0AA          /OK, READY CLEAR
0412  4463             ERROR                 /READY SET, POWER OFF
0413  0001             1
0414  5203             JMP     T0AC          /RETEST

                    /TEST READY BIT, PRINTER OFF LINE - POWER ON

0415  4455    T0AA,    TYPE                  /TYPE INSTRUCTIONS, TURN POWER ON
0416  5270             T0MSG1
```

```
0417  4457             HOLD                  /WAIT FOR OPERATOR
0420  4464    T0AB,    CHECK                 /CHECK FOR CONTROL
0421  7300             CLA CLL               /CLEAR AC AND LINK
0422  1145             TAD     P177          /SEND RUBOUT
0423  4506             JMS I   TPCLP
0424  4516             JMS I   TDELAY        /DELAY 150 MSEC FOR FLAG
0425  4502             JMS I   TPSKF         /SKIP ON READY
0426  5232             JMP     T0B           /OK, READY CLEAR
0427  4463             ERROR                 /READY SET, PRINTER OFF LINE
0430  0002             2
0431  5220             JMP     T0AB          /RESTEST

                    /TEST READY BIT, PRINTER ON LINE

0432  4455    T0B,     TYPE                  /TYPE INSTR, TURN ON LINE
0433  5302             T0MSG2
0434  4457             HOLD                  /WAIT FOR OPERATOR
0435  4464    T0C,     CHECK                 /CHECK FOR CONTROL
0436  7300             CLA CLL               /CLEAR AC AND LINK
0437  1145             TAD     P177          /SEND RUBOUT
0440  4506             JMS I   TPCLP
0441  4516             JMS I   TDELAY        /DELAY 150 MSEC FOR FLAG
0442  4502             JMS I   TPSKF         /SKIP ON READY
0443  5253             JMP     .+10          /READY NOT SET
0444  4777*            JMS     OP1CHK        /CHECK TO SEE IF PARALLEL I/O
0445  0447             .+2                   /WAS PARALLEL I/O
0446  5256             JMP     T0E           /OK-READY SET
0447  1145             TAD     P177          /RESET DATA ACCEPTED FLAG
0450  4506             JMS I   TPCLP         /GO LOAD THE BUFFER
0451  4516             JMS I   TDELAY
0452  5256             JMP     T0E           /CONTINUE THE TEST
0453  4463             ERROR                 /READY CLEAR, PRINTER ON LINE
0454  0003             3
0455  5235             JMP     T0C           /RETEST

                    /TEST PAPER OUT SWITCH

0456  4455    T0E,     TYPE                  /TYPE INSTR, PAPER OUT
0457  5320             T0MSG3
0460  4457             HOLD                  /WAIT FOR OPERATOR
0461  4464    T0F,     CHECK                 /CHECK FOR CONTROL
0462  4461             PRINT
0463  5440             LF                    /SEND LF
0464  4516             JMS I   TDELAY        /DELAY FOR 150 MSEC
0465  4502             JMS I   TPSKF         /SKIP ON READY
0466  5272             JMP     T0H           /OK, READY CLEAR
0467  4463             ERROR                 /READY SET, PAPER OUT, ON LINE
0470  0004             4
0471  5261             JMP     T0F           /RETEST

                    /TEST ABILITY TO CLEAR ERROR CONDITION

0472  4455    T0H,     TYPE                  /TYPE INSTR, RESET & ON LINE
0473  5335             T0MSG4
0474  4457             HOLD                  /WAIT FOR OPERATOR
```

```
0475 4464    T0I,    CHECK                       /CHECK FOR CONTROL
0476 7300            CLA CLL                      /CLEAR AC AND LINK
0477 1145            TAD     P177                 /SEND RUBOUT
0500 4506            JMS I   TPCLP
0501 4516            JMS I   TDELAY               /DELAY 150 MSEC FOR FLAG
0502 4502            JMS I   TPSKF                /SKIP ON READY
0503 7410            SKP
0504 5310            JMP     T0K                  /OK, READY SET
0505 4463            ERROR                        /READY NOT SET
0506 0005            5
0507 5275            JMP     T0I                  /RETEST
```

                     /TEST ABILITY TO CLEAR READY FLAG

```
0510 4464    T0K,    CHECK                       /CHECK FOR CONTROL
0511 4503            JMS I   TPCLF                /CLEAR FLAG
0512 4502            JMS I   TPSKF                /SKIP ON CHAR FLAG
0513 5317            JMP     T0L                  /OK, FLAG CLEAR
0514 4463            ERROR                        /FLAG DID NOT CLEAR
0515 0006            6
0516 5310            JMP     T0K                  /RETEST
```

                     /TEST THAT SENDING CHAR WILL RESET READY FLAG

```
0517 4464    T0L,    CHECK                       /CHECK FOR CONTROL
0520 7300            CLA CLL
0521 1145            TAD     P177                 /GET RUBOUT
0522 4504            JMS I   TPSTB                /LOAD CHAR
0523 4516            JMS I   TDELAY               /WAIT 150 MSEC
0524 4502            JMS I   TPSKF                /SKIP ON CHAR FLAG
0525 7410            SKP
0526 5332            JMP     T0M
0527 4463            ERROR                        /READY DID NOT SET
0530 0007            7
0531 5310            JMP     T0K                  /RETEST CLEAR & SET FLAG
```

                     /TEST AGAIN USING SINGLE INSTR

```
0532 4464    T0M,    CHECK                       /CHECK FOR CONTROL
0533 4776            JMS     SETSKP               /GO SETUP FOR SKIP IOT  TO BE USED
0534 1145            TAD     P177                 /SET RUBOUT
0535 4506            JMS I   TPCLP                /LOAD CHAR
0536 6661    T0MIOT, PSKF/DBST                    /SKIP ON CHAR FLAG
0537 5343            JMP     T0N                  /OK, FLAG CLEAR
0540 4463            ERROR                        /FLAG DID NOT CLEAR
0541 0010            10
0542 5332            JMP     T0M                  /RETEST
0543 4516    T0N,    JMS I   TDELAY               /DELAY 150 MSEC
0544 4502            JMS I   TPSKF                /SKIP ON CHAR FLAG
0545 7410            SKP
0546 5352            JMP     T00                  /OK, FLAG SET
0547 4463            ERROR                        /FLAG DID NOT SET
0550 0011            11
0551 5332            JMP     T0M                  /RETEST
```

                     /CHECK FOR UNEXPECTED INTERRUPTS

```
0552 4464    T00,    CHECK                       /CHECK FOR CONTROL
0553 7300            CLA CLL
0554 1375            TAD     (T0P                 /SET INT RETURN
0555 3002            DCA     ISRV
0556 4473            JMS I   TKCC
0557 4477            JMS I   TTCF                 /CLEAR CONSOLE PTR FLAG
0560 4503            JMS I   TPCLF                /CLEAR LA180 READY BIT
0561 7300            CLA CLL
0562 4505            JMS I   TPSIE                /DISABLE LA180 INTERRUPT
0563 6001            ION                          /ENABLE INTERRUPT SYSTEM
0564 7000            NOP
0565 7000            NOP
0566 6002            IOF                          /DISABLE INTERRUPT SYSTEM
0567 5773            JMP I   LT00                 /OK, CONTINUE
0570 4463    T0P,    ERROR                        /UNEXPECTED INTERRUPT
0571 0012            12
0572 5352            JMP     T00                  /RETEST
0573 0600    LT00,   T0Q
0575 0570
0576 1540
0577 3142
0600                 PAGE
```

                     /CHECK THAT NO INTERRUPT OCCURS WITH READY BIT CLEAR

```
0600 4464    T0Q,    CHECK                       /CHECK FOR CONTROL
0601 7300            CLA CLL
0602 1377            TAD     (T0R                 /SET INTERRUPT RETURN
0603 3002            DCA     ISRV
0604 4473            JMS I   TKCC
0605 4477            JMS I   TTCF                 /CLEAR CONSOLE PTR FLAG
0606 4503            JMS I   TPCLF                /CLEAR LA180 READY BIT
0607 7201            CLA IAC
0610 4505            JMS I   TPSIE                /ENABLE LA180 INTERRUPT
0611 6001            ION                          /ENABLE INTERRUPT SYSTEM
0612 7000            NOP                          /DELAY 2 INSTRUCTION TIMES
0613 7000            NOP
0614 6002            IOF                          /DISABLE INTERRUPT SYSTEM
0615 7300            CLA CLL
0616 4505            JMS I   TPSIE                /DISABLE LA180 INTERRUPT
0617 5225            JMP     T0S
```

```
0620 7300    T0R,    CLA CLL
0621 4505            JMS I   TPSIE                /DISABLE LA180 INTERRUPT
0622 4463            ERROR                        /INTERRUPT WITH READY BIT CLEAR
0623 0013            13
0624 5200            JMP     T0Q                  /RETEST
```

                     /CHECK THAT INTERRUPT OCCURS WITH READY BIT SET

```
0625 4464    T0S,    CHECK                       /CHECK FOR CONTROL
0626 7300            CLA CLL
0627 1376            TAD     (T0W                 /SET INTER RETURN
```

```
        0630  3002          DCA     ISRV            /SEND CHAR TO SET FLAG
        0631  1145          TAD     P177
        0632  4506          JMS I   TPCLP
        0633  4775'         JMS     OP1CHK          /GO CHECK FOR PARALLEL I/O
        0634  0640          .+4                     /ON PARALLEL I/O - GO DELAY
        0635  4502          JMS I   TPSKF           /SKIP ON READY
        0636  5235          JMP     .-1             /WAIT FOR READY
        0637  7410          SKP
        0640  4516          JMS I   TDELAY
        0641  4473          JMS I   TKCC
        0642  4477          JMS I   TTCF            /CLEAR CONSOLE PTR FLAG
        0643  7201          CLA IAC
        0644  4505          JMS I   TPSIE           /ENABLE LA180 INTERRUPT
        0645  6001          ION                     /ENABLE INTERRUPT SYSTEM
        0646  7000          NOP                     /WAIT 2 INSTR TIMES
        0647  7000          NOP
        0650  6002          IOF                     /DISABLE INTERRUPT SYSTEM
        0651  7300          CLA CLL
        0652  4505          JMS I   TPSIE           /DISABLE LA180 INTERRUPT
        0653  4463          ERROR                   /DID NOT INTER, READY SET
        0654  0014          14
        0655  5225          JMP     T08             /RETEST
        0656  7300  T0W,    CLA CLL
        0657  4505          JMS I   TPSIE           /DISABLE LA180 INTERRUPT

                /TEST NO INTERRUPT OCCURS WITH LA180 INTERRUPT ENABLED, READY SET,
                /BUT CPU INTERRUPT SYSTEM OFF.

        0660  4464  T0U,    CHECK                   /CHECK FOR CONTROL
        0661  7300          CLA CLL
        0662  1374          TAD     (T0V             /SET INTER RETURN ADR
        0663  3002          DCA     ISRV
        0664  1145          TAD     P177            /SEND CHAR TO SET FLAG
        0665  4506          JMS I   TPCLP
        0666  4775'         JMS     OP1CHK          /GO CHECK FOR PARALLEL I/O
        0667  0673          .+4                     /ADDRESS FOR PARALLEL I/O - DELAY
        0670  4502          JMS I   TPSKF           /WAIT FOR READY
        0671  9270          JMP     .-1
        0672  7410          SKP
        0673  4516          JMS I   TDELAY          /DELAY TO ALLOW FLAG TO SET
        0674  4473          JMS I   TKCC
        0675  4477          JMS I   TTCF            /CLEAR CONSOLE PTR FLAG
        0676  7201          CLA IAC
        0677  4505          JMS I   TPSIE           /ENABLE LA180 INTERRUPT
        0700  7000          NOP                     /WAIT 2 INSTR TIMES
        0701  7000          NOP
        0702  7300          CLA CLL
        0703  4505          JMS I   TPSIE           /DISABLE LA180 INTERRUPT
        0704  1125          TAD     LIERR           /SET INTERRUPT ERROR ADR
        0705  3002          DCA     ISRV
        0706  5465          EXIT                    /EXIT TEST

        0707  7300  T0V,    CLA CLL
        0710  4505          JMS I   TPSIE           /DISABLE LA180 INTERRUPT
        0711  4463          ERROR                   /INTERRUPT WITH SYSTEM DISABLED
```

```
        0712  0015          15
        0713  5260          JMP     T0U             /RETEST

                /TEST 1 - TOP OF FORM SWITCH TEST

        0714  4462  TEST1,  PRTHDR                  /PRINT TEST HEADER
        0715  1373          TAD     (TITAB
        0716  3041          DCA     TABPTR          /STORE TABLE POINTER
        0717  1165          TAD     M30
        0720  3034          DCA     COUNT           /SET DASH COUNT
        0721  1136          TAD     P55             /SET DASH CHAR
        0722  4460          MLOAD                   /LOAD DASHED LINE
        0723  4461          PRINT
        0724  5437          CR                      /PRINT LINE
        0725  4455  T1A,    TYPE                    /TYPE INSTRUCTIONS
        0726  5375          T1MSG3                  /SET SWITCH SETTING FOR MSG
        0727  1041          TAD     TABPTR
        0730  3332          DCA     .+2
        0731  4455          TYPE
        0732  0000          0                       /FINISH INSTR
        0733  4455          TYPE
        0734  5412          T1MSG4
        0735  4457          HOLD                    /WAIT FOR OPERATOR
        0736  4464          CHECK                   /CHECK FOR CONTROL
        0737  4461          PRINT                   /ISSUE FF
        0740  5442          FF
        0741  4461          PRINT                   /PRINT REFERENCE LINE
        0742  5355          T1MSG1
        0743  1041          TAD     TABPTR          /SET FF LENGTH FOR MESG
        0744  3346          DCA     .+2
        0745  4461          PRINT
        0746  0000          0
        0747  4461          PRINT                   /FINISH MESG
        0750  5361          T1MSG2
        0751  2041          ISZ     TABPTR          /INC TABLE POINTER
        0752  2041          ISZ     TABPTR
        0753  1441          TAD I   TABPTR          /CHECK TABLE TO SEE IF DONE
        0754  7640          SZA CLA
        0755  5325          JMP     T1A             /CONTINUE
        0756  4461          PRINT
        0757  5440          LF                      /ADVANCE PAPER
        0760  5465          EXIT                    /EXIT

        0773  5447
        0774  0707
        0775  3142
        0776  0656
        0777  0620
        1000          PAGE

                /TEST 2 - PRINT SPEED TIMING TEST
                /
                /A SWIRL PATTERN IS PRINTED FOR ONE FULL MINUTE
                /WHILE THE NUMBER OF LINES PRINTED IS COUNTED.
                /TIMING WILL BE DONE BY DK8-EA OR DK8-EC CLOCK
```

```
                    /OPTION IF EITHER IS AVAILABLE AND LOCATION
                    /"CKFLAG" IS PRESET WITH THE TIME COUNT.
                    /IF CKFLAG IS ZERO, MANUAL TIMING WILL BE USED TO
                    /OBTAIN AN APPROXIMATE PRINT TIMING.
                    /IF A HARDWARE SWITCH REGISTER IS NOT AVAILABLE, THIS TEST
                    /CANNOT BE RUN WITHOUT A CLOCK OPTION BEING AVAILABLE.
                    /THE PROGRAM WILL AUTOMATICALLY SKIP THIS TEST IF IT CANNOT BE RUN.

    1000  4462    TEST2,   PRTHDR            /PRINT TEST HEADER
    1001  3040             DCA      PASCNT   /CLEAR PASS COUNT (LINE COUNT)
    1002  1054             TAD      CKFLAG   /CLOCK OPTION AVAILABLE?
    1003  7640             SZA CLA
    1004  5230             JMP      T2C      /YES, GO TO CLOCK SET-UP
    1005  1021             TAD      PARAM    /HAVE HARDWARE SWITCH REGISTER?
    1006  7710             SPA CLA
    1007  5215             JMP      T2A      /YES, CONTINUE
    1010  4461             PRINT             /NO, PRINT ERROR MESG
    1011  5151             T2EM
    1012  4455             TYPE
    1013  5151             T2EM
    1014  5465             EXIT              /EXIT TEST

                    /MANUAL TIMING START-UP

    1015  4455    T2A,     TYPE              /PRINT INSRTUCTIONS
    1016  5067             T2M1
    1017  4455             TYPE
    1020  5105             T2M2
    1021  4455             TYPE
    1022  5126             T2M3
    1023  4521    T2B,     GETSW             /GET SWITCHES
    1024  0146             AND      P200     /MASK SWITCH 0
    1025  7650             SNA CLA            /START? - SWITCH UP?
    1026  5223             JMP      T2B      /NO, WAIT FOR SWITCH TO GO UP
    1027  5244             JMP      T2SP     /YES, START PRINTING

                    /CLOCK OPTION START-UP

    1030  1377    T2C,     TAD      (6650    /SET TIME COUNT FOR ONE MINUTE
    1031  3036             DCA      LPCNT
    1032  1120             TAD      TCKSRV
    1033  3002             DCA      ISRV
    1034  1054             TAD      CKFLAG
    1035  3037             DCA      CKCNT
    1036  4473             JMS I    TKCC
    1037  4477             JMS I    TTCF
    1040  7300             CLA CLL
    1041  4505             JMS I    TPSIE    /DISABLE PRINTER INTERRUPT
    1042  6131             CLEI              /SET CLOCK INTERRUPT ENABLE
    1043  6001             ION               /INTERRUPT SYSTEM ON

                    /PRINTING ROUTINE FOR TEST 2

    1044  7201    T2SP,    CLA IAC           /SET START CHAR
    1045  1134             TAD      P40
```

```
    1046  3032             DCA      CHAR2    /SAVE IT
    1047  1032    T2PA,    TAD      CHAR2    /GET START CHAR
    1050  3031             DCA      CHAR     /SET CHARACTER TO BE LOADED
    1051  1026             TAD      WIDTH    /SET COLUMN COUNT
    1052  3034             DCA      COUNT
    1053  1031    T2PC,    TAD      CHAR     /GET CHAR
    1054  4456             LOAD              /LOAD CHAR
    1055  2034             ISZ      COUNT    /INC CHAR COUNT
    1056  7410             SKP               /CONTINUE LINE
    1057  5270             JMP      T2PD     /SEND LF IF END OF LINE
    1060  2031             ISZ      CHAR     /SET NEXT CHAR
    1061  1174             TAD      M177     /CHECK CHAR
    1062  1031             TAD      CHAR
    1063  7640             SZA CLA
    1064  5253             JMP      T2PC     /OK, CONTINUE
    1065  1134             TAD      P40      /RESET CHAR TO SPACE
    1066  3031             DCA      CHAR     /STORE NEW CHAR
    1067  5253             JMP      T2PC     /CONTINUE
    1070  4461    T2PD,    PRINT             /SEND LF TO PRINT LINE
    1071  5440             LF
    1072  2040             ISZ      PASCNT   /INC LINE COUNT
    1073  1054             TAD      CKFLAG   /USING CLOCK?
    1074  7640             SZA CLA
    1075  5302             JMP      T2PE     /YES, BYPASS MANUAL TIMING
    1076  4521             GETSW             /GET SWITCH REGISTER
    1077  0146             AND      P200     /MASK SWITCH 0
    1100  7650             SNA CLA            /STILL UP?
    1101  5314             JMP      T2SPD    /NO, EXIT PRINTING ROUTINE - PRINT COUNT
    1102  2032    T2PE,    ISZ      CHAR2    /SET NEW START CHAR (SWIRL)
    1103  1174             TAD      M177     /CHECK CHAR
    1104  1032             TAD      CHAR2
    1105  7640             SZA CLA
    1106  5247             JMP      T2PA     /OK, CONTINUE
    1107  5244             JMP      T2SP     /RESET START CHAR

                    /ROUTINE TO PRINT NUMBER OF LINES PRINTED

    1110  6002    T2SPDC,  IOF               /INTERRUPT SYSTEM OFF
    1111  6132             CLDI              /DISABLE CLOCK INTERRUPT
    1112  1125             TAD      LIERR    /RESET UNEXPECTED INTERRUPT ERROR
    1113  3002             DCA      ISRV
    1114  7300    T2SPD,   CLA CLL           /CLEAR AC AND LINK
    1115  1145             TAD      P177     /GET RUBOUT
    1116  4456             LOAD              /CLEAR LA180 BUFFER
    1117  4455             TYPE              /START MESG
    1120  5171             PRSP1
    1121  4461             PRINT
    1122  5171             PRSP1
    1123  1054             TAD      CKFLAG   /CHECK IF USED CLOCK
    1124  7640             SZA CLA
    1125  5332             JMP      T2S1     /YES, SKIP WORD "APPROX"
    1126  4455             TYPE              /NO, ADD WORD "APPROXIMATE" TO MESG
    1127  5202             PRSP2
    1130  4461             PRINT
    1131  5202             PRSP2
```

```
1132 1040   T281,   TAD     PASCNT      /GET LINE COUNT
1133 4517           JMS I   TCNVRT      /CONVERT NUMBER TO ASCII MESG
1134 4461           PRINT               /PRINT IT
1135 5435           CNVMSG
1136 4455           TYPE
1137 5435           CNVMSG
1140 4461           PRINT               /PRINT MORE OF MESG
1141 5206           PRSP3
1142 4455           TYPE
1143 5206           PRSP3
1144 1026           TAD     WIDTH       /GET # OF COLUMNS
1145 7041           CIA
1146 4517           JMS I   TCNVRT      /CONVERT IT TO ASCII MESG
1147 4461           PRINT
1150 5435           CNVMSG
1151 4455           TYPE
1152 5435           CNVMSG
1153 4461           PRINT
1154 5222           PRSP4               /FINISH MESG & PRINT
1155 4455           TYPE
1156 5222           PRSP4
1157 5465           EXIT                /EXIT TEST

1177 6650
     1200                   PAGE

               /PRINTING TESTS


               /TEST 20 = DATA TRANSFER PATHS TEST
               /
               /THIS TEST PRINTS 16 LINES OF ALTERNATING X'S AND U'S IN A
               /CHECKERBOARD PATTERN

1200 4462   TEST20, PRTHDR              /PRINT TEST HEADER
1201 1162           TAD     H20         /SET LINE COUNT FOR 16 LINES
1202 3036           DCA     LPCNT       /STORE COUNT
1203 1026   T20A,   TAD     WIDTH       /GET # COLUMNS
1204 3034           DCA     COUNT       /STORE
1205 7001           IAC                 /CHECK LINE COUNT
1206 0036           AND     LPCNT
1207 7640           SZA CLA             /START CHAR =?
1210 5216           JMP     T20C        /START WITH "U"
1211 1377   T20B,   TAD     (52         /GET "*" CHAR CODE
1212 4456           LOAD                /LOAD *
1213 2034           ISZ     COUNT       /INC CHAR COUNT
1214 7410           SKP                 /CONTINUE
1215 5222           JMP     T20D        /PRINT LINE IF DONE LOAD
1216 1376   T20C,   TAD     (125        /GET "U" CHAR CODE
1217 4456           LOAD                /LOAD CHAR
1220 2034           ISZ     COUNT       /INC CHAR COUNT
1221 5211           JMP     T20B        /CONTINUE LOAD
1222 4461   T20D,   PRINT               /PRINT LINE WHEN DONE LOAD
1223 5440           LF                  /ADVANCE PAPER
1224 2036           ISZ     LPCNT       /INC LINE COUNT
```

```
1225 5203           JMP     T20A        /FINISH TEST
1226 5465           EXIT                /EXIT

               /TEST 21 = HEAD POSITIONING TEST
               /
               /THIS TEST PRINTS A SINGLE LINE OF ALTERNATING 0'S AND SPACES
               /THEN FILLS IN THE SPACES WITH X'S ONE AT A TIME

1227 4462   TEST21, PRTHDR              /PRINT TEST HEADER
1230 1026           TAD     WIDTH       /GET # COLUMNS
1231 3034           DCA     COUNT       /STORE
1232 1140   T21B,   TAD     P60         /LOAD 0
1233 4456           LOAD
1234 2034           ISZ     COUNT       /INC CHAR COUNT, DONE?
1235 7410           SKP                 /NO, SEND SPACE
1236 5243           JMP     T21C        /YES, SEND CR = PRINT LINE
1237 1134           TAD     P40         /LOAD SPACE
1240 4456           LOAD
1241 2034           ISZ     COUNT       /INC COUNT, DONE?
1242 5232           JMP     T21B        /NO, CONTINUE LOAD
1243 4461   T21C,   PRINT               /YES, PRINT LINE
1244 5437           CR
1245 7240           CLA CMA             /SET AC==1
1246 3273           DCA     T21W        /STORE SPACE COUNT
1247 1273   T21D,   TAD     T21W        /SAVE SPACE COUNT
1250 3034           DCA     COUNT
1251 1134           TAD     P40         /GET SPACE
1252 4460           MLOAD               /LOAD SPACES
1253 1375           TAD     (130        /GET X CHAR CODE
1254 4456           LOAD                /LOAD IT
1255 4461           PRINT               /PRINT LINE
1256 5437           CR
1257 1154           TAD     H2          /ADD 2 TO SPACE COUNT
1260 1273           TAD     T21W
1261 3273           DCA     T21W        /STORE NEW COUNT
1262 7240           CLA CMA             /SET AC==1
1263 1273           TAD     T21W        /SUBTRACT SPACE COUNT
1264 7041           CIA                 /MAKE IT POSITIVE
1265 1026           TAD     WIDTH       /ADD # COLUMNS
1266 7750           SPA SNA CLA         /DONE LINE?
1267 5247           JMP     T21D        /NO CONTINUE
1270 4461           PRINT               /ADVANCE PAPER
1271 5440           LF
1272 5465           EXIT                /EXIT

1273 0000   T21W,   0

               /TEST 22 = BACKSPACE TEST
               /
               /TWO LINES OF X'S INTERSPACED WITH DASHES
               /WILL BE PRINTED BY PRINTING A SLASH, EXECUTING A BACKSPACE,
               /AND THEN PRINTING A BACKSLASH TO COMPLETE EACH X CHAR.
               /A MAX. OF 127 COLUMNS WILL BE PRINTED.

1274 4462   TEST22, PRTHDR              /PRINT TEST HEADER
```

```
        1275  1154          TAD   M2              /SET LINE COUNT
        1276  3036          DCA   LPCNT           /STORE COUNT
        1277  1026  T22A,   TAD   WIDTH           /GET # COLUMNS
        1300  1145          TAD   P177            /OVER 127?
        1301  7710          SPA CLA
        1302  5305          JMP   .+3
        1303  1026          TAD   WIDTH
        1304  7410          SKP
        1305  1174          TAD   M177            /YES, SET TO 127
        1306  3034          DCA   COUNT           /STORE COUNT
        1307  1137  T22B,   TAD   P57             /GET "/" CODE
        1310  4456          LOAD                  /LOAD
        1311  1130          TAD   P10             /GET BACKSPACE CODE
        1312  4456          LOAD                  /LOAD
        1313  1144          TAD   P134            /GET "\" CODE
        1314  4456          LOAD                  /LOAD
        1315  2034          ISZ   COUNT           /INC COLUMN COUNT
        1316  7410          SKP                   /CONTINUE IF NOT DONE
        1317  5324          JMP   T22C            /PRINT LINE IF DONE
        1320  1136          TAD   P55             /GET DASH
        1321  4456          LOAD                  /LOAD
        1322  2034          ISZ   COUNT           /INC COUNT, DONE?
        1323  5307          JMP   T22B            /NO, CONTINUE
        1324  4461  T22C,   PRINT                 /YES, PRINT LINE
        1325  5440          LF
        1326  2036          ISZ   LPCNT           /INC LINE COUNT, DONE?
        1327  5277          JMP   T22A            /NO, CONTINUE
        1330  5465          EXIT                  /YES, EXIT

                    /TEST 23 - CHARACTER GENERATOR TEST
                    /
                    /THIS TEST PRINTS A SINGLE LINE (30 CHARACTERS LONG) OF EACH
                    /PRINTABLE CHARACTER PRECEEDED BY A LINE OF ALL SPACES

        1331  4462  TEST23, PRTHDR                /PRINT TEST HEADER
        1332  1134          TAD   P40             /SET START CHAR (SPACE)
        1333  3031          DCA   CHAR            /STORE IT
        1334  1167  T23A,   TAD   M36             /SET COLUMN COUNT = 30
        1335  3034          DCA   COUNT           /STORE IT
        1336  1031          TAD   CHAR            /GET CHAR
        1337  4460          MLOAD                 /LOAD LINE
        1340  4461          PRINT                 /PRINT IT
        1341  5440          LF
        1342  2031          ISZ   CHAR            /SET NEXT CHAR
        1343  1174          TAD   M177            /CHECK CHAR
        1344  1031          TAD   CHAR
        1345  7640          SZA CLA               /DONE TEST?
        1346  5334          JMP   T23A            /NO, CONTINUE
        1347  5465          EXIT                  /YES, EXIT

        1375  0130
        1376  0125
        1377  0052
              1400          PAGE
```

```
                    /TEST 24 - NON-PRINTABLE CHARACTER TEST
                    /
                    /THIS TEST PRINTS A 30 LINE SWIRL PATTERN WITH NON-PRINTABLE CHARACTERS
                    /LOADED BEFORE AND AFTER THE PRINTING CHARACTERS TO TEST ALL AREAS OF THE
                    /CHARACTER BUFFER IN THE LA180.  IF THIS TEST IS LOOPED ON,
                    /THE SWIRL PATTERN WILL CONTINUE, 30 LINES PRINTTED
                    /EACH TIME THE TEST IS LOOPED.

        1400  4462  TEST24, PRTHDR                /PRINT TEST HEADER
        1401  1135          TAD   P41             /SET START CHAR
        1402  3031          DCA   CHAR
        1403  1167  T24H,   TAD   M36
        1404  3036          DCA   LPCNT           /SET LINE COUNT
        1405  3040          DCA   PASCNT          /CLEAR CHAR INC COUNT
        1406  1026          TAD   WIDTH
        1407  1150          TAD   P377            /BUFFER SIZE=COLUMN COUNT
        1410  1166  T24A,   TAD   M35             /DIVIDE NON-PRINT CHAR COUNT BY 29
        1411  7510          SPA
        1412  5215          JMP   T24B
        1413  2040          ISZ   PASCNT          /PASCNT=NON-PRINT CHAR INC COUNT
        1414  5210          JMP   T24A
        1415  7300  T24B,   CLA CLL               /CLEAR NON-PRINT CHAR COUNT 2ND BLOCK
        1416  3035          DCA   COUNT2
        1417  1035  T24C,   TAD   COUNT2          /CALCULATE # NON-PRINT CHARS, 1ST BLOCK
        1420  7041          CIA
        1421  1377          TAD   (-377
        1422  1026          TAD   WIDTH
        1423  4277          JMS   T24S            /LOAD 1ST BLOCK OF NON-PRINT CHAR
        1424  7300          CLA CLL               /CLEAR AC AND LINK
        1425  1026          TAD   WIDTH           /SET # PRINTABLE CHARS (COLUMN COUNT)
        1426  3034          DCA   COUNT
        1427  1031          TAD   CHAR            /SET FORST PRINT CHAR
        1430  3032          DCA   CHAR2
        1431  1032  T24D,   TAD   CHAR2           /GET CHAR
        1432  4456          LOAD                  /LOAD PRINTABLE CHAR
        1433  2034          ISZ   COUNT           /INS CHAR COUNT
        1434  7410          SKP                   /NEXT CHAR
        1435  5246          JMP   T24E
        1436  2032          ISZ   CHAR2
        1437  1032          TAD   CHAR2           /CHECK CHAR
        1440  1174          TAD   M177            /CHAR=RUBOUT?
        1441  7640          SZA CLA
        1442  5231          JMP   T24D            /NO, CONTINUE
        1443  1134          TAD   P40             /YES, RESET CHAR=SPACE
        1444  3032          DCA   CHAR2
        1445  5231          JMP   T24D            /CONTINUE
        1446  1035  T24E,   TAD   COUNT2          /SET # NON-PPINT CHARS, 2ND BLOCK
        1447  4277          JMS   T24S            /LOAD 2ND BLOCK NON-PRINT CHARS
        1450  4461          PRINT                 /PRINT LINE
        1451  5440          LF
        1452  1035          TAD   COUNT2          /IN NON-PRINT CHAR COUNT, 2ND BLOCK
        1453  1040          TAD   PASCNT
        1454  3035          DCA   COUNT2
        1455  2031          ISZ   CHAR            /INC START CHAR
        1456  1031          TAD   CHAR            /CHECK START CHAR
```

```
          1457  1174              TAD     M177
          1460  7640              SZA CLA
          1461  5264              JMP     .+3             /OK, CONTINUE
          1462  1134              TAD     P40             /RESET START CHAR
          1463  3031              DCA     CHAR
          1464  2036              ISZ     LPCNT           /INC LINE COUNT
          1465  5217              JMP     T24C            /CONTINUE
          1466  7300      T24F,   CLA CLL
          1467  1052              TAD     TLOOP           /LOOP ON TEST?
          1470  7640              SZA CLA
          1471  5276              JMP     T24G            /YES, CONTINUE SWIRL
          1472  4521              GETSW
          1473  0152              AND     P1000           /LOOP ON TEST?
          1474  7650              SNA CLA
          1475  5465              EXIT                    /NO, EXIT TEST
          1476  5203      T24G,   JMP     T24H            /LOOP ON TEST

                  /ROUTINE TO LOAD NON-PRINTABLE CHARACTERS FOR TEST 24

          1477  0000      T24S,   0
          1500  7550              SPA SNA                 /GOOD CHAR COUNT?
          1501  5677              JMP I   T24S            /NO, RETURN
          1502  7041              CIA                     /YES, NEGATE IT
          1503  3034              DCA     COUNT           /SAVE IT
          1504  3032      T24SC,  DCA     CHAR2           /SET FIRST NON-PRINT CHAR
          1505  1032      T24SA,  TAD     CHAR2           /GET CHAR
          1506  4456              LOAD                    /LOAD CHAR
          1507  2034              ISZ     COUNT           /INC COUNT
          1510  7410              SKP
          1511  5677              JMP I   T24S            /RETURN IF ZERO
          1512  2032      T24SB,  ISZ     CHAR2           /NEXT CHAR
          1513  7300              CLA CLL
          1514  1032              TAD     CHAR2           /CHECK CHAR
          1515  1157              TAD     M7
          1516  7450              SNA
          1517  5312              JMP     T24SB           /BELL, SKIP
          1520  1153              TAD     M1
          1521  7450              SNA
          1522  5312              JMP     T24SB           /SKIP BS
          1523  1154              TAD     M2
          1524  7450              SNA
          1525  5312              JMP     T24SB           /SKIP LF
          1526  1154              TAD     M2
          1527  7450              SNA
          1530  5312              JMP     T24SB           /SKIP FF
          1531  1153              TAD     M1
          1532  7450              SNA
          1533  5312              JMP     T24SB           /SKIP CR
          1534  1163              TAD     M23
          1535  7650              SNA CLA                 /CHAR=SPACE?
          1536  5304              JMP     T24SC           /YES, RESET CHAR
          1537  5305              JMP     T24SA           /NO, CONTINUE

          1540  0000      SETSKP, 0
          1541  7300              CLA     CLL
```

```
          1542  1021              TAD     PARAM           /GET HARDWARE WORD 1
          1543  7004              RAL                     /PUT OPTION 1 BIT INTO BIT 0
          1544  7710              SPA     CLA             /WAS  OPTION 1 SELECTED ?
          1545  5351              JMP     .+4             /YES-SETUP IOT TO SKIP ON AND CLEAR DATA  ACCEPTED
          1546  1776'             TAD     RPSKF+3         /NO-SETUP FOR LA180 SKIP ON CHAR IOT
          1547  3775'             DCA     T0MIOT          /SAVE THE SKIP IOT
          1550  5740              JMP  I  SETSKP          /RETURN TO PROGRAM TO LOAD CHAR
          1551  1774'             TAD     OPDBST          /GET OPTION 1 IOT TO SKIP
          1552  5347              JMP     .-3             /RETURN TO PROGRAM

          1574  2643
          1575  0536
          1576  2637
          1577  7401
          1600              PAGE

                  /TEST 25 - BUFFER TEST
                  /
                  /THIS TEST CHECKS THE CHARACTER BUFFER OF THE LA180 WHILE PRINTING
                  /FOUR LINES OF NUMBERS (WITH 2 BLANK LINES BETWEEN THE
                  /FIRST AND SECOND LINE).  THESE LINES CAN BE USED TO
                  /CHECK THE PROPER PRINTING WIDTH.
                  /ANY E PRINTED INDICATES AN INCORRECT LOAD OR BUFFER ACTION,

          1600  4462      TEST25, PRTHDR                  /PRINT TEST HEADER
          1601  1162              TAD     M20             /SET CHAR COUNT
          1602  3034              DCA     COUNT
          1603  1377              TAD     (105            /SET E CHAR
          1604  4460              MLOAD                   /LOAD BUFFER
          1605  1145              TAD     P177            /
          1606  4456              LOAD                    /CLEAR BUFFER
          1607  1026              TAD     WIDTH
          1610  3034              DCA     COUNT           /SET COLUMN COUNT
          1611  1173              TAD     M144
          1612  3036              DCA     LPCNT           /SET ONES COUNT
          1613  7001              IAC                     /SET FIRST CHAR=1
          1614  4345              JMS     T25S            /LOAD ONES
          1615  5230              JMP     T25A            /DONE LINE-PRINT
          1616  1167              TAD     M36
          1617  3036              DCA     LPCNT           /SET THREE'S COUNT
          1620  1376              TAD     (3
          1621  4345              JMS     T25S            /PRINT THREE'S
          1622  5230              JMP     T25A
          1623  1154              TAD     M2
          1624  3036              DCA     LPCNT           /SET TWO'S COUNT
          1625  1126              TAD     P2              /SET CHAR
          1626  4345              JMS     T25S            /PRINT TWO'S
          1627  7000              NOP
          1630  4461      T25A,   PRINT                   /PRINT LINE
          1631  5440              LF
          1632  1375              TAD     (-400           /SET CHAR COUNT
          1633  3034              DCA     COUNT
          1634  1377              TAD     (105            /SET E CHAR
          1635  4460              MLOAD                   /FILL BUFFER
          1636  4461              PRINT                   /PRINT BLANK LINE
```

```
1637  5440            LF
1640  1374            TAD      (=376
1641  3034            DCA      COUNT
1642  1377            TAD      (105
1643  4460            HLOAD                     /LOAD BUFFER E'S
1644  1145            TAD      P177             /CLEAR BUFFER
1645  4456            LOAD                      /CLEAR BUFFER
1646  4461            PRINT
1647  5440            LF                        /PRINT BLANK LINE
1650  1375            TAD      (=400
1651  3034            DCA      COUNT
1652  1377            TAD      (105
1653  4460            HLOAD                     /FILL BUFFER ALL E'S
1654  1026            TAD      WIDTH
1655  3034            DCA      COUNT            /SET COLUMN COUNT
1656  1373            TAD      (=143
1657  3036            DCA      LPCNT            /SET 0'S COUNT=99
1660  4345            JMS      T25S             /LOAD 0'S
1661  5265            JMP      T25B             /PRINT IF DONE LINE
1662  7001            IAC                       /SET 1'S
1663  4345            JMS      T25S             /LOAD 1'S TILL END OF LINE
1664  7000            NOP
1665  4461   T25B,    PRINT                     /PRINT LINE
1666  5440            LF
1667  1372            TAD      (=377
1670  3034            DCA      COUNT
1671  1377            TAD      (105
1672  4460            MLOAD                     /FILL BUFFER WITH E'S
1673  1145            TAD      P177
1674  4456            LOAD                      /CLEAR BUFFER
1675  1026            TAD      WIDTH
1676  3034            DCA      COUNT            /SET COLUMN COUNT
1677  1371            TAD      (=11
1700  3036            DCA      LPCNT            /SET GROUP COUNT
1701  3031   T25C,    DCA      CHAR             /SET CHAR
1702  1031   T25D,    TAD      CHAR             /CHECK CHAR
1703  1160            TAD      M12
1704  7650            SNA CLA
1705  5301            JMP      T25C             /RESET CHAR IF NECESSARY
1706  1031            TAD      CHAR             /GET CHAR
1707  4345            JMS      T25S             /LOAD CHAR
1710  5315            JMP      T25E             /PRINT LINE IF DONE
1711  1160            TAD      M12              /RESET GROUP COUNT
1712  3036            DCA      LPCNT            /SET NEXT CHAR
1713  2031            ISZ      CHAR
1714  5302            JMP      T25D             /CONTINUE
1715  4461   T25E,    PRINT                     /PRINT LINE
1716  5440            LF
1717  1375            TAD      (=400
1720  3034            DCA      COUNT
1721  1377            TAD      (105
1722  4460            MLOAD                     /FILL BUFFER WITH E'S
1723  1370            TAD      (61
1724  3031            DCA      CHAR             /SET FIRST CHAR=1
1725  1026            TAD      WIDTH
```

```
1726  3034            DCA      COUNT            /SET COLUMN COUNT
1727  1031   T25F,    TAD      CHAR             /GET CHAR
1730  4456            LOAD                      /LOAD IT
1731  2031            ISZ      CHAR             /LINE CHAR
1732  1031            TAD      CHAR             /CHECK CHAR
1733  1367            TAD      (=72
1734  7640            SZA CLA
1735  5340            JMP      T25G
1736  1140            TAD      P60
1737  3031            DCA      CHAR             /RESET CHAR TO 0
1740  2034   T25G,    ISZ      COUNT            /INC COLUMN COUNT
1741  5327            JMP      T25F             /FINISH LINE
1742  4461            PRINT                     /PRINT LINE
1743  5440            LF
1744  5465            EXIT                      /EXIT TEST

              /ROUTINE TO LOAD GROUPS OF CHARS FOR TEST 25

1745  0000   T25S,    0
1746  1140            TAD      P60              /MAKE CHAR ASCII
1747  3032            DCA      CHAR2            /SAVE CHAR
1750  1032            TAD      CHAR2            /GET CHAR
1751  4456            LOAD                      /LOAD CHAR
1752  2034            ISZ      COUNT            /INC COLUMN COUNT
1753  7410            SKP                       /CONTINUE
1754  5745            JMP I    T25S             /RETURN, END OF LINE
1755  2036            ISZ      LPCNT
1756  5350            JMP      T25S+3           /CONTINUE
1757  2345            ISZ      T25S             /INC RETURN ADR

1760  5745            JMP I    T25S             /RETURN

1767  7706
1770  0061
1771  7767
1772  7401
1773  7635
1774  7402
1775  7400
1776  0003
1777  0105
      2000            PAGE


              /TEST 26 = OVERPRINT TEST
              /
              /THIS TEST PRINTS FOUR LINES OF ALTERNATING CHARACTERS AND SPACES
              /IN A CHECKERBOARD PATTERN. EACH LINE IS OVERPRINTED TWICE

2000  4462   TEST26,  PRTHDR                    /PRINT TEST HEADER
2001  1377            TAD      (T26TAB          /SET TABLE POINTER
2002  3041            DCA      TABPTR
2003  1155   T26A,    TAD      M3               /STROE COUNT FOR 2 OPERPRINTS
2004  3036            DCA      LPCNT
2005  1026   T26B,    TAD      WIDTH            /SET # COLUMNS
```

```
          2006  3034              DCA     COUNT
          2007  1441    T26C,     TAD I   TABPTR          /GET CHARS
          2010  7450              SNA                     /DONE TEST?
          2011  5465              EXIT                    /YES, EXIT TEST
          2012  0142              AND     P77             /NO, MASK CHAR
          2013  1170              TAD     M40             /MAKE ASCII
          2014  7510              SPA
          2015  1143              TAD     P100
          2016  1134              TAD     P40
          2017  4456              LOAD                    /LOAD CHAR
          2020  2034              ISZ     COUNT           /INC CHAR COUNT
          2021  7410              SKP                     /CONTINUE
          2022  5237              JMP     T26D            /PRINT LINE
          2023  1441              TAD I   TABPTR          /GET CHAR PAIR AGAIN
          2024  7012              RTR                     /GET SECOND CHAR
          2025  7012              RTR
          2026  7012              RTR
          2027  0142              AND     P77             /MASK CHAR
          2030  1170              TAD     M40             /MAKE ASCII
          2031  7510              SPA
          2032  1143              TAD     P100
          2033  1134              TAD     P40
          2034  4456              LOAD                    /LOAD IT
          2035  2034              ISZ     COUNT           /INC COUNT
          2036  5207              JMP     T26C            /CONTINUE
          2037  4461    T26D,     PRINT                   /PRINT LINE
          2040  5437              CR
          2041  2036              ISZ     LPCNT           /INC OVERPRINT COUNT
          2042  5209              JMP     T26B            /CONTINUE
          2043  4461              PRINT                   /ADVANCE PAPER
          2044  5440              LF
          2045  2041              ISZ     TABPTR          /INC TABLE POINTER
          2046  5203              JMP     T26A            /GET NEXT PAIR

          2047  0540    T26TAB,   0540                    /E=SP
          2050  4000              4000                    /SP=E
          2051  1540              1540                    /M=SP
          2052  4043              4043                    /SP=#
          2053  0000              0                       /END OF TABLE

                        /TEST 27 - MULTIPLE LINE FEED TEST
                        /
                        /NUMBER PRINTED INDICATES NUMBER OF LINE FEEDS FOLLOWING THAT LINE.
                        /DASHED REFERENCE LINES ARE PRINTED TO AID IN CHECKING PROPER
                        /LINE FEEDS.

          2054  4462    TEST27,   PRTHDR                  /PRINT TEST HEADER
          2055  1376              TAD     (T27TAB         /SET TABLE POINTER
          2056  3041              DCA     TABPTR
          2057  3045    T27A,     DCA     TENS            /CLEAR CONVERSION COUNTERS
          2060  3044              DCA     ONES
          2061  1441              TAD I   TABPTR          /GET NUMBER
          2062  2045              ISZ     TENS            /CONVERT TO ASCII
          2063  1160              TAD     M12
          2064  7500              SMA
```

```
          2065  5262              JMP     .-3
          2066  3044              DCA     ONES
          2067  7240              CLA CMA
          2070  1045              TAD     TENS
          2071  7450              SNA                     /SKIP LEADING ZERO'S
          2072  5275              JMP     T27B
          2073  1140              TAD     P60
          2074  4456              LOAD                    /LOAD TENS DIGIT
          2075  7300    T27B,     CLA CLL
          2076  1044              TAD     ONES
          2077  1141              TAD     P72
          2100  4456              LOAD                    /LOAD ONES DIGIT
          2101  1441              TAD I   TABPTR          /GET #
          2102  7450              SNA                     /SKIP IF NOT ZERO
          2103  5307              JMP     T27C            /ZERO, PRINT 131 DASHES MAX
          2104  1153              TAD     M1
          2105  7440              SZA                     /SKIP IF ONE
          2106  5315              JMP     T27D
          2107  1026    T27C,     TAD     WIDTH           /PRINT 131 DASHES MAX,
          2110  1153              TAD     P36             /29 MINIMUM
          2111  7740              SMA SZA CLA
          2112  5322              JMP     T27DA
          2113  1026              TAD     WIDTH
          2114  5323              JMP     T27E
          2115  1160    T27D,     TAD     M12             /CHECK IF WANT 28 OR 29 DASHES
          2116  7700              SMA CLA
          2117  5322              JMP     .+3
          2120  1166              TAD     M35             /SET 29
          2121  7410              SKP
          2122  1375    T27DA,    TAD     (-34            /SET 28
          2123  3034    T27E,     DCA     COUNT           /STORE DASH COUNT
          2124  1136              TAD     P55
          2125  4460              MLOAD                   /LOAD DASH LINE
          2126  1441              TAD I   TABPTR
          2127  7450              SNA
          2130  5337              JMP     T27X
          2131  7041              CIA
          2132  3034              DCA     COUNT
          2133  1131              TAD     P12
          2134  4460              MLOAD
          2135  2041              ISZ     TABPTR
          2136  5257              JMP     T27A
          2137  4461    T27X,     PRINT                   /PRINT LINE
          2140  5440              LF
          2141  5465              EXIT                    /EXIT TEST

          2142  0001    T27TAB,   1
          2143  0002              2
          2144  0004              4
          2145  0010              10
          2146  0020              20
          2147  0040              40
          2150  0000              0                       /END OF TABLE

          2175  7744
```

```
                  2176  2142
                  2177  2047
                        2200            PAGE
```

```
                                /TEST 30 = RIBBON FEED TEST
                                /
                                /THIS TEST PRINTS A SINGLE COLUMN OF 24 LINES OF X'S DOWN THE
                                /LEFT HAND MARGIN OF THE PAGE

                  2200  4462    TEST30, PRTHDR                  /PRINT TEST HEADER
                  2201  1165            TAD     H30             /SET LINE COUNT
                  2202  3034            DCA     COUNT
                  2203  4461    T30A,   PRINT                   /PRINT X=LF
                  2204  2210            T30H
                 .2205  2034            ISZ     COUNT           /DEC LINE COUNT
                  2206  5203            JMP     T30A            /FINISH TEST
                  2207  5465            EXIT                    /EXIT TEST

                  2210  3073    T30H,   TEXT    /X/
                  2211  0000

                                /TEST 31 = BELL TEST
                                /
                                /THIS TEST WILL SOUND 5 BELLS BETWEEN PRINTING "BELL TEST"

                  2212  4462    TEST31, PRTHDR                  /PRINT TEST HEADER
                  2213  1127            TAD     P7
                  2214  4456            LOAD                    /SEND BELL CODE
                  2215  4461            PRINT                   /LOAD WORD "BELL"
                  2216  2240            T31M1
                  2217  1127            TAD     P7
                  2220  4456            LOAD                    /LOAD BELL CODE
                  2221  4461            PRINT                   /LOAD WORD "TEST"
                  2222  2243            T31M2
                  2223  1127            TAD     P7
                  2224  4456            LOAD                    /LOAD
                  2225  4461            PRINT                   /SEND CR
                  2226  5437            CR
                  2227  1127            TAD     P7
                  2230  4456            LOAD                    /LOAD BELL CODE
                  2231  4461            PRINT                   /SEND LF
                  2232  5440            LF
                  2233  1127            TAD     P7              /LOAD BELL CODE
                  2234  4456            LOAD
                  2235  4461            PRINT                   /SEND CR
                  2236  5437            CR
                  2237  5465            EXIT                    /EXIT TEST

                  2240  0205    T31M1,  TEXT    /BELL/
                  2241  1414
```

```
                  2242  0000
                  2243  4024    T31M2,  TEXT    / TEST/
                  2244  0523
                  2245  2400

                                /MAINTENANCE AIDS


                                /TEST 60 = LIFE TEST
                                /
                                /THIS TEST PRINTS 2 FULL LINES OF EACH PRINTABLE CHARACTER
                                /THE SECOND LINE IS OVERPRINTED 4 TIMES TO CONSERVE PAPER
                                /AT THE END OF EACH PASS THROUGH THE ENTIRE PRINTABLE CHARACTER
                                /SET, THE PASS COUNT WILL BE PRINTED ON THE LA180.

                  2246  7300    TEST60, CLA CLL                 /CLEAR
                  2247  3040            DCA     PASCNT          /CLEAR PASS COUNT
                  2250  4462    T60A,   PRTHDR                  /PRINT TEST HEADER ON BLANK LINES
                  2251  1135            TAD     P41             /SET FIRST CHAR
                  2252  3031            DCA     CHAR            /STORE IT
                  2253  1026    T60B,   TAD     WIDTH           /GET # COLUMNS
                  2254  3034            DCA     COUNT           /STORE IT
                  2255  1031            TAD     CHAR            /GET CHAR
                  2256  4460            MLOAD                   /LOAD LINE
                  2257  4461            PRINT                   /PRINT LINE
                  2260  5440            LF
                  2261  1377            TAD     (=5             /SET OVERPRINT COUNT
                  2262  3036            DCA     LPCNT
                  2263  1026    T60C,   TAD     WIDTH           /SET # COLUMNS
                  2264  3034          , DCA     COUNT
                  2265  1031            TAD     CHAR            /GET CHAR
                  2266  4460            MLOAD                   /LOAD LINE
                  2267  4461            PRINT                   /PRINT LINE
                  2270  5437            CR
                  2271  2036            ISZ     LPCNT           /INC OVERPRINT COUNT, DONE?
                  2272  5263            JMP     T60C            /NO, DO AGAIN
                  2273  4461            PRINT                   /YES, ADVANCE PAPER
                  2274  5440            LF
                  2275  2031            ISZ     CHAR            /SET NEXT CHAR
                  2276  1174            TAD     H177            /CHECK IT
                  2277  1031            TAD     CHAR
                  2300  7640            SZA CLA                 /CHAR=RUBOUT?
                  2301  5253            JMP     T60B            /NO, CONTINUE THIS PASS
                  2302  2040            ISZ     PASCNT          /YES, INC PASS COUNT
                  2303  7000            NOP
                  2304  4461            PRINT                   /PRINT PASS COUNT MESG
                  2305  5057            PASMSG
                  2306  3047            DCA     THOUS           /CLEAR CONVERSION COUNTERS
                  2307  1040            TAD     PASCNT          /GET PASS COUNT & CONVERT TO DECIMAL
                  2310  2047            ISZ     THOUS
                  2311  1376            TAD     (=1750
                  2312  7500            SMA
                  2313  5310            JMP     .=3
                  2314  1375            TAD     (1750
```

```
           2315  3040            DCA     PASCNT
           2316  1137            TAD     P57
           2317  1047            TAD     THOUS
           2320  4456            LOAD
           2321  1040            TAD     PASCNT
           2322  4517            JMS I   TCNVRT
           2323  4461            PRINT
           2324  5435            CNVMSG
           2325  4461            PRINT                   /PRINT LINE
           2326  5440            LF
           2327  5250            JMP     T60A            /CONTINUE TEST

           2375  1750
           2376  6030
           2377  7773
                 2400            PAGE

                        /TEST 61 = SCOPE DRIVE ROUTINE
                        /
                        /THIS TEST WILL LOAD A CHARACTER SET IN SW REG BITS 05=11
                        /IF SWITCH 04 IS DOWN, FULL LINES WILL BE LOADED & PRINTED
                        /A LINEFEED WILL BE INSERTED AUTOMATICALLY IF LOADING PRINTABLE CHARACTERS.
                        /IF SWITCH 04 IS UP, THE CHARACTER WILL BE LOADED ONCE & THE
                        /PROGRAM WILL HALT; NO LINE FEEDS OF CARRIAGE RETURNS WILL BE SENT BY THE PROGRAM.

           2400  4462    TEST61, PRTHDR                  /PRINT HEADER
           2401  5225            JMP     T61C            /CHECK SWITCH 4 FIRST
           2402  1026    T61A,   TAD     WIDTH           /GET # COLUMNS
           2403  3034            DCA     COUNT           /STORE IT
           2404  4521    T61B,   GETSW                   /GET SW REG
           2405  0145            AND     P177            /MARK CHAR
           2406  3031            DCA     CHAR            /SAVE IT
           2407  1031            TAD     CHAR            /GET CHAR
           2410  4456            LOAD                    /LOAD IT
           2411  1160            TAD     H12             /CHECK CHAR
           2412  1031            TAD     CHAR
           2413  7450            SNA                     /CHAR = LF?
           2414  5225            JMP     T61C            /YES, RESET COLUMN COUNT
           2415  1155            TAD     H3
           2416  7450            SNA                     /CHAR = CR?
           2417  5225            JMP     T61C            /YES, RESET COLUMN COUNT
           2420  1163            TAD     M23
           2421  7700            SMA CLA                 /NON=PRINTABLE CHAR?
           2422  2034            ISZ     COUNT           /NO, INC COLUMN COUNT
           2423  7000            NOP
           2424  5230            JMP     T61D            /CHECK SW 04
           2425  7300    T61C,   CLA CLL                 /CLEAR
           2426  1026            TAD     WIDTH           /GET # COLUMNS
           2427  3034            DCA     COUNT           /STORE IT
           2430  7604    T61D,   LAS                     /GET SW REG
           2431  0146            AND     P200            /MASH SW 04
           2432  7650            SNA CLA                 /SWITCH 4 UP?
           2433  5236            JMP     T61E            /NO, CONTINUE
           2434  7402            HLT                     /YES, HALT
           2435  5204            JMP     T61B            /GET NEXT CHAR
```

```
           2436  1034    T61E,   TAD     COUNT           /GET COLUMN COUNT
           2437  7510            SPA                     /DONE LOAD?
           2440  5204            JMP     T61B            /NO, CONTINUE
           2441  7650            SNA CLA                 /TOO MANY LOADED?
           2442  5245            JMP     T61F            /NO, CONTINUE
           2443  1145            TAD     P177            /YES, SET RUBOUT
           2444  4456            LOAD                    /CLEAR BUFFER
           2445  4461    T61F,   PRINT                   /PRINT LOADED CHARACTERS
           2446  5440            LF
           2447  5202            JMP     T61A            /CONTINUE TEST

                        /TEST 62 = LINE PRINT TEST
                        /
                        /THIS TEST PRINTS FULL LINES CONTINUOUSLY OF WHATEVER CHARACTER
                        /IS TYPED ON THE CONSOLE KEYBOARD.  TO CHANGE CHARACTERS,
                        /RESELECT THIS TEST.  AN ERROR MESSAGE WILL BE PRINTED
                        /IF THIS TEST IS SELECTED AND A CONSOLE TERMINAL DOES NOT EXIST.

           2450  4462    TEST62, PRTHDR                  /PRINT TEST HEADER
           2451  1053            TAD     TPFLG           /CHECK IF TERM EXISTS
           2452  7650            SNA CLA
           2453  5341            JMP     TERR            /EXIT IF NONE
           2454  4455            TYPE                    /TYPE INSTR
           2455  5244            TCHAR
           2456  4472            JMS I   TKSF            /WAIT FOR KYBD FLAG
           2457  5256            JMP     .=1
           2460  4464            CHECK                   /CHECK CHAR FOR CONTROL
           2461  4475            JMS I   TKRB            /READ CHAR
           2462  4501    T62A,   JMS I   TTLS            /ECHO CHAR
           2463  4476            JMS I   TTSF
           2464  5263            JMP     .=1
           2465  3031            DCA     CHAR            /SAVE CHAR
           2466  4455            TYPE                    /SEND CR=LF
           2467  5441            CRLF
           2470  1026    T62B,   TAD     WIDTH           /SET COLUMN COUNT
           2471  3034            DCA     COUNT
           2472  1031            TAD     CHAR            /GET CHAR
           2473  4460            MLOAD                   /LOAD LINE
           2474  4461            PRINT
           2475  5440            LF                      /PRINT LINE
           2476  5270            JMP     T62B            /CONTINUE

                        /TEST 63 = CHARACTER PRINT TEST
                        /
                        /THIS TEST LOADS WHATEVER CHARACTER IS TYPED ON THE CONSOLE KEYBOARD
                        /TO THE LA180, CHARACTER BY CHARACTER.
                        /IF THIS TEST IS SELECTED AND A CONSOLE TERMINAL DOES NOT EXIST,
                        /AN ERROR MESG WILL BE PRINTED.

           2477  4462    TEST63, PRTHDR                  /PRINT TEST HEADER
           2500  1053            TAD     TPFLG           /CHECK IF TERM EXISTS
           2501  7650            SNA CLA
           2502  5341            JMP     TERR            /EXIT IF NONE
           2503  4455            TYPE                    /TYPE INSTR
           2504  5244            TCHAR
```

```
2505  4455              TYPE               /SEND CR-LF
2506  5441              CRLF
2507  4472    T63B,     JMS I    TKSF      /WAIT FOR KYBD FLAG
2510  5307              JMP      .-1
2511  4464              CHECK              /CHECK CHAR FOR CONTROL
2512  4475              JMS I    TKRB      /READ CHAR
2513  0145              AND      P177      /MASK BIT 5
2514  3031              DCA      CHAR
2515  1031              TAD      CHAR
2516  4501    T63A,     JMS I    TTLS      /ECHO CHAR
2517  4476              JMS I    TTSF
2520  5317              JMP      .-1
2521  4456              LOAD               /LOAD CHAR
2522  1031              TAD      CHAR      /CR-LF AFTER CR
2523  1161              TAD      M15
2524  7650              SNA CLA
2525  5336              JMP      T63E
2526  1031    T63C,     TAD      CHAR      /CR-LF AFTER LF
2527  1160              TAD      M12
2530  7650              SNA CLA
2531  5336              JMP      T63E
2532  1031    T63D,     TAD      CHAR      /CR-LF AFTER FF
2533  1377              TAD      (-14
2534  7640              SZA CLA
2535  5307              JMP      T63B
2536  4455    T63E,     TYPE
2537  5441              CRLF
2540  5307              JMP      T63B     .

2541  4461    TERR,     PRINT              /PRINT ERROR MESG ON LA180
2542  5231              NCMSG
2543  5465              EXIT               /EXIT TEST
2577  7764
      2600              PAGE

              /TTY I-O INSTRUCTIONS

2600  0000    RKSF,     0
2601  6031              KSF                /SKIP IF FLAG IS SET
2602  7410              SKP
2603  2200              ISZ      RKSF      /INC RETURN ADR
2604  5600              JMP I    RKSF      /RETURN

2605  0000    RKCC,     0
2606  6032              KCC                /CLEAR FLAG
2607  5605              JMP I    RKCC      /RETURN

2610  0000    RKRS,     0
2611  6034              KRS                /READ BUFFER (STATIC)
2612  5610              JMP I    RKRS      /RETURN

2613  0000    RKRB,     0
2614  6036              KRB                /CLEAR AC, READ BUFFER & CLEAR FLAG
2615  5613              JMP I    RKRB      /RETURN
```

```
2616  0000    RTSF,     0
2617  6041              TSF                /SKIP IF FLAG IS SET
2620  7410              SKP
2621  2216              ISZ      RTSF      /INC RETURN ADR
2622  5616              JMP I    RTSF      /RETURN

2623  0000    RTCF,     0
2624  6042              TCF                /CLEAR FLAG
2625  5623              JMP I    RTCF      /RETURN

2626  0000    RTPC,     0
2627  6044              TPC                /LOAD BUFFER
2630  5626              JMP I    RTPC      /RETURN

2631  0000    RTLS,     0
2632  6046              TLS                /PRINT CHAR
2633  5631              JMP I    RTLS      /RETURN
              /PRINTER INSTRUCTIONS

2634  0000    RPSKF,    0
2635  4777'             JMS      OP1CHK    /GO CHECK TO SEE IF RUNNING ON PAR I/O
2636  2643              OPDBST             /ON PARALLEL I/O
2637  6661              PSKF               /SKIP ON CHARACTER FLAG
2640  7410              SKP
2641  2234              ISZ      RPSKF     /INCREMENT RETURN ADDRESS FOR SKIP
2642  5634              JMP I    RPSKF     /RETURN
2643  6570    OPDBST,   DBST               /SKIP ON DATA ACCEPTED AND CLEAR IT
2644  5634              JMP I    RPSKF     /FLAG NOT SET RETURN
2645  5241              JMP      .-4       /BUMP RETURN AND THEN RETURN

2646  0000    RPCLF,    0
2647  4777'             JMS      OP1CHK    /GO CHECK FOR PARALLEL I/O
2650  2653              OP1CLF             /ADDRESS FOR PARALLEL I/O ROUTINE
2651  6662              PCLF               /CLEAR CHARACTER FLAG
2652  5646              JMP I    RPCLF     /RETURN
2653  6570    OP1CLF,   DBST               /SKIP ON DATA ACCEPTED AND CLEAR IT
2654  5646              JMP I    RPCLF     /RETURN FLAG WAS NOT SET
2655  5646              JMP I    RPCLF     /RETURN FLAG IS NOW A ZERO

2656  0000    RPSTB,    0
2657  4777'             JMS      OP1CHK    /GO CHECK FOR PARALLEL I/O
2660  2663              OPLOD1             /ADDRESS FOR PARALLEL I/O ROUTINE
2661  6664              PSTB               /LOAD BUFFER
2662  5656              JMP I    RPSTB     /RETURN TO PROGRAM
2663  7040    OPLOD1,   CMA                /NEGATE THE WORD FOR PARALLEL I/O
2664  6574              DBTD               /LOAD THE 12 BIT PARALLEL I/O
2665  7040              CMA                /RESET THE WORD TO ORIGINAL WORD
2666  6577              DBSS               /ISSUE A DATA STROBE PULSE
2667  5656              JMP I    RPSTB     /RETURN TO PROGRAM

2670  0000    RPSIE,    0
2671  4777'             JMS      OP1CHK    /GO CHECK FOR PARALLEL I/O
2672  2675              OPSCIE             /ADDRESS FOR PARALLEL I/O ROUTINE
2673  6665              PSIE               /ENABLE INTERRUPTS
2674  5670              JMP I    RPSIE     /RETURN
```

```
2675  7440    OPSCIE, SZA                          /CHECK DATA BIT 11
2676  6575            DBBE                          /SET DATA BIT 11
2677  7450            SNA
2700  6576            DBCE                          /CLEAR PARALLEL I/O INT ENA
2701  5670            JMP   I  RPSIE                /RETURN TO THE PROGRAM

2702  0000    RPCLP,  0
2703  4777'           JMS      OP1CHK               /GO CHECK FOR PARALLEL I/O
2704  2707            OPLOD2                        /ADDRESS FOR PARALLEL I/O ROUTINE
2705  6666            PCLP                          /CLEAR FLAG AND LOAD BUFFER
2706  5702            JMP   I  RPCLP                /RETURN TO THE PROGRAM
2707  6570    OPLOD2, DBST                          /SKIP ON DATA ACCEPTED AND CLEAR IT
2710  7000            NOP                           /USED INCASE FLAG WAS SET
2711  7040            CHA                           /NEGATE THE WORD TO LOAD FOR PAR I/O
2712  6574            DBTD                          /LOAD THE PARALLEL I/O BUFFER
2713  7040            CMA                           /RESET THE WORD BACK TO ORIGINAL WORD
2714  6577            DBSS                          /ISSUE A DATA STROBE
2715  5702            JMP   I  RPCLP                /RETURN BACK TO PROGRAM

              /ROUTINE TO MODIFY I-O INSTRUCTIONS FOR SELECTED IOT CODES
              /ON CONSOLE TERMINAL & LA180 PRINTER

2716  0000    MIOT,   0
2717  7300            CLA CLL                       /CLEAR
2720  1156            TAD      M4                   /SET LOOP COUNT
2721  3034            DCA      COUNT
2722  1376            TAD      (IOTAB-1              /SET TABLE POINTER
2723  3010            DCA      AUTPTR
2724  1030            TAD      IOTSEL               /GET IOT SELECTION
2725  0172            AND      M100                 /MASK XMIT IOT
2726  7110            CLL RAR
2727  7112            CLL RTR
2730  3033    MIOTB,  DCA      SAVE                 /STORE IOT
2731  1410    MIOTA,  TAD   I  AUTPTR               /GET TABLE ENTRY
2732  7450            SNA                           /DONE TTY IOT'S?
2733  5350            JMP      MIOTC                /YES, DO PRINTER
2734  3041            DCA      TABPTR               /NO, STORE INSTR ADR
2735  1441            TAD   I  TABPTR               /GET INSTR
2736  0375            AND      (7807                /MASK INSTR CODE
2737  1033            TAD      SAVE                 /ADD IOT
2740  3441            DCA   I  TABPTR               /STORE NEW IO INSTR
2741  2034            ISZ      COUNT                /INC COUNT
2742  5331            JMP      MIOTA                /CONTINUE THIS IOT
2743  1030            TAD      IOTSEL               /GET IOT SELECTION
2744  0142            AND      P77                  /MASK RCVR IOT
2745  7106            CLL RTL
2746  7104            CLL RAL
2747  5330            JMP      MIOTB                /CONTINUE
2750  1410    MIOTC,  TAD   I  AUTPTR               /GET TABLE ENTRY
2751  7450            SNA                           /DONE?
2752  5716            JMP   I  MIOT    .            /YES, RETURN
2753  3041            DCA      TABPTR               /NO, STORE INSTR ADR
2754  1441            TAD   I  TABPTR               /GET INSTR
2755  0375            AND      (7007                /MASK INSTR CODE
2756  1027            TAD      PTRIOT               /ADD IOT
```

```
2757  3441            DCA   I  TABPTR               /STORE NEW INSTR
2760  5350            JMP      MIOTC                /CONTINUE

2775  7007
2776  4534
2777  3142
      3000            PAGE


              /CLOCK INTERRUPT SERVICE ROUTINE FOR TEST 2

3000  6133    CKSRV,  CLSK                          /SKIP ON CLOCK FLAG
3001  5213            JMP      CKEXIT               /RETURN IF NOT CLOCK INTERRUPT
3002  2037            ISZ      CKCNT                /INC CLOCK COUNT
3003  5213            JMP      CKEXIT               /RETURN IF COUNT IS NOT ZERO
3004  2036            ISZ      LPCNT                /INC TIME COUNT
3005  7410            SKP                           /CONTINUE IF NOT ZERO
3006  5615            JMP   I  CKSTOP               /END OF TIME - PRINT TIMING MESG
3007  3216            DCA      ISAVE                /SAVE AC
3010  1054            TAD      CKFLAG               /RESET CLOCK COUNT
3011  3037            DCA      CKCNT
3012  1216            TAD      ISAVE                /RESTORE AC
3013  6001    CKEXIT, ION                           /INTERRUPT SYSTEM ON
3014  5400            JMP   I  0000                 /RETURN TO TEST

3015  1110    CKSTOP, T2SPDC                        /RETURN ADR - PRINT TIMING MESG
3016  0000    ISAVE,  0                             /SAVE AC

              /TEST EXIT ROUTINE

3017  4507    REXIT,  JMS   I  TKBFG                /CHECK FOR KYBD FLAG
3020  4521            GETSW                         /GET SW REG
3021  0152            AND      P1000                /MASK SW2
3022  7640            SZA CLA                       /LOOP ON TEST?
3023  5237            JMP      EXIT3                /YES, RETURN TO TEST
3024  4521            GETSW                         /GET SW REG
3025  0151            AND      P400                 /MASK SW3
3026  7640            SZA CLA                       /WANT SW REG CONTROL?
3027  5467            JMP   I  TSELCT               /YES, SELECT TEST HALT
3030  1052            TAD      TLOOP                /KYBD CNTRL - LOOP ON TEST?
3031  7640            SZA CLA
3032  5237            JMP      EXIT3                /YES, RETURN TO TEST
3033  1051            TAD      TRONE                /KYBD CNTRL - RUN TEST ONCE?
3034  7640            SZA CLA
3035  5510            JMP   I  TTSEL                /YES, SELECT TEST
3036  2023    EXIT1,  ISZ      TSTNM                /INC TEST NUMBER
3037  1070    EXIT3,  TAD      TTAT                 /GET TABLE ADR
3040  1023            TAD      TSTNM                /ADD TEST NUMBER
3041  3041            DCA      TABPTR               /STORE POINTER
3042  1441            TAD   I  TABPTR               /GET TEST ADR
3043  7550            SNA SPA                       /SKIP IF OK
3044  5247            JMP      EXIT2                /CHECK IF NOT OK
3045  3042            DCA      TSTPTR               /STORE ADR
3046  5442            JMP   I  TSTPTR               /GO TO TEST
3047  7700    EXIT2,  SMA CLA                       /-1 IN TABLE?
```

```
3050  5236          JMP     EXIT1           /NO, INC TEST #
3051  1377          TAD     (20             /RESTART PRINTING TEST SEQUENCE
3052  3023          DCA     TSTNM
3053  5237          JMP     EXIT3

              /SELECT TEST FROM CPU SW REG BITS 06-11

3054  6002  SELECT, IOF                     /DISABLE INTERRUPTS
3055  6132          CLDI
3056  7300          CLA CLL
3057  4505          JMS I   TPSIE
3060  3050          DCA     STRONE          /CLEAR CONTROL FLAGS
3061  3051          DCA     TRONE
3062  3052          DCA     TLOOP
3063  1125          TAD     LIERR           /RESET INTERRUPT ERROR
3064  3002          DCA     ISRV
3065  4507          JMS I   TKBFG           /CHECK IF KYBD FLAG
3066  7402          HLT                     /WAIT FOR OPERATOR TO SELECT TEST
                                            /PRESS CONTINUE WHEN READY
3067  4521          GETSW                   /GET SW REG
3070  0151          AND     P400            /MASK SW3
3071  7640          SZA CLA                 /WANT TO RUN TEST ONCE & HALT?
3072  7040          CHA                     /YES, SET FLAG
3073  3050          DCA     STRONE          /STORE FLAG
3074  4521          GETSW                   /GET SW REG
3075  0142          AND     P77             /SAVE TEST #
3076  3023          DCA     TSTNM           /STORE TEST #
3077  1070          TAD     TTAT            /GET TABLE ADDRESS
3100  1023          TAD     TSTNM           /ADD TEST NUMBER
3101  3041          DCA     TABPTR          /STORE POINTER
3102  1441          TAD I   TABPTR          /GET TEST ADR
3103  7550          SNA SPA                 /CHECK IT - OK?
3104  5254          JMP     SELECT          /NO, GET NEW SELECTION
3105  3042          DCA     TSTPTR          /OK, STORE ADR
3106  5442          JMP I   TSTPTR          /GO TO TEST

              /ROUTINE TO CHECK FOR KYBD OR SW REG CONTROL
              /CALL: CHECK = JMS I   TCHECK

3107  0000  RCHECK, 0
3110  3033          DCA     SAVE            /SAVE AC
3111  4507          JMS I   TKBFG           /CHECK FOR KYBD FLAG
3112  4521          GETSW                   /GET SW REG
3113  0151          AND     P400            /MASK SW3
3114  7640          SZA CLA                 /SW3 UP?
3115  7001          IAC                     /YES, SET AC = +1
3116  1050          TAD     STRONE          /ADD ONE RUN FLAG
3117  7640          SZA CLA                 /CHANGE IN SWITCH SETTING?
3120  5467          JMP I   TSELCT          /YES, SELECT TEST
3121  1033          TAD     SAVE            /RESTORE AC
3122  5707          JMP I   RCHECK          /NO, RETURN


              /ROUTINE TO WAIT FOR OPERATOR ACTION
```

```
3123  0000  RHOLD,  0
3124  3341          DCA     HOLDCH          /SAVE AC
3125  1053          TAD     TPFLG           /TERMINAL THERE?
3126  7650          SNA CLA                 /BRANCH IF YES
3127  5336          JMP     RHOLDA          /HALT IF NO TERMINAL
3130  4455          TYPE                    /TYPE WAIT MESG
3131  4777          WTMSG
3132  1341          TAD     HOLDCH          /RESTORE AC
3133  4472          JMS I   TKSF            /WAIT FOR KYBD FLAG
3134  5333          JMP     .-1
3135  5723          JMP I   RHOLD           /RETURN
3136  1341  RHOLDA, TAD     HOLDCH          /RESTORE AC
3137  7402          HLT                     /HALT
3140  5723          JMP I   RHOLD           /RETURN

3141  0000  HOLDCH, 0                       /SAVE AC

              /ROUTINE TO CHECK FOR PARALLEL I/O

3142  0000  OP1CHK, 0
3143  3356          DCA     SAVEAC          /SAVE THE ENTERING AC
3144  1021          TAD     PARAM           /GET HARDWARE WORD 1
3145  7004          RAL                     /PUT OPTION 1 BIT INTO BIT 0
3146  7710          SPA     CLA             /IS LA180 RUNNING ON PARALLEL I/O
3147  5353          JMP     .+4             /YES-GO GET ADDRESS FOR PARALLEL I/O
3150  2342          ISZ     OP1CHK          /BUMP RETURN POINTER
3151  1356          TAD     SAVEAC          /RESTORE THE AC
3152  5742          JMP I   OP1CHK          /RETURN TO  IOT SUBROUTINE
3153  1742          TAD I   OP1CHK          /GET ADDRESS OF PARALLEL I/O
3154  3342          DCA     OP1CHK          /SAVE IT FOR RETURN
3155  5351          JMP     .-4             /RETURN TO EXECUTE PARALLEL I/O CODE

3156  0000  SAVEAC, 0

3177  0020
      3200          PAGE

              /ROUTINE TO CHECK FOR KYBD FLAG
              /WHEN LOOKING FOR CONTROL FROM THE CONSOLE DEVICE KEYBOARD
              /ALSO CHECKS FOR DYNAMIC SOFTWARE SWITCH REGISTER CONTROL WHEN
              /USING SOFTWARE SWITCHS

3200  0000  KYBDF,  0
3201  7300          CLA CLL                 /CLEAR
3202  1053          TAD     TPFLG           /GET TERMINAL FLAG
3203  7650          SNA CLA                 /TERMINAL THERE?
3204  5600          JMP I   KYBDF           /NO, RETURN
3205  4472          JMS I   TKSF            /KYBD FLAG SET?
3206  5600          JMP I   KYBDF           /NO, RETURN
3207  4475          JMS I   TKRB            /YES, READ CHAR
3210  0145          AND     P177            /MASK BIT 8
3211  3324          DCA     KYBDC           /SAVE CHAR
3212  1021          TAD     PARAM           /USING SOFTWARE SWITCH REG?
3213  7710          SPA CLA
3214  5313          JMP     KFA             /NO, CONTINUE
```

```
        3215    1324            TAD     KYBDC           /YES, GET CHAR
        3216    1157            TAD     M7              /CHAR = BEL <007> ?
        3217    7640            SZA CLA
        3220    5313            JMP     KFA             /NO, CHECK CHAR AGAIN FOR OTHER CONTROLS
        3221    7300    KFB,    CLA CLL                 /CLEAR AC AND LINK
        3222    3325            DCA     TTYIN           /CLEAR NEW SWITCH SETTINGS
        3223    3326            DCA     INFLAG          /CLEAR INPUT FLAG
        3224    4455            TYPE                    /TYPE MESG
        3225    4766            DSMSG1
        3226    1020            TAD     SWITCH          /GET CURRENT SOFTWARE SWITCH SETTING
        3227    4523            JMS I   TPOCT           /TYPE IT
        3230    4455            TYPE                    /TYPE REST OF MESG
        3231    4772            DSMSG2
        3232    4472    KFF,    JMS I   TKSF            /KYBD FLAG?
        3233    5232            JMP     .=1             /NO, WAIT
        3234    4475            JMS I   TKRB            /YES, READ CHAR
        3235    0145            AND     P177            /MASK CHAR = MAKE 7=BIT ASCII
        3236    3324            DCA     KYBDC           /SAVE CHAR
        3237    1160            TAD     M25             /CHECK CHAR
        3240    1324            TAD     KYBDC
        3241    7640            SZA CLA                 /CHAR = CONTROL=U
        3242    5246            JMP     KFC             /NO, CHECK AGAIN
        3243    4455            TYPE                    /YES, TYPE CONTROL=U, CR=LF
        3244    5445            CNTLU
        3245    5221            JMP     KFB             /RESTART ROUTINE
        3246    1161    KFC,    TAD     M15             /CHECK IF CHAR = CR?
        3247    1324            TAD     KYBDC
        3250    7640            SZA CLA                 /CHAR = CR?
        3251    5262            JMP     KFD             /NO, CHECK AGAIN
        3252    4455            TYPE                    /YES, ECHO CR=LF
        3253    5441            CRLF
        3254    1326            TAD     INFLAG          /CHECK INPUT FLAG
        3255    7650            SNA CLA
        3256    5600            JMP I   KYBDF           /LEAVE SW SETTINGS ALONE IF NO INPUT
        3257    1325            TAD     TTYIN           /SET NEW SWITCH SETTINGS
        3260    3020            DCA     SWITCH
        3261    5600            JMP I   KYBDF           /RETURN TO TEST
        3262    1160    KFD,    TAD     M12             /CHECK IF CHAR = LF
        3263    1324            TAD     KYBDC
        3264    7640            SZA CLA
        3265    5276            JMP     KFE             /NO, CHECK AGAIN
        3266    4455            TYPE                    /YES, ECHO CR=LF
        3267    5441            CRLF
        3270    1326            TAD     INFLAG          /CHECK INPUT FLAG
        3271    7650            SNA CLA
        3272    5510            JMP I   TTSEL           /LEAVE SW SETTINGS ALONE IF NO INPUT
        3273    1325            TAD     TTYIN           /SET NEW SWITCH SETTINGS
        3274    3020            DCA     SWITCH
        3275    5510            JMP I   TTSEL           /SELECT TEST
        3276    1324    KFE,    TAD     KYBDC           /GET CHAR
        3277    4522            JMS I   PDIGIT          /PRINT OCTAL DIGIT ALWAYS AS BEING STORED
        3300    1324            TAD     KYBDC           /GET CHAR AGAIN
        3301    0127            AND     P7              /MASK OCTAL DIGIT FROM ASCII CODE
        3302    3324            DCA     KYBDC           /SAVE IT
        3303    1325            TAD     TTYIN           /GET CURRENT SWITCH SETTING
```

```
        3304    7104            CLL RAL                 /ROTATE SWITCH SETTINGS TO ADD NEW ONE
        3305    7104            CLL RAL
        3306    7104            CLL RAL
        3307    1324            TAD     KYBDC           /ADD NEW SWITCHES
        3310    3325            DCA     TTYIN           /SAVE NEW SETTING
        3311    2326            ISZ     INFLAG          /SET INPUT FLAG
        3312    5232            JMP     KFF             /CONTINUE
        3313    1324    KFA,    TAD     KYBDC           /GET CHAR AGAIN
        3314    1174            TAD     M177            /CHAR = RUBOUT?
        3315    7650            SNA CLA
        3316    5510            JMP I   TTSEL           /YES, GET TEST SELECTION
        3317    1324            TAD     KYBDC           /NO, GET CHAR AGAIN
        3320    1155            TAD     M3              /CHAR = CNTL C ?
        3321    7650            SNA CLA
        3322    5466            JMP I   TKBDST          /YES, GET # COLUMNS
        3323    5600            JMP I   KYBDF           /NO, RETURN

        3324    0000    KYBDC,  0                       /INPUT CHAR
        3325    0000    TTYIN,  0                       /SOFTWARE SWITCH INPUT
        3326    0000    INFLAG, 0                       /INPUT FLAG
                3400            PAGE


        3400    4451    KBTAB,  READQ                   /INPUT ERROR
        3401    3422            KYBDAA                  /3 DIGIT # INPUT
        3402    3433            KYBDA                   /2 DIGIT # INPUT
        3403    3447            KYBDB                   /1 DIGIT # INPUT
        3404    4451            READQ                   /INPUT ERROR

                        /ROUTINE TO SET NUMBER OF COLUMNS FROM CONSOLE DEVICE KYBD
                        /WILL ALLOW 1 TO 3 DIGIT INPUT, NO LEADING ZEROS NEEDED,

        3405    4455    KYBDST, TYPE                    /TYPE COLUMNS MESG
        3406    4746            COLUMN
        3407    3026            DCA     WIDTH           /CLEAR COLUMN COUNT
        3410    4511            JMS I   READ            /READ # COLUMNS
        3411    1377            TAD     (READT=1        /GET TABLE ADR
        3412    3010            DCA     AUTPTR          /SET TABLE POINTER
        3413    1034            TAD     COUNT           /GET CHAR COUNT FROM INPUT ROUTINE
        3414    7041            CIA                     /MAKE IT POSITIVE
        3415    1376            TAD     (KBTAB          /ADD TABLE STARTING ADR
        3416    3033            DCA     SAVE            /SAVE TABLE ENTRY ADR
        3417    1433            TAD I   SAVE            /GET TABLE ENTRY
        3420    3033            DCA     SAVE            /SAVE ADR FOR CONVERSION ROUTINE
        3421    5433            JMP I   SAVE            /CONVERT INPUT NUMBER TO BINARY (OCTAL)
        3422    1410    KYBDAA, TAD I   AUTPTR          /GET CHAR
        3423    4514            JMS I   CHKNR           /CHECK IF NUMBER & MAKE OCTAL
        3424    7450            SNA                     /ZERO?
        3425    5233            JMP     KYBDA           /YES, CONTINUE
        3426    7041            CIA                     /NEGATE #
        3427    3034            DCA     COUNT           /STORE IN COUNT
        3430    1173            TAD     M144            /CONVERT TO BINARY
        3431    2034            ISZ     COUNT
        3432    5230            JMP     .=2
        3433    3026    KYBDA,  DCA     WIDTH           /STORE #
```

```
              3434   1410              TAD I   AUTPTR        /GET NEXT DIGIT
              3435   4514              JMS I   CHKNR         /CHECK IF #
              3436   7450              SNA                   /ZERO?
              3437   5247              JMP     KYBDB         /YES, CONTINUE
              3440   7041              CIA                   /NEGATE #
              3441   3034              DCA     COUNT         /STORE IN COUNT
              3442   1160              TAD     M12           /CONVERT TO BINARY
              3443   2034              ISZ     COUNT
              3444   5242              JMP     .-2
              3445   1026              TAD     WIDTH         /ADD TO CURRENT TOTAL
              3446   3026              DCA     WIDTH         /STORE NEW #
              3447   1410     KYBDB,   TAD I   AUTPTR        /GET LAST DIGIT
              3450   4514              JMS I   CHKNR         /CHECK IF #
              3451   7041              CIA                   /NEGATE IT
              3452   1026              TAD     WIDTH         /ADD TO CURRENT TOTAL
              3453   3026              DCA     WIDTH         /STORE WIDTH
              3454   1126              TAD     P2            /CHECK COLUMN SELECTION
              3455   1026              TAD     WIDTH
              3456   7740              SMA SZA CLA           /# COLUMNS <2?
              3457   5512              JMP I   TREADQ        /YES, INPUT ERROR
              3460   1147              TAD     P204
              3461   1026              TAD     WIDTH
              3462   7710              SPA CLA               /# COLUMNS >132 (10)?
              3463   5512              JMP I   TREADQ        /YES, INPUT ERROR
              3464   5510              JMP I   TTSEL         /NO, GO TO TEST SELECT

                       /ROUTINE TO SELECT TEST FROM CONSOLE DEVICE KYBD
                       /AND DETERMINE TEST ACTION BY INPUT CONTROL CHAR
                       /TEST NUMBER MUST BE A 2 DIGIT OCTAL NUMBER, FOLLOWED
                       /BY ONE OF THE CONTROL CHARACTERS BELOW:

                       /PERIOD .        = RUN TEST ONCE & SELECT NEXT TEST
                       /L              = LOOP ON SELECTED TEST
                       /S              = START TEST SEQUENCE WITH SELECTED TEST

              3465   6002     TSEL,    IOF                   /DISABLE INTERRUPTS
              3466   6132              CLDI
              3467   7300              CLA CLL
              3470   4505              JMS I   TPSIE
              3471   3051              DCA     TRONE         /CLEAR PROGRAM CONTROL FLAGS
              3472   3052              DCA     TLOOP
              3473   3050              DCA     STRONE
              3474   1125              TAD     LIERR         /SET INTERRUPT ERROR ADR
              3475   3002              DCA     ISRV
              3476   4455              TYPE                  /TYPE SELECT TEXT MESG
              3477   4755              SELTST
              3500   4511              JMS I   READ          /GET SELECTION
              3501   1524              TAD I   LREADT        /FIRST CHAR = CONTROL=C ?
              3502   1155              TAD     M3
              3503   7650              SNA CLA
              3504   5466              JMP I   TKBDST        /YES, GET # COLUMNS
              3505   2034              ISZ     COUNT         /CORRECT # CHAR'S INPUT?
              3506   5512              JMP I   TREADQ        /NO, INPUT ERROR
              3507   1377              TAD     (READT=1      /GET TABLE ADR
              3510   3010              DCA     AUTPTR        /SET POINTER
```

```
              3511   1410              TAD I   AUTPTR        /GET FIRST DIGIT
              3512   4513              JMS I   CHKOCT        /CHECK IF OCTAL
              3513   7106              CLL RTL               /SHIFT TO CORRECT POSITION
              3514   7104              CLL RAL
              3515   3023              DCA     TSTNM         /STORE
              3516   1410              TAD I   AUTPTR        /GET SECOND DIGIT
              3517   4513              JMS I   CHKOCT        /CHECK & MAKE OCTAL
              3520   1023              TAD     TSTNM         /ADD TO CURRENT #
              3521   3023              DCA     TSTNM         /STORE SELECTED TEST #
              3522   1070              TAD     TTAT          /GET TEST ADR TABLE ADR
              3523   1023              TAD     TSTNM         /ADD TEST #
              3524   3041              DCA     TABPTR        /STORE POINTER
              3525   1441              TAD I   TABPTR        /GET TEST ADR
              3526   7550              SNA SPA               /TEST IN TABLE?
              3527   5512              JMP I   TREADQ        /NO = INVALID TEST #
              3530   3042              DCA     TSTPTR        /YES, STORE TEST ADR
              3531   1410              TAD I   AUTPTR        /GET CONTROL CHAR
              3532   3033              DCA     SAVE          /SAVE CONTROL CHAR
              3533   1171              TAD     M56           /CHECK IF PERIOD
              3534   1033              TAD     SAVE
              3535   7640              SZA CLA               /PERIOD?
              3536   5342              JMP     TSEL1         /NO, CONTINUE
              3537   7240              CLA CMA               /YES, SET ONE=RUN FLAG
              3540   3051              DCA     TRONE
              3541   5355              JMP     TSELX         /GO TO TEST

              3542   1033     TSEL1,   TAD     SAVE          /GET CHAR
              3543   0375              AND     (137          /ALLOW LOWER CASE
              3544   1374              TAD     (-114         /CHECK CHAR
              3545   7440              SZA                   /CHAR=L?
              3546   5352              JMP     TSEL2         /NO, CONTINUE
              3547   7240              CLA CMA               /YES, SET LOOP ON TEST FLAG
              3550   3052              DCA     TLOOP
              3551   5355              JMP     TSELX         /GO TO TEST
              3552   1157     TSEL2,   TAD     M7            /CHECK CHAR
              3553   7640              SZA CLA               /CHAR=S?
              3554   5512              JMP I   TREADQ        /INVALID INPUT, READ AGAIN
              3555   4455     TSELX,   TYPE                  /YES, TYP CR=LF AND GO TO TEST
              3556   5441              CRLF
              3557   5442              JMP I   TSTPTR

              3574   7664
              3575   0137
              3576   3400
              3577   4505
              3600              PAGE

                       /ERROR ROUTINE, ERROR MESG IS IN FORM:
                       /
                       /TEST #XX,  PC=XXXX,  ERROR #XXXX,  MESSAGE>>>>>>

              3600   0000     RERROR,  0
              3601   7240              CLA CMA               /GET ERROR PC
              3602   1200              TAD     RERROR
              3603   3025              DCA     ERRPC         /SAVE IT
```

```
      3604  1600              TAD I   RERROR          /GET ERROR NUMBER
      3605  3024              DCA     ERRNM           /SAVE IT
      3606  4521              GETSW                   /GET SW REG
      3607  7004              RAL                     /GET SW 1
      3610  7710              SPA CLA                 /WANT ERROR MESG?
      3611  5250              JMP     IERRT           /NO, SKIP PRINT OUT
      3612  1053              TAD     TPFLG           /CHECK IF TERMINAL EXISTS
      3613  7650              SNA CLA
      3614  5250              JMP     IERRT           /NO, SKIP PRINT OUT
      3615  4455              TYPE                    /PRINT FIRST PART OF MESG
      3616  5036              ETSTNO
      3617  1023              TAD     TSTNM           /GET TEST #
      3620  7012              RTR                     /GET FIRST DIGIT
      3621  7010              RAR
      3622  4522              JMS I   PDIGIT          /PRINT IT
      3623  1023              TAD     TSTNM           /GET TEST #
      3624  4522              JMS I   PDIGIT          /PRINT SECOND DIGIT
      3625  4455              TYPE                    /TYPE MORE OF MESG
      3626  5043              PCMSG
      3627  1025              TAD     ERRPC           /GET ERROR PC
      3630  4523              JMS I   TPOCT           /PRINT IT
      3631  4455              TYPE                    /TYPE MORE OF MESG
      3632  5047              ERR
      3633  1024              TAD     ERRNM           /GET ERROR #
      3634  4523              JMS I   TPOCT           /TYPE IT
      3635  4455              TYPE                    /TYPE SPACES
      3636  5055              ERRS
      3637  1377              TAD     (EMAT-1         /GET ERROR MESG ADR TABLE
      3640  1024              TAD     ERRNM           /ADD ERROR #
      3641  3245              DCA     RSAVE           /STORE POINTER
      3642  1645              TAD I   RSAVE           /GET MESG ADR
      3643  3245              DCA     RSAVE           /SET FOR TYPE
      3644  4455              TYPE                    /TYPE END OFMESG
      3645  0000      RSAVE,  0
      3646  4455              TYPE                    /TYPE CR-LF
      3647  5441              CRLF
      3650  4521      IERRT,  GETSW                   /GET SW REG
      3651  7700              SMA CLA                 /STOP ON ERROR?
      3652  5255              JMP     .+3             /NO, RETURN
      3653  1024              TAD     ERRNM           /YES, GET ERROR #
      3654  4457              HOLD                    /STOP
      3655  2200              ISZ     RERROR          /SET RETURN ADR
      3656  7300              CLA CLL                 /CLEAR AC AND LINK
      3657  5600              JMP I   RERROR          /RETURN

                      /ROUTINE TO PRINT AN OCTAL DIGIT ON THE CONSOLE DEVICE

      3660  0000      RPDIGT, 0
      3661  0127              AND     P7              /MASK DIGIT
      3662  1140              TAD     P60             /MAKE ASCII
      3663  4515              JMS I   GOUT            /PRINT IT
      3664  5660              JMP I   RPDIGT          /RETURN

                      /ROUTINE TO CONVERT A DIGIT OCTAL NUMBER TO ASCII AND TYPE ON CONSOLE
```

```
      3665  0000      POCT,   0
      3666  3312              DCA     OCTSAV          /SAVE NUMBER
      3667  1312              TAD     OCTSAV          /GET NUMBER AGAIN
      3670  7012              RTR                     /GET FIRST DIGIT
      3671  7012              RTR
      3672  7012              RTR
      3673  7012              RTR
      3674  7010              RAR
      3675  4522              JMS I   PDIGIT          /PRINT IT
      3676  1312              TAD     OCTSAV          /GET NUMBER
      3677  7012              RTR                     /GET SECOND DIGIT
      3700  7012              RTR
      3701  7012              RTR
      3702  4522              JMS I   PDIGIT          /PRINT IT
      3703  1312              TAD     OCTSAV          /GET NUMBER
      3704  7012              RTR                     /GET THIRD DIGIT
      3705  7010              RAR
      3706  4522              JMS I   PDIGIT          /PRINT IT
      3707  1312              TAD     OCTSAV          /GET NUMBER
      3710  4522              JMS I   PDIGIT          /PRINT LAST DIGIT
      3711  5665              JMP I   POCT            /RETURN

      3712  0000      OCTSAV, 0

                      /ROUTINE TO CONVERT OCTAL NUMBER TO 3 DIGIT DECIMAL NUMBER IN ASCII STRING
                      /RETURN WITH CONVERT NUMBER STRING IN CNVMSG.

      3713  0000      CNVRT,  0
      3714  3361              DCA     CNVNM           /SAVE NUMBER
      3715  3046              DCA     HUNDS           /CLEAR CONVERSION COUNTERS
      3716  3045              DCA     TENS
      3717  3044              DCA     ONES
      3720  1361              TAD     CNVNM           /GET NUMBER
      3721  2046              ISZ     HUNDS           /GET HUNDRESD DIGIT
      3722  1173              TAD     M144
      3723  7500              SMA
      3724  5321              JMP     .-3
      3725  1376              TAD     (144
      3726  2045              ISZ     TENS            /GET TENS DIGIT
      3727  1160              TAD     M12
      3730  7500              SMA
      3731  5326              JMP     .-3
      3732  3044              DCA     ONES            /STORE ONES DIGIT -12
      3733  1375              TAD     (CNVMSG         /SET MESG ADR
      3734  3362              DCA     MSGPTR
      3735  1046              TAD     HUNDS           /GET HUNDREDS DIGIT
      3736  1137              TAD     P57             /MAKE ASCII
      3737  7006              RTL                     /SET FIRST CHAR
      3740  7006              RTL
      3741  7006              RTL
      3742  0172              AND     M100            /MASK OTHER BITS
      3743  3762              DCA I   MSGPTR          /STORE CHAR IN MESG
      3744  1045              TAD     TENS            /GET TENS DIGIT
      3745  1137              TAD     P57             /MAKE ASCII
```

```
3746  1762              TAD I   MSGPTR          /ADD FIRST CHAR
3747  3762              DCA I   MSGPTR          /STORE CHAR PAIR
3750  2362              ISZ     MSGPTR          /INC MESG POINTER
3751  1044              TAD     ONES            /GET ONES DIGIT
3752  1141              TAD     P72             /MAKE ASCII
3753  7006              RTL                     /ROTATE TO CORRECT POSITION
3754  7006              RTL
3755  7006              RTL
3756  0172              AND     M100            /MASK OTHER BITS (NULL = TERMINATOR)
3757  3762              DCA I   MSGPTR          /STORE CHAR
3760  5713              JMP I   CNVRT           /RETURN

3761  0000      CNVNM,  0                       /SAVE NUMBER
3762  0000      MSGPTR, 0                       /MESG POINTER

3775  5435
3776  0144
3777  4677
      0000              PAGE

              /TYPE ROUTINE - TO TYPE ASCII MESSAGES
              /CALL: TYPE - JUMP TO TYPE ROUTINE
              /      MESADR - MESSAGE ADDRESS
              /RETURN WITH CLEAR AC AND LINK

4000  0000      RTYPE,  0
4001  7300              CLA CLL                 /CLEAR
4002  1053              TAD     TPFLG           /GET TERMINAL FLAG
4003  7640              SZA CLA                 /TERMINAL THERE?
4004  5207              JMP     .+3             /YES, CONTINUE
4005  2200      RT2,    ISZ     RTYPE           /INC RETURN ADR
4006  5600              JMP I   RTYPE           /RETURN
4007  1600              TAD I   RTYPE           /GET MESG ADR
4010  3043              DCA     MSGADR          /STORE
4011  1443      RT1,    TAD I   MSGADR          /GET CHAR PAIR
4012  7112              CLL RTR
4013  7112              CLL RTR
4014  7112              CLL RTR
4015  4222              JMS     OUT             /PRINT CHAR
4016  1443              TAD I   MSGADR          /GET CHAR PAIR
4017  4222              JMS     OUT             /PRINT CHAR
4020  2043              ISZ     MSGADR          /ADR NEXT CHAR PAIR
4021  5211              JMP     RT1             /CONTINUE

4022  0000      OUT,    0
4023  0142              AND     P77             /MASK CHAR
4024  7450              SNA                     /CONTINUE IF NOT END
4025  5205              JMP     RT2             /ZERO, RETURN
4026  3033              DCA     SAVE            /SAVE CHAR
4027  1033              TAD     SAVE            /GET CHAR
4030  1377              TAD     (-53            /CHECK CHAR
4031  7450              SNA                     /WANT CR-LF?
4032  5244              JMP     OUTCL           /YES, DO CR-LF
4033  1162              TAD     M20             /CHECK CHAR
4034  7650              SNA CLA                 /WANT LF?
```

```
4035  5251              JMP     OUTLF           /YES, DO LF
4036  1033              TAD     SAVE            /GET CHAR AGAIN
4037  0134              AND     P40             /MAKE ASCII
4040  7650              SNA CLA
4041  1143              TAD     P100
4042  1033              TAD     SAVE
4043  5253              JMP     OUTCHR          /PRINT CHAR

4044  7300      OUTCL,  CLA CLL                 /CLEAR
4045  1132              TAD     P15             /GET CR
4046  4501              JMS I   TTLS            /PRINT
4047  4476              JMS I   TTSF            /WAIT FOR READY
4050  5247              JMP     .-1
4051  7300      OUTLF,  CLA CLL                 /CLEAR
4052  1131              TAD     P12             /GET LF
4053  4501      OUTCHR, JMS I   TTLS            /PRINT CHR
4054  4476              JMS I   TTSF            /WAIT FOR READY
4055  5254              JMP     .-1
4056  7300              CLA CLL                 /CLEAR
4057  5622              JMP I   OUT             /RETURN

              /ROUTINE TO LOAD SINGLE CHARACTERS TO LA180 PRINTER
              /CALL:          LOAD

4060  0000      RLOAD,  0
4061  4464              CHECK                   /CHECK FOR CONTROL
4062  7300      RLA,    CLA CLL                 /CHECK READY TIME
4063  3303              DCA     RLDC
4064  1376              TAD     (-300
4065  3304              DCA     RLDCC
4066  2303      RLB,    ISZ     RLDC
4067  5275              JMP     RLC
4070  2304              ISZ     RLDCC
4071  5275              JMP     RLC
4072  4463              ERROR                   /PRINTER NOT READY
4073  0016              16
4074  5660              JMP I   RLOAD           /EXIT
4075  4502      RLC,    JMS I   TPSKF           /CHECK FOR PRINTER READY
4076  5266              JMP     RLB             /WAIT FOR READY
4077  1033              TAD     SAVE
4100  4506              JMS I   TPCLP           /LOAD CHAR
4101  7300              CLA CLL                 /CLEAR AC AND LINK
4102  5660              JMP I   RLOAD           /RETURN

4103  0000      RLDC,   0                       /DELAY COUNT.
4104  0000      RLDCC,  0


              /ROUTINE TO LOAD MULTIPLE CHARACTERS (NOT TEXT STRINGS) TO LA180
              /WILL LOAD CHAR ONCE IT COUNT = 0
              /PUT CHAR IN AC AND CHAR COUNT IN "COUNT" (NEGATIVE NUMBER)
              /CALL:          MLOAD

4105  0000      RMLOAD, 0
```

```
4106  3033            DCA     SAVE            /SAVE CHAR
4107  1033            TAD     SAVE            /GET CHAR
4110  4456            LOAD                    /LOAD CHAR
4111  2034            ISZ     COUNT           /INC COUNT
4112  1034            TAD     COUNT           /CHECK IF WAS ZERO
4113  7710            SPA CLA                 /SKIP IF WAS ZERO OR IS ZERO
4114  5307            JMP     RMLOAD+2        /CONTINUE
4115  5705            JMP I   RMLOAD          /RETURN
4176  7500
4177  7725
      4200            PAGE

            /ROUTINE TO PRINT ASCII MESSAGES ON THE LA180 PRINTER
            /SPECIAL CHARACTERS ARE LISTED AT THE BEGINNING OF THE
            /PROGRAM MESSAGE AREA.
            /CALL:  PRINT = CALL TO SUBROUTINE
            /       MESADR = MESSAGE ADDRESS
            /RETURN WITH CLEAR AC AND LINK

4200  0000  RPRINT, 0
4201  7300            CLA CLL                 /CLEAR
4202  1600            TAD I   RPRINT          /GET MESG ADR
4203  3043            DCA     MSGADR          /STORE
4204  2200            ISZ     RPRINT          /INC RETURN ADR
4205  1443  RP1,      TAD I   MSGADR          /GET CHAR PAIR
4206  7112            CLL RTR
4207  7112            CLL RTR
4210  7112            CLL RTR
4211  4216            JMS     PRT             /LOAD CHAR
4212  1443            TAD I   MSGADR          /GET PAIR AGAIN
4213  4216            JMS     PRT             /LOAD CHAR
4214  2043            ISZ     MSGADR          /SET NEXT CHAR ADR
4215  5205            JMP     RP1             /CONTINUE

4216  0000  PRT,      0
4217  0142            AND     P77             /MASK CHAR
4220  7450            SNA                     /CONTINUE IF NOT END
4221  5600            JMP I   RPRINT          /ZERO, RETURN
4222  3033            DCA     SAVE            /SAVE CHAR
4223  1033            TAD     SAVE            /GET AGAIN
4224  1377            TAD     (-41            /CHECK CHAR
4225  7450            SNA                     /WANT FF?
4226  5246            JMP     PRTFF           /YES, DO FF
4227  1160            TAD     M12             /CHECK AGAIN
4230  7450            SNA                     /WANT CRLF?
4231  5254            JMP     PRTCL           /YES, DO CRLF
4232  1376            TAD     (-17            /CHECK AGAIN
4233  7450            SNA                     /WANT CR ONLY?
4234  5251            JMP     PRTCR           /YES, DO CR
4235  1153            TAD     M1              /CHECK AGAIN
4236  7650            SNA CLA                 /WANT LF ONLY?
4237  5257            JMP     PRTLF           /YES, DO LF
4240  1033            TAD     SAVE            /GET CHAR AGAIN
4241  0134            AND     P40             /MAKE ASCII
4242  7650            SNA CLA
```

```
4243  1143            TAD     P100
4244  1033            TAD     SAVE
4245  5260            JMP     PRTCHR          /LOAD CHAR

4246  7300  PRTFF,    CLA CLL                 /CLEAR
4247  1375            TAD     (14             /GET FF
4250  5260            JMP     PRTCHR          /GO LOAD FF
4251  7300  PRTCR,    CLA CLL                 /CLEAR
4252  1132            TAD     P15             /GET CR
4253  5260            JMP     PRTCHR          /GO LOAD CR
4254  7300  PRTCL,    CLA CLL                 /CLEAR
4255  1132            TAD     P15             /GET CR
4256  4456            LOAD                    /LOAD CR
4257  1131  PRTLF,    TAD     P12             /GET LF
4260  4456  PRTCHR,   LOAD                    /LOAD CHAR
4261  5616            JMP I   PRT             /RETURN

            /ROUTINE TO PRINT TEST HEADER ON LA180
            /# OF COLUMNS WILL ALSO BE PRINTED FOR TEST 25 ONLY

4262  0000  RPRHDR, 0
4263  7300            CLA CLL                 /CLEAR
4264  1145            TAD     P177            /SET RUBOUT
4265  4456            LOAD                    /CLEAR LA180 CHAR BUFFER
4266  1331            TAD     SVTST           /GET SAVED TEST #
4267  7041            CIA                     /NEGATE IT
4270  1023            TAD     TSTNM           /ADD CURRENT TEST #
4271  7650            SNA CLA                 /CHECK IF PRINTED THIS # LAST
4272  5326            JMP     HDRX            /YES, PRINT BLANK LINE & EXIT
4273  1023            TAD     TSTNM           /NO, STORE NEW NUMBER
4274  3331            DCA     SVTST
4275  4461            PRINT                   /LOAD TEST # MESG
4276  5020            TSTNO
4277  1023            TAD     TSTNM           /GET TEST #
4300  7012            RTR                     /GET FIRST DIGIT
4301  7010            RAR
4302  0127            AND     P7              /MAKE ASCII
4303  1140            TAD     P60
4304  4456            LOAD                    /LOAD IT
4305  1023            TAD     TSTNM           /GET TEST #
4306  0127            AND     P7              /GET LAST DIGIT
4307  1140            TAD     P60             /MAKE ASCII
4310  4456            LOAD                    /LOAD IT
4311  4461            PRINT                   /PRINT LINE
4312  5440            LF
4313  1164            TAD     M25             /CHECK IF TEST 25
4314  1023            TAD     TSTNM
4315  7640            SZA CLA                 /IS IT?
4316  5326            JMP     HDRX            /NO, PRINT BLANK LINE & EXIT
4317  1026            TAD     WIDTH           /GET NUMBER OF COLUMNS
4320  7041            CIA                     /MAKE POSITIVE
4321  4517            JMS I   TCNVRT          /CONVERT NUMBER TO DECIMAL, ASCII STRING
4322  4461            PRINT                   /PRINT IT
4323  5435            CNVMSG
4324  4461            PRINT
```

```
          4325  5030          COLMN
          4326  4461   HDRX,  PRINT                    /BLANK LINE
          4327  5440          LF
          4330  5662          JMP I   RPRHDR           /RETURN

          4331  0000   SVTST, 0                        /SAVE TEST # FOR CHECK

          4375  0014
          4376  7761
          4377  7737
                4400   PAGE

                       /ROUTINE TO READ 4 CHARS FROM THE CONSOLE KEYBOARD
                       /
                       /RUBOUTS DELETE CHARACTERS
                       /CONTROL=U (↑U) RESTARTS INPUT ROUTINE

          4400  0000   TREAD, 0
          4401  7300   READ0, CLA CLL                  /CLEAR
          4402  3303          DCA     RFLAG            /CLEAR RUBOUT FLAG
          4403  1156   READ1, TAD     H4               /SET # CHARS TO READ
          4404  3034          DCA     COUNT            /STORE
          4405  1124          TAD     LREADT           /GET CHAR STORE TABLE ADR
          4406  3041          DCA     TABPTR           /SET POINTER
          4407  4472   READ2, JMS I   TKSF             /KYBD FLAG SET?
          4410  5207          JMP     .=1              /NO, WAIT
          4411  4475          JMS I   TKRB             /YES, READ CHAR
          4412  0145          AND     P177             /MAKE ASCII
          4413  3441          DCA I   TABPTR           /SAVE CHAR
          4414  1170          TAD     H40              /CHECK CHAR
          4415  1441          TAD I   TABPTR
          4416  7650          SNA CLA                  /CHAR=SPACE?
          4417  5207          JMP     READ2            /YES, IGNORE IT
          4420  1164          TAD     H25              /CHAR = CONTROL=U
          4421  1441          TAD I   TABPTR
          4422  7650          SNA CLA
          4423  5254          JMP     READU            /YES, TYPE IT AND RESTART
          4424  1174          TAD     H177             /CHECK CHAR
          4425  1441          TAD I   TABPTR
          4426  7650          SNA CLA                  /CHAR=RUBOUT?
          4427  5257          JMP     READD            /YES, DELETE LAST CHAR
          4430  1161          TAD     M15              /CHECK FOR CR= END OF INPUT
          4431  1441          TAD I   TABPTR
          4432  7650          SNA CLA                  /CHAR=CR?
          4433  5600          JMP I   TREAD            /YES, RETURN
          4434  1303          TAD     RFLAG            /CHECK RUBOUT FLAG
          4435  7650          SNA CLA                  /RECEIVED RUBOUT?
          4436  5241          JMP     .+3              /NO, CONTINUE
          4437  1144          TAD     P134             /GET BACKSLASH
          4440  4515          JMS I   GOUT             /PRINT IT
          4441  3303          DCA     RFLAG            /CLEAR RUBOUT FLAG
          4442  1441          TAD I   TABPTR           /GET CHAR
          4443  4501          JMS I   TTLS             /ECHO CHAR
          4444  4476          JMS I   TTSF
          4445  5244          JMP     .=1
```

```
          4446  2041          ISZ     TABPTR           /INC TABLE POINTER
          4447  2034          ISZ     COUNT            /INC CHAR COUNT
          4450  5207          JMP     READ2            /READ CHAR

          4451  4455   READQ, TYPE                     /TYPE QUESTION MASK
          4452  5443          QUES
          4453  5201          JMP     READ0            /READ NEW STRING
          4454  4455   READU, TYPE                     /TYPE CONTROL=U
          4455  5445          CNTLU
          4456  5201          JMP     READ0            /RESTART ROUTINE
          4457  7240   READD, CLA CHA                  /SET AC==1
          4460  1034          TAD     COUNT            /ADD COUNT
          4461  3034          DCA     COUNT            /STORE NEW COUNT
          4462  1377          TAD     (4               /CHECK CHAR COUNT
          4463  1034          TAD     COUNT
          4464  7710          SPA CLA                  /LESS THAN =5?
          4465  5203          JMP     READ1            /YES, RESTART READ ROUTINE
          4466  7240          CLA CHA                  /SET AC==1
          4467  1041          TAD     TABPTR           /SUBTRACT ONE FROM TABLE POINTER
          4470  3041          DCA     TABPTR           /STORE NEW POINTER
          4471  1303          TAD     RFLAG            /CHECK RUBOUT FLAG
          4472  7640          SZA CLA                  /SET?
          4473  5276          JMP     .+3              /YES, SKIP BACKSLASH
          4474  1144          TAD     P134             /NO, PRINT BACKSLASH
          4475  4515          JMS I   GOUT
          4476  1441          TAD I   TABPTR           /GET DELETED CHAR
          4477  4515          JMS I   GOUT             /PRINT IT
          4500  7240          CLA CHA                  /SET RUBOUT FLAG
          4501  3303          DCA     RFLAG
          4502  5207          JMP     READ2            /READ NEXT CHAR

          4503  0000   RFLAG, 0

          4504  0000   READT, 0
          4505  0000          0
          4506  0000          0
          4507  0000          0

                       /ROUTINE TO CHECK FOR OCTAL DIGIT INPUT

          4510  0000   TCKOUT, 0
          4511  4320          JMS     TCHKNR           /CHECK IF NUMBER FIRST
          4512  0130          AND     P10              /CHECK IF OCTAL
          4513  7640          SZA CLA                  /# = 8 OR 9?
          4514  5512          JMP I   TREADQ           /YES, INPUT ERROR
          4515  1033          TAD     SAVE             /OK, GET #
          4516  0127          AND     P7               /MAKE OCTAL
          4517  5710          JMP I   TCKOUT           /RETURN

                       /ROUTINE TO CHECK INPUTTED CHAR IF A NUMBER:

          4520  0000   TCHKNR, 0
```

```
        4521  3033          DCA     SAVE            /SAVE CHAR
        4522  1376          TAD     (-60            /CHECK CHAR
        4523  1033          TAD     SAVE
        4524  7710          SPA CLA                 /NUMBER?
        4525  5512          JMP I   TREADQ          /NO, INPUT ERROR
        4526  1375          TAD     (-72            /CHECK AGAIN
        4527  1033          TAD     SAVE
        4530  7700          SMA CLA                 /NUMBER?
        4531  5512          JMP I   TREADQ          /NO, INPUT ERROR
        4532  1033          TAD     SAVE            /SET CHAR
        4533  0374          AND     (17             /MASK NOT EQUAL
        4534  5720          JMP I   TCHKNR          /RETURN

        4535  2601  IOTAB,  RKSF+1                  /I-0 INSTRUCTION ADDRESS TABLE
        4536  2606          RKCC+1
        4537  2611          RKRS+1
        4540  2614          RKRB+1
        4541  2617          RTSF+1
        4542  2624          RTCF+1
        4543  2627          RTPC+1
        4544  2632          RTLS+1
        4545  0000          0                       /END OF TTY IOT'S
        4546  2637          RPSKF+3
        4547  2651          RPCLF+3
        4550  2661          RPSTB+3
        4551  2673          RPSIE+3
        4552  2705          RPCLP+3
        4553  0000          0                       /END OF TABLE


        4574  0017
        4575  7706
        4576  7720
        4577  0004
        4600          PAGE

                /TEST ADDRESS TABLE
                /
                /0 = NON-EXISTENT TEST, SKIP IN SEQUENCE
                /-1 = END OF TEST SEQUENCE, RESTART WITH TEST #20

        4600  0400  TAT,    TEST0
        4601  0714          TEST1
        4602  1000          TEST2
        4603  0000          0               /TEST3
        4604  0000          0               /TEST4
        4605  0000          0               /TEST5
        4606  0000          0               /TEST6
        4607  0000          0               /TEST7
        4610  0000          0               /TEST10
        4611  0000          0               /TEST11
        4612  0000          0               /TEST12
        4613  0000          0               /TEST13
        4614  0000          0               /TEST14
```

```
        4615  0000          0               /TEST15
        4616  0000          0               /TEST16
        4617  0000          0               /TEST17
        4620  1200          TEST20
        4621  1227          TEST21
        4622  1274          TEST22
        4623  1331          TEST23
        4624  1400          TEST24
        4625  1600          TEST25
        4626  2000          TEST26
        4627  2054          TEST27
        4630  2200          TEST30
        4631  2212          TEST31
        4632  7777          -1              /TEST32 .....   END OF TEST SEQUENCE
        4633  0000          0               /TEST33
        4634  0000          0               /TEST34
        4635  0000          0               /TEST35
        4636  0000          0               /TEST36
        4637  0000          0               /TEST37
        4640  0000          0               /TEST40
        4641  0000          0               /TEST41
        4642  0000          0               /TEST42
        4643  0000          0               /TEST43
        4644  0000          0               /TEST44
        4645  0000          0               /TEST45
        4646  0000          0               /TEST46
        4647  0000          0               /TEST47
        4650  0000          0               /TEST50
        4651  0000          0               /TEST51
        4652  0000          0               /TEST52
        4653  0000          0               /TEST53
        4654  0000          0               /TEST54
        4655  0000          0               /TEST55
        4656  0000          0               /TEST56
        4657  0000          0               /TEST57

        4660  2246          TEST60
        4661  2400          TEST61
        4662  2450          TEST62
        4663  2477          TEST63
        4664  0000          0               /TEST64
        4665  0000          0               /TEST65
        4666  0000          0               /TEST66
        4667  0000          0               /TEST67
        4670  0000          0               /TEST70
        4671  0000          0               /TEST71
        4672  0000          0               /TEST72
        4673  0000          0               /TEST73
        4674  0000          0               /TEST74
        4675  0000          0               /TEST75
        4676  0000          0               /TEST76
        4677  0000          0               /TEST77
```

/ERROR MESSAGE ADDRESS TABLE

```
4700    5476    EMAT,    ERR1
4701    5511             ERR2
4702    5527             ERR3
4703    5546             ERR4
4704    5561             ERR5
4705    5602             ERR6
4706    5617             ERR7
4707    5640             ERR10
4710    5655             ERR11
4711    5676             ERR12
4712    5711             ERR13
4713    5733             ERR14
4714    5755             ERR15
4715    5777             ERR16
```

/PROGRAM MESSAGES

/SPECIAL CHARACTERS AND FUNCTIONS:

```
/       +        =       CRLF
/       :        =       CR
/       ;        =       LF
/       ]        =       FF
```

```
4716    5315    HEADER, TEXT     '+MAINDEC=08=DILAC=8+LA180 PRINTER DIAGNOSTIC+:'
4717    0111
4720    1604
4721    0503
4722    5560
4723    7055
4724    0411
4725    1401
4726    0355
4727    0253
4730    1401
4731    6170
4732    6040
4733    2022
4734    1116
4735    2405
4736    2240
4737    0411
4740    0107
4741    1617
4742    2324
4743    1103
4744    5373
4745    0000
4746    5343    COLUMN, TEXT     '+# COLUMNS = '
4747    4003
4750    1714
4751    2515
4752    1623
```

```
4753    4075
4754    4000
4755    5323    SELTST, TEXT     '+SELECT TEST # '
4756    0514
4757    0503
4760    2440
4761    2405
4762    2324
4763    4043
4764    4040
4765    0000
4766    5323    DSMSG1, TEXT     /+SWR = /
4767    2722
4770    4075
4771    4000
4772    4040    DSMSG2, TEXT     /   NEW = /
4773    4016
4774    0527
4775    4075
4776    4000
4777    2701    WTMSG,  TEXT     /WAITING, TYPE SPACE TO CONTINUE+/
5000    1124
5001    1116
5002    0754
5003    4024
5004    3120
5005    0540
5006    2320
5007    0103
5010    0540
5011    2417
5012    4003
5013    1716
5014    2411
5015    1625
5016    0553
5017    0000
5020    7373    TSTNO,  TEXT     ';;TEST NUMBER '
5021    2405
5022    2324
5023    4016
5024    2515
5025    0205
5026    2240
5027    4000
5030    4040    COLMN,  TEXT     '  COLUMNS:'
5031    0317
5032    1425
5033    1516
5034    2373
5035    0000
5036    5324    ETSTNO, TEXT     '+TEST # '
5037    0523
5040    2440
5041    4340
```

```
        5042    0000
        5043    5440    PCMSG,  TEXT    ', PC#'
        5044    4020
        5045    0375
        5046    0000
        5047    5440    ERR,    TEXT    ', ERROR #'
        5050    4005
        5051    2222
        5052    1722
        5053    4043
        5054    0000
        5055    5440    ERRS,   TEXT    ', '
        5056    4000
        5057    7305    PASMSG, TEXT    '/END OF PASS #'
        5060    1604
        5061    4017
        5062    0640
        5063    2001
        5064    2323
        5065    4040
        5066    4300
        5067    2022    T2M1,   TEXT    'PRINT SPEED MANUAL TIMING+'
        5070    1116
        5071    2440
        5072    2320
        5073    0505
        5074    0440
        5075    1501
        5076    1625
        5077    0114
        5100    4024
        5101    1115
        5102    1116
        5103    0753
        5104    0000
        5105    2025    T2M2,   TEXT    'PUT SWITCH 0 UP TO START TIMING+'
        5106    2440
        5107    2327
        5110    1124
        5111    0310
        5112    4064
        5113    4025
        5114    2040
        5115    2417
        5116    4023
        5117    2401
        5120    2224
        5121    4024
        5122    1115
        5123    1116
        5124    0753
        5125    0000
        5126    2025    T2M3,   TEXT    'PUT SWITCH 0 DOWN AT END OF 1 MINUTE+'
        5127    2440
        5130    2327
```

```
        5131    1124
        5132    0310
        5133    4064
        5134    4004
        5135    1727
        5136    1640
        5137    0124
        5140    4005
        5141    1604
        5142    4017
        5143    0640
        5144    6140
        5145    1511
        5146    1625
        5147    2405
        5150    5300
        5151    1617    T2EM,   TEXT    /NO METHOD OF TIMING AVAILABLE+/
        5152    4015
        5153    0524
        5154    1017
        5155    0440
        5156    1706
        5157    4024
        5160    1115
        5161    1116
        5162    0740
        5163    0126
        5164    0111
        5165    1401
        5166    0214
        5167    0553
        5170    0000
        5171    5320    PRSP1,  TEXT    '+PRINT SPEED IS '
        5172    2211
        5173    1624
        5174    4023
        5175    2005
        5176    0504
        5177    4011
        5200    2340
        5201    0000
        5202    0120    PRSP2,  TEXT    'APPROX '
        5203    2022
        5204    1730
        5205    4000
        5206    4040    PRSP3,  TEXT    ' LINES/MINUTE , WITH '
        5207    1411
        5210    1605
        5211    2357
        5212    1511
        5213    1625
        5214    2405
        5215    4054
        5216    4027
        5217    1124
```

```
5220  1040
5221  0000
5222  4040    PRSP4,    TEXT    '  CHARS/LINE+'
5223  0310
5224  0122
5225  2357
5226  1411
5227  1605
5230  5300

5231  7316    NCMSG,    TEXT    '/NO CONSOLE TERMINAL/'
5232  1740
5233  0317
5234  1623
5235  1714
5236  0540
5237  2405
5240  2215
5241  1116
5242  0114
5243  7300
5244  0310    TCHAR,    TEXT    'CHAR = '
5245  0122
5246  0075
5247  4000
5250  2425    T0MSG0,   TEXT    /TURN POWER OFF & SET OFF LINE+/
5251  2216
5252  4020
5253  1727
5254  0522
5255  4017
5256  0606
5257  4046
5260  4023
5261  0524
5262  4017
5263  0606
5264  4014
5265  1116
5266  0553
5267  0000
5270  1713    T0MSG1,   TEXT    /OK, TURN POWER ON+/
5271  5440
5272  2425
5273  2216
5274  4020
5275  1727
5276  0522
5277  4017
5300  1653
5301  0000
5302  1713    T0MSG2,   TEXT    /OK, SET PRINTER TO ON-LINE+/
5303  5440
5304  2305
5305  2440
```

```
5306  2022
5307  1116
5310  2405
5311  2240
5312  2417
5313  4017
5314  1655
5315  1411
5316  1605
5317  5300
5320  1713    T0MSG3,   TEXT    /OK, TRY PAPER OUT SWITCH+/
5321  5440
5322  2422
5323  3140
5324  2001
5325  2005
5326  2240
5327  1725
5330  2440
5331  2327
5332  1124
5333  0310
5334  5300
5335  1713    T0MSG4,   TEXT    /OK, RESTORE PRINTER TO ON-LINE+/
5336  5440
5337  2205
5340  2324
5341  1722
5342  0540
5343  2022
5344  1116
5345  2405
5346  2240
5347  2417
5350  4017
5351  1655
5352  1411
5353  1605
5354  5300
5355  5555    T1MSG1,   TEXT    '----- '
5356  5555
5357  5540
5360  0000
5361  4011    T1MSG2,   TEXT    ' INCH FORM FEED -----;'
5362  1603
5363  1040
5364  0617
5365  2215
5366  4006
5367  0505
5370  0440
5371  5555
5372  5555
5373  5572
5374  0000
```

```
        5375   2305    T1MSG3,  TEXT      'SET FORM FEED SWITCH TO '
        5376   2440
        5377   0617
        5400   2215
        5401   4006
        5402   0505
        5403   0440
        5404   2327
        5405   1124
        5406   0310
        5407   4024
        5410   1740
        5411   4000
        5412   4040    T1MSG4,  TEXT      '  INCHES & DEPRESS TOF RESET SWITCH+'
        5413   1116
        5414   0310
        5415   0523
        5416   4046
        5417   4004
        5420   0520
        5421   2205
        5422   2323
        5423   4024
        5424   1706
        5425   4022
        5426   0523
        5427   0524
        5430   4023
        5431   2711
        5432   2403
        5433   1053
        5434   0000
        5435   4040    CNVMSG,  TEXT      /   /
        5436   4000
        5437   7200    CR,      TEXT      '|'
        5440   7300    LF,      TEXT      '/'
        5441   5300    CRLF,    TEXT      '+'
        5442   4100    FF,      TEXT      '|'
        5443   5377    QUES,    TEXT      '+?+'
        5444   5300
        5445   3625    CNTLU,   TEXT      /^U+/
        5446   5300
        5447   4063    T1TAB,   TEXT      ' 3 '
        5450   4000
        5451   6356             TEXT      '3.5'
        5452   6500
        5453   4064             TEXT      ' 4 '
        5454   4000
        5455   6556             TEXT      '5.5'
        5456   6500
        5457   4066             TEXT      ' 6 '
        5460   4000
        5461   4067             TEXT      ' 7 '
        5462   4000
```

```
        5463   4070             TEXT      ' 8 '
        5464   4000
        5465   7056             TEXT      '8.5'
        5466   6500
        5467   6161             TEXT      '11 '
        5470   4000
        5471   6162             TEXT      '12 '
        5472   4000
        5473   6164             TEXT      '14 '
        5474   4000

        5475   0000             0                   /END OF TABLE

                      /ERROR MESSAGES

        5476   2205    ERR1,    TEXT      /READY SET, POWER OFF/
        5477   0104
        5500   3140
        5501   2305
        5502   2454
        5503   4020
        5504   1727
        5505   0522
        5506   4017
        5507   0606
        5510   0000
        5511   2205    ERR2,    TEXT      /READY SET, PRINTER OFF LINE/
        5512   0104
        5513   3140
        5514   2305
        5515   2454
        5516   4020
        5517   2211
        5520   1624
        5521   0522
        5522   4017
        5523   0606
        5524   4014
        5525   1116
        5526   0500
        5527   2205    ERR3,    TEXT      /READY CLEAR, PRINTER ON LINE/
        5530   0104
        5531   3140
        5532   0314
        5533   0501
        5534   2254
        5535   4020
        5536   2211
        5537   1624
        5540   0522
        5541   4017
        5542   1640
        5543   1411
        5544   1605
        5545   0000
```

```
          5546  2205    ERR4,    TEXT    /READY SET, PAPER OUT/
          5547  0104
          5550  3140
          5551  2305
          5552  2454
          5553  4020
          5554  0120
          5555  0522
          5556  4017
          5557  2524
          5560  0000
          5561  2205    ERR5,    TEXT    /READY NOT SET AFTER ERROR CLEARED/
          5562  0104
          5563  3140
          5564  1617
          5565  2440
          5566  2305
          5567  2440
          5570  0106
          5571  2405
          5572  2240
          5573  0522
          5574  2217
          5575  2240
          5576  0314
          5577  0501
          5600  2205
          5601  0400
          5602  2003    ERR6,    TEXT    /PCLF DID NOT CLEAR READY/
          5603  1406
          5604  4004
          5605  1104
          5606  4016
          5607  1724
          5610  4003
          5611  1405
          5612  0122
          5613  4022
          5614  0501
          5615  0431
          5616  0000
          5617  2205    ERR7,    TEXT    /READY DID NOT SET AFTER CHAR LOAD/
          5620  0104
          5621  3140
          5622  0411
          5623  0440
          5624  1617
          5625  2440
          5626  2305
          5627  2440
          5630  0106
          5631  2405
          5632  2240
          5633  0310
          5634  0122
```

```
          5635  4014
          5636  1701
          5637  0400
          5640  2003    ERR10,   TEXT    /PCLP DID NOT CLEAR READY/
          5641  1420
          5642  4004
          5643  1104
          5644  4016
          5645  1724
          5646  4003
          5647  1405
          5650  0122
          5651  4022
          5652  0501
          5653  0431
          5654  0000
          5655  2205    ERR11,   TEXT    /READY DID NOT SET AFTER CHAR LOAD/
          5656  0104
          5657  3140
          5660  0411
          5661  0440
          5662  1617
          5663  2440
          5664  2305
          5665  2440
          5666  0106
          5667  2405
          5670  2240
          5671  0310
          5672  0122
          5673  4014
          5674  1701
          5675  0400
          5676  2516    ERR12,   TEXT    /UNEXPECTED INTERRUPT/
          5677  0530
          5700  2005
          5701  0324
          5702  0504
          5703  4011
          5704  1624
          5705  0522
          5706  2225
          5707  2024
          5710  0000
          5711  1116    ERR13,   TEXT    /INTER = READY CLEAR, ENABLED & ION/
          5712  2405
          5713  2240
          5714  5540
          5715  2205
          5716  0104
          5717  3140
          5720  0314
          5721  0501
          5722  2254
          5723  4005
```

```
          5724  1601
          5725  0214
          5726  0504
          5727  4046
          5730  4011
          5731  1716
          5732  0000
          5733  1617    ERR14,  TEXT    /NO INTER - READY SET, ENABLED & ION/
          5734  4011
          5735  1624
          5736  0522
          5737  4055
          5740  4022
          5741  0501
          5742  0431
          5743  4023
          5744  0524
          5745  5440
          5746  0516
          5747  0102
          5750  1405
          5751  0440
          5752  4640
          5753  1117
          5754  1600
          5755  1116    ERR15,  TEXT    /INTER - READY SET, ENABLED BUT IOF/
          5756  2405
          5757  2240
          5760  5540
          5761  2205
          5762  0104
          5763  3140
          5764  2305
          5765  2454
          5766  4005
          5767  1601
          5770  0214
          5771  0504
          5772  4002
          5773  2524
          5774  4011
          5775  1706
          5776  0000
          5777  2022    ERR16,  TEXT    /PRINTER NOT READY/
          6000  1116
          6001  2405
          6002  2240
          6003  1617
          6004  2440
          6005  2205
          6006  0104
          6007  3100
```

```
                      $
```

```
0000  11100000  10000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000

0200  11100000  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11000000  00000000  00001111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00011111

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  00000000  00000001

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  00000000  00000000  00000111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11100000  00000000  00001111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  10000001  11111111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  10000000  00000000  00000111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  00000000  00000000  00000000  00000000  00000111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11110000  00000000  00000000  00000001

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00000111

3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111110  00000000  00000001

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111110  00000000  00000000  00000000  00000000  00000000

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11111111  00000000  00001111

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111111  11111111  11111111  11111111  11111111  11111111  11100000  00000111
```

```
4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111100  00000000  00000000  00000000  00000000  00000000  00000011

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11000000  00000000  00000000  00000000  00000111

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  11111111  11110000  00000000  00001111

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6000  11111111  00000000  00000000  00000000  00000000  00000000  00000000  00000000
6100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600
7700
```

Symbol	Value	Symbol	Value	Symbol	Value	Symbol	Value
AUTPTR	0010	ERR6	5602	M20	0162	PARAM	0021
CHAR	0031	ERR7	5617	M23	0163	PASCNT	0040
CHAR2	0032	ERRNM	0024	M25	0164	PASMSG	5057
CHECK	4464	ERROR	4463	M3	0155	PCLF	6662
CHKNR	0114	ERRPC	0025	M30	0165	PCLP	6666
CHKOCT	0113	ERRS	5055	M35	0166	PCHSG	5043
CKCNT	0037	ETSTNO	5036	M36	0167	PDIGIT	0122
CKEXIT	3013	EXIT	5465	M4	0156	POCT	3665
CKFLAG	0054	EXIT1	3036	M40	0170	PRINT	4461
CKSRV	3000	EXIT2	3047	M56	0171	PRSP1	5171
CKSTOP	3015	EXIT3	3037	M7	0157	PRSP2	5202
CLDI	6132	FF	5442	MIOT	2716	PRSP3	5206
CLEI	6131	GETSW	4521	MIOTA	2731	PRSP4	5222
CLSK	6133	GOUT	0115	MIOTB	2730	PRT	4216
CNTLU	5445	HORX	4326	MIOTC	2750	PRTCHR	4260
CNVMSG	5435	HEADER	4716	MLOAD	4460	PRTCL	4254
CNVNN	3761	HOLD	4457	MSGADR	0043	PRTCR	4251
CNVRT	3713	HOLDCH	3141	MSGPTR	3762	PRTFF	4246
COLMN	5030	HUNDS	0046	NCMSG	5231	PRTHDR	4462
COLUMN	4746	IERROR	0347	OCTSAV	3712	PRTLF	4257
CONTRL	0217	IERRT	3650	ONES	0044	PSIE	6665
COUNT	0034	INFLAG	3326	OP1CHK	3142	PSKF	6661
COUNT2	0035	IOTAB	4535	OP1CLF	2653	PSTB	6664
CR	5437	IOTSEL	0030	OPDBST	2643	PTRIOT	0027
CRLF	5441	ISAVE	3016	OPLOD1	2663	QUES	5443
DBCE	6576	ISRV	0002	OPLOD2	2707	RCHECK	3107
DBCF	6573	KBTAB	3400	OPSCIE	2675	READ	0111
DBRD	6572	KFA	3313	OUT	4022	READ0	4401
DBSE	6575	KFB	3221	OUTCHR	4053	READ1	4403
DBSK	6571	KFC	3246	OUTCL	4044	READ2	4407
DBSS	6577	KFD	3262	OUTLF	4051	READD	4457
DBST	6570	KFE	3276	P10	0130	READG	4451
DBTD	6574	KFF	3232	P100	0143	READT	4504
DELAY	0333	KYBDA	3433	P1000	0152	READU	4454
DELAYS	0345	KYBDAA	3422	P12	0131	RERROR	3600
DELAY1	0346	KYBDB	3447	P134	0144	RESTRT	0213
DSMSG1	4766	KYBDC	3324	P15	0132	REXIT	3017
DSMSG2	4772	KYBDF	3200	P177	0145	RFLAG	4503
EMAT	4700	KYBDST	3405	P2	0126	RGETSW	0322
ERR	5047	LF	5440	P200	0146	RHOLD	3123
ERR1	5476	LIERR	0125	P204	0147	RHOLDA	3136
ERR10	5640	LOAD	4456	P36	0133	RKCC	2605
ERR11	5655	LPCNT	0036	P377	0150	RKRB	2613
ERR12	5676	LREADT	0124	P40	0134	RKRS	2610
ERR13	5711	LT00	0573	P400	0151	RKSF	2600
ERR14	5733	M1	0153	P41	0135	RLA	4062
ERR15	5755	M100	0172	P55	0136	RLB	4066
ERR16	5777	M12	0160	P57	0137	RLC	4075
ERR2	5511	M144	0173	P60	0140	RLDC	4103
ERR3	5527	M15	0161	P72	0141	RLDCC	4104
ERR4	5546	M177	0174	P77	0142	RLOAD	4060
ERR5	5561	M2	0154			RMLOAD	4105

Symbol	Value	Symbol	Value	Symbol	Value	Symbol	Value
RP1	4205	T00	0552	T27B	2075	TERR	2541
RPCLF	2646	T0P	0570	T27C	2107	TERROR	0063
RPCLP	2702	T0Q	0600	T27D	2115	TEST0	0400
RPDIGT	3660	T0R	0620	T27DA	2122	TEST1	0714
RPRHDR	4262	T0S	0625	T27E	2123	TEST2	1000
RPRINT	4200	T0U	0660	T27TAB	2142	TEST20	1200
RPSIE	2670	T0V	0707	T27X	2137	TEST21	1227
RPSKF	2634	T0W	0656	T2A	1015	TEST22	1274
RPSTB	2656	T1A	0725	T2B	1023	TEST23	1331
RSAVE	3645	T1MSG1	5355	T2C	1030	TEST24	1400
RT1	4011	T1MSG2	5361	T2EM	5151	TEST25	1600
RT2	4005	T1MSG3	5375	T2M1	5067	TEST26	2000
RTCF	2623	T1MSG4	5412	T2M2	5105	TEST27	2054
RTLS	2631	T1TAB	5447	T2M3	5126	TEST30	2200
RTPC	2626	T20A	1203	T2PA	1047	TEST31	2212
RTSF	2616	T20B	1211	T2PC	1053	TEST60	2246
RTYPE	4000	T20C	1216	T2PD	1070	TEST61	2400
SAVE	0033	T20D	1222	T2PE	1102	TEST62	2450
SAVEAC	3156	T21B	1232	T2S1	1132	TEST63	2477
SELECT	3054	T21C	1243	T2SP	1044	TEXIT	0065
SELTST	4755	T21D	1247	T2SPD	1114	TGETSW	0121
SETSKP	1540	T21W	1273	T2SPDC	1110	THOLD	0057
START	0210	T22A	1277	T30A	2203	THOUS	0047
START2	0241	T22B	1307	T30M	2210	TKBDST	0066
START5	0274	T22C	1324	T31M1	2240	TKBFG	0107
START7	0306	T23A	1334	T31M2	2243	TKCC	0073
START8	0303	T24A	1410	T60A	2250	TKRB	0075
START9	0277	T24B	1415	T60B	2253	TKRS	0074
STARTB	0266	T24C	1417	T60C	2263	TKSF	0072
STARTX	0221	T24D	1431	T61A	2402	TLOAD	0056
STRONE	0050	T24E	1446	T61B	2404	TLOOP	0052
SVTST	4331	T24F	1466	T61C	2425	TMIOT	0071
SWITCH	0020	T24G	1476	T61D	2430	THLOAD	0060
T0AA	0415	T24H	1403	T61E	2436	TPCLF	0103
T0AB	0420	T24S	1477	T61F	2445	TPCLP	0106
T0AC	0403	T24SA	1505	T62A	2462	TPFLG	0053
T0B	0432	T24SB	1512	T62B	2470	TPOCT	0123
T0C	0435	T24SC	1504	T63A	2516	TPRHDR	0062
T0E	0456	T25A	1630	T63B	2507	TPRINT	0061
T0F	0461	T25B	1665	T63C	2526	TPSIE	0105
T0H	0472	T25C	1701	T63D	2532	TPSKF	0102
T0I	0475	T25D	1702	T63E	2536	TPSTB	0104
T0K	0510	T25E	1715	TABPTR	0041	TREAD	4400
T0L	0517	T25F	1727	TAT	4600	TREADO	0112
T0H	0532	T25G	1740	TCHAR	5244	TRONE	0051
T0MIOT	0536	T25S	1745	TCHECK	0064	TSEL	3465
T0MSG0	5250	T26A	2003	TCHKNR	4520	TSEL1	3542
T0MSG1	5270	T26B	2005	TCKOUT	4510	TSEL2	3552
T0MSG2	5302	T26C	2007	TCKSRV	0120	TSELCT	0067
T0MSG3	5320	T26D	2037	TCNVRT	0117	TSELX	3555
T0MSG4	5335	T26TAB	2047	TDELAY	0116	TSTNM	0023
T0N	0543	T27A	2057	TENS	0045	TSTNO	5020

```
TSTPTR   0042
TTAT     0070
TTCF     0077
TTLS     0101
TTPC     0100
TTSEL    0110
TTSF     0076
TTYIN    3325
TTYPE    0055
TYPE     4455
WIDTH    0026
WTMSG    4777
```

ERRORS DETECTED: 0

LINKS GENERATED: 12

RUN-TIME: 16 SECONDS

3K CORE USED