

IDENTIFICATION

Product Code: MAINDEC-08-DILAC-B-D
Product Name: LA180 Printer Diagnostic
Date: July 1976
Maintainer: Diagnostic Group
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Table of Contents

1.0	ABSTRACT
2.0	REQUIREMENTS
2.1	Equipment
2.2	Storage
2.3	Preliminary Programs
3.0	LOADING PROCEDURE & INITIALIZATION
4.0	STARTING PROCEDURES
5.0	OPERATING PROCEDURES
5.1	Switch Register Controls
5.2	Console Terminal Keyboard Control
5.3	Dynamic Software Switch Register Control
5.4	Error Reporting
6.0	TEST DESCRIPTIONS
6.1	Operator Intervention Tests
6.1.1	Test 00 - Interface & Control Tests
6.1.2	Test 01 - Top of Form Switch Test
6.1.3	Test 02 - Print Speed Timing Test
6.2	Printing Tests
6.2.1	Test 20 - Data Transfer Paths Test
6.2.2	Test 21 - Head Positioning Test
6.2.3	Test 22 - Backspace Test
6.2.4	Test 23 - Character Generator Test
6.2.5	Test 24 - Non-Printable Character Test
6.2.6	Test 25 - Buffer Test
6.2.7	Test 26 - Overprint Test
6.2.8	Test 27 - Multiple Line Feed Test
6.2.9	Test 30 - Ribbon Feed Test
6.2.10	Test 31 - Bell Test
6.3	Maintenance Aids
6.3.1	Test 60 - Life Test
6.3.2	Test 61 - Scope Drive Routine
6.3.3	Test 62 - Line Print Test
6.3.4	Test 63 - Character Print Test

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) 0 (DWN)	Stop on Error Continue on Error
01	1 (UP) 0 (DWN)	Inhibit Error Timeout Normal Operation
02	1 (UP) 0 (DWN)	Loop on Test Normal Operation
03	1 (UP) 0 (DWN)	Halt & Select Test Normal Operation
04		Manual Timing - Overall print speed timing
04	1 (UP) 0 (DWN)	Single Char - Scope Routine 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 Timeout

Whenever this switch is in the up (1) position, error timeouts 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 -----
.	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 (™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 reenter 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 diagnostic 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 timeout 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 possibly 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 examine 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.

6.2.4 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:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

```

.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
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....
```

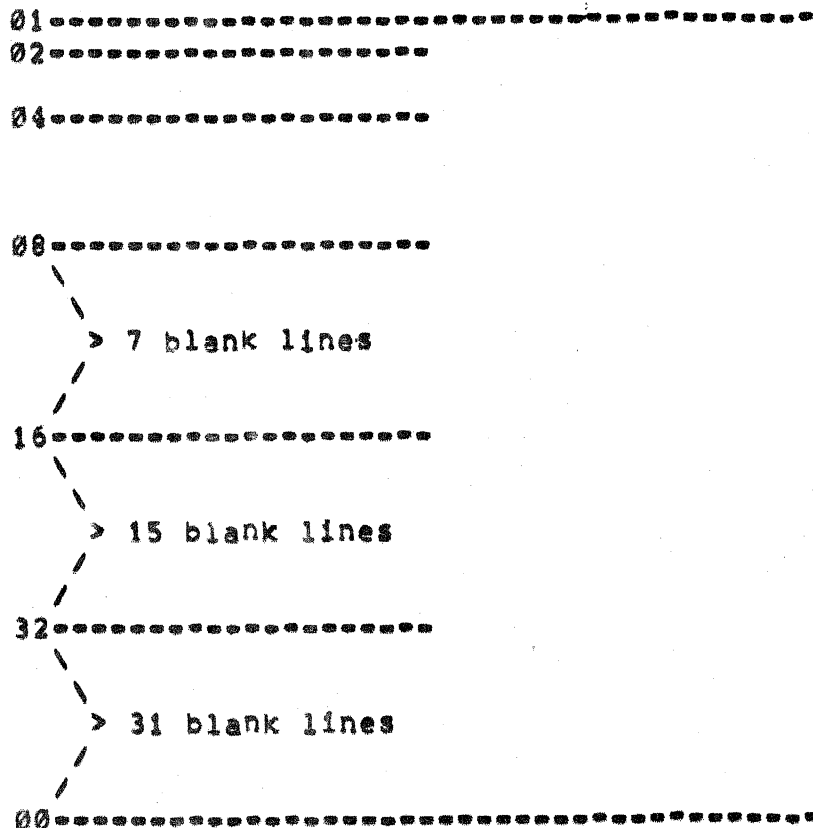
6.2.6 Test 25 - Buffer Test

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.

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:



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 Maintenance 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:

```

AAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBB
BBBBBBBBBBBBBBBBBBBBB

```

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 vinter and interface control logic with an oscilloscope.

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.

1 /MAINDEC-08-DILAC-B-L
2
3 /LA180 PRINTER DIAGNOSTIC
4
5 /COPYRIGHT (C) 1975, 1976, DIGITAL EQUIPMENT CO., MAYNARD, MA. 01754
6
7 /AUTHOR: ROBERT BAKER/BRUCE HANSEN
8
9
10
11
12
13
14

/SWITCH REGISTER OPTIONS:

15 /SWITCH NUMBER DESCRIPTION
16
17 / 00 STOP ON ERROR
18
19 / 01 INHIBIT ERROR TYP0UT
20
21 / 02 LOOP ON TEST
22
23 / 03 HALT AND SELECT TEST
24
25 / 04 SINGLE CHAR/FULL LINES - SCOPE ROUTINE
26 MANUAL TIMING - PRINT SPEED TEST
27
28 / 04 - 11 # COLUMNS AT START UP
29
30 / 06 - 11 TEST SELECTION
31
32 / 05 - 11 CHARACTER SELECTION - SCOPE ROUTINE
33
34
35 0000 *0
36
37 0000 0000 0 JMP I ISRV /INTERRUPT SERVICE
38 0001 5402
39 0002 0347 ISRV, IERROR
40
41 0010 *10
42
43 0010 0000 AUIPTR, 0 /AUTO INCREMENT POINTER
44
45 0020 *20
46
47 0020 0000 SWITCH, 0000 /SOFTWARE SWITCH REGISTER
48 0021 4003 PARAM, 4003 /SET TO 0003 IF NO HARDWARE SWITCH REG IS AVAILABLE
49 0022 0000 0000
50
51 /FLAGS, POINTERS, & STORAGE
52
53 0023 0000 TSTNM, 0 /CURRENT TEST NUMBER
54 0024 0000 ERRNM, 0 /ERROR NUMBER
55

56 0025 0000 ERRPC, 0 /ERROR LOCATION
57 0026 0000 WIDTH, 0 /NEGATIVE NUMBER OF COLUMNS
58
59 0027 0660 PTRIOT, 0660 /LA180 IOT CODE - 0XX0
60 0030 0304 IOTSEL, 0304 /TTY IOT CODES, XMT - RCV
61
62 0031 0000 CHAR, 0 /CHARACTER STORAGE
63 0032 0000 CHAR2, 0
64 0033 0000 SAVE, 0 /TEMP STORAGE
65 0034 0000 COUNT, 0 /WORKING COUNTERS
66 0035 0000 COUNT2, 0
67 0036 0000 LPCNT, 0
68 0037 0000 CKCNT, 0
69 0040 0000 PASCNT, 0
70 0041 0000 TABPTR, 0 /TABLE POINTER
71 0042 0000 TSTPTR, 0 /TEST ADDRESS FROM TABLE
72 0043 0000 MSGADR, 0 /MESSAGE ADDRESS STORAGE
73
74 0044 0000 ONES, 0 /CONVERSION COUNTERS
75 0045 0000 TENS, 0
76 0046 0000 HUNDS, 0
77 0047 0000 THOUS, 0
78
79
80 0050 0000 STRONE, 0 /ONE RUN FLAG - SW REG CNTRL
81 0051 0000 TRONE, 0 /ONE RUN FLAG - KYBD CNTRL
82 0052 0000 TLOOP, 0 /LOOP ON TEST FLAG - KYBD CNTRL
83
84 0053 0000 TPFLG, 0 /TERMINAL AVAILABLE FLAG
85 /0 = NO, 7777 = YES --- (SET BY THE PROGRAM)
86
87 0054 0000 CKFLAG, 0 /CLOCK OPTION FLAG
88 /0 = NONE AVAILABLE, OR DO NOT USE AVAILABLE OPTION
89
90 /IF DK8EA OR DK8EC IS AVAILABLE -
91 /SET CKFLAG DEPENDING ON CLOCK FREQ.
92
93 /7773 = 50 HZ - DK8EC
94 /7766 = 50 HZ LINE FREQ. - DK8EA
95 /7764 = 60 HZ LINE FREQ. - DK8EA
96 /7716 = 500 HZ - DK8EC
97 /7014 = 5 KHZ - DK8EC
98
99 /TAGS
100
101 0055 4000 TTYPE, RTYPE
102 0056 4060 TLOAD, RLOAD
103 0057 3123 THOLD, RHOLD
104 0060 4105 THLOAD, RHLOAD
105 0061 4200 TPRINT, RPRINT
106 0062 4262 TPRHDR, RPRHDR
107 0063 3600 TERROR, RERROR
108 0064 3107 TCHECK, RCHECK
109 0065 3017 TEXIT, REXIT
110 0066 3405 TKBDST, KYBDST

111	0067	3054	TSELCT,	SELECT
112	0070	4600	TTAT,	TAT
113	0071	2716	TMIOI,	MIOI
114	0072	2630	TKSF,	RKSF
115	0073	2605	TKCC,	RKCC
116	0074	2610	TKRS,	RKRS
117	0075	2613	TKRB,	RKRB
118	0076	2616	TTSF,	RTSF
119	0077	2623	TTCP,	RTCP
120	0100	2626	TTBC,	RTPC
121	0101	2631	TTLS,	RTLS
122	0102	2634	TPSKF,	RPSKF
123	0103	2646	TPCLF,	RPCLF
124	0104	2656	TPSTB,	RPSTB
125	0105	2670	TPSIE,	RPSIE
126	0106	2702	TPCLP,	RPCLP
127	0107	3200	TKBFG,	KYBDF
128	0110	3465	TTSEL,	TSEL
129	0111	4400	READ,	TREAD
130	0112	4451	TREADQ,	READQ
131	0113	4510	CHKOCT,	TCKOCT
132	0114	4520	CHKNR,	TCHKNR
133	0115	4022	GOUT,	OUT
134	0116	0333	TDELAY,	DELAY
135	0117	3713	TCNVRT,	CNVRT
136	0120	3000	TCKSRV,	CKSRV
137	0121	0322	TGETSW,	RGETSW
138	0122	3660	PDIGIT,	RPDIGT
139	0123	3665	TPOCT,	POCT
140	0124	4504	LREADT,	READT
141	0125	0347	LIERR,	IERR

/CONSTANTS

145	0126	0002	P2,	0002
146	0127	0007	P7,	0007
147	0130	0010	P10,	0010
148	0131	0012	P12,	0012
149	0132	0015	P15,	0015
150	0133	0036	P36,	0036
151	0134	0040	P40,	0040
152	0135	0041	P41,	0041
153	0136	0055	P55,	0055
154	0137	0057	P57,	0057
155	0140	0060	P60,	0060
156	0141	0072	P72,	0072
157	0142	0077	P77,	0077
158	0143	0100	P100,	0100
159	0144	0134	P134,	0134
160	0145	0177	P177,	0177
161	0146	0200	P200,	0200
162	0147	0204	P204,	0204
163	0150	0377	P377,	0377
164	0151	0400	P400,	0400
165	0152	1000	P1000,	1000

166	0153	7777	M1,	7777
167	0154	7776	M2,	7776
168	0155	7775	M3,	7775
169	0156	7774	M4,	7774
170	0157	7771	M7,	7771
171	0160	7766	M12,	7766
172	0161	7763	M15,	7763
173	0162	7760	M20,	7760
174	0163	7755	M23,	7755
175	0164	7753	M25,	7753
176	0165	7750	M30,	7750
177	0166	7743	M35,	7743
178	0167	7742	M36,	7742
179	0170	7740	M40,	7740
180	0171	7722	M56,	7722
181	0172	7700	M100,	7700
182	0173	7634	M144,	7634
183	0174	7601	M177,	7601

/SUBROUTINE CALL EQUATES

187	4455	TYPE=JMS I	TTYPE	/TYPE ASCII STRING ON CONSOLE
188	5465	EXIT=JMP I	TEXIT	/EXIT TEST
189	4456	LOAD=JMS I	TLOAD	/LOAD SINGLE CHAR TO LA100
190	4457	HOLD=JMS I	THOLD	/WAIT FOR OPERATOR
191	4464	CHECK=JMS I	TCHECK	/CHECK FOR CONTROL
192	4463	ERRR=JMS I	TERROR	/ERROR REPORT
193	4461	PRINT=JMS I	TPRINT	/PRINT ASCII STRING ON LA100
194	4460	MLOAD=JMS I	TMLOAD	/LOAD MULTIPLE CHARS TO LA100
195	4521	GETSW=JMS I	TGETSW	/GET SWITCH REGISTER SETTING
196	4462	PRTHDR=JMS I	TPRHDR	/PRINT TEST HEADER ON LA100

/LINE PRINTER INSTRUCTIONS

201	6661	PSKF=6661	/SKIP ON CHAR FLAG
202	6662	PCLF=6662	/CLEAR CHAR FLAG
203	6664	PSTB=6664	/LOAD BUFFER
204	6665	PSIE=6665	/ENABLE INTERRUPT
205	6666	PCLP=6666	/CLEAR FLAG & LOAD CHAR

/DK0-EA & DK0-EC CLOCK INSTRUCTIONS

210	6131	CLEI=6131	/ENABLE CLOCK INTERRUPT
211	6132	CLDI=6132	/DISABLE CLOCK INTERRUPT
212	6133	CUSK=6133	/SKIP ON CLOCK FLAG, AND CLEAR FLAG

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

216	6570	DBS=6570	/SKIP ON DATA ACCEPTED AND CLEAR DATA
217			/DATA ACCEPTED AND DATA AVAILABLE
218	6571	DBSK=6571	/SKIP ON DATA READY
219	6572	DBRD=6572	/READ DATA INTO AC 0-11
220	6573	DBCF=6573	/CLEAR DATA READY ISSUE DATA ACCEPTED OUT

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221      6574      DBPD=6574      /LOAD AC 0-11 INTO BUFFER AND TRANSMIT
222      6575      DBSE=6575      /SET PARALLEL I/O INTERRUPT ENABLE
223      6576      DECA=6576      /CLFAP PARALLEL I/O INTERRUPT ENABLE
224      6577      DRSS=6577      /ISSUE DATA STORE PULSE
225
226
227
228
229
230      0200      *200
231
232      0200 5210      JMP      START      /GENERAL DIAGNOSTIC STARTING ADR
233
234      0201 5213      JMP      RESTRT     /RESTART, SKIP OPR INTERVENTION TESTS
235
236      0202 5217      JMP      CONTRL    /GO DIRECTLY TO OPERATOR CONTROL
237
238      0210      *210
239
240      0210 7300      START,  CLA CLL     /CLEAR
241      0211 3023      DCA      TSTNM     /SET TEST NUMBER TO ZERO
242      0212 5221      JMP      STARTX    /INITIALIZE
243      0213 7300      RESTRT, CLA CLL    /CLEAR
244      0214 1377      TAD      (20      /GET CONSTANT
245      0215 3023      DCA      TSTNM     /SET TEST #20
246      0216 5221      JMP      STARTX    /INITIALIZE
247      0217 7240      CONTRL, CLA CMA   /SET AC = -1
248      0220 3023      DCA      TSTNM     /SET CONTROL FLAG
249      0221 6002      STARTX, IOF       /INTERRUPTS OFF
250      0222 6132      CLDI
251      0223 7300      CLA CLL
252      0224 4505      JMS I    TPSIE
253      0225 4521      GETSW
254      0226 0150      AND      P377      /GET SW REG
255      0227 7041      CIA      /SAVE BITS 04-11
256      0230 3026      DCA      WIDTH    /NEGATE VALUE
257      0231 1126      TAD      P2        /STORE # COLUMNS
258      0232 1026      TAD      WIDTH    /CHECK COLUMN SELECTION
259      0233 7740      SMA SZA CLA      /* COLUMNS < 2 ?
260      0234 5241      JMP      START2    /YES, SET TO 132(10)
261      0235 1147      TAD      P204     /NO, CHECK AGAIN
262      0236 1026      TAD      WIDTH
263      0237 7700      SMA CLA          /* COLUMNS > 132(10) ?
264      0240 5243      JMP      .+3      /NO, CONTINUE
265      0241 1376      START2, TAD      (-204 /SET COLUMN COUNT TO 132(10)
266      0242 3026      DCA      WIDTH    /STORE VALUE
267      0243 3052      DCA      TLOOP    /CLEAR PROGRAM FLAGS
268      0244 3050      DCA      STRONE
269      0245 3051      DCA      TRONE
270      0246 1125      TAD      LIERR    /RESET INTERRUPT ERROR
271      0247 3002      DCA      ISRV
272      0250 1145      TAD      P177     /SET LA180 READY FLAG
273      0251 4506      JMS I    TPCLP
274      0252 4471      JMS I    TMIOT   /SET IOTS FOR TTY & PRINTER
275      0253 4501      JMS I    TTLS    /CLEAR FLAG

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276      0254 4333      JMS      DELAY    /WAIT 150 MILLISECONDS
277      0255 4476      JMS I    TTSF     /SKIP IF FLAG IS SET
278      0256 7610      SKP CLA          /AC = 0, NO TERMINAL EXISTS
279      0257 7240      CLA CMA         /AC = -1, TERMINAL EXISTS
280      0260 3953      DCA      TPFLG   /STORE TERMINAL FLAG
281      0261 1053      TAD      TPFLG   /CHECK FOR CONSOLE
282      0262 7640      SZA CLA          /SKIP IF NONE
283      0263 5266      JMP      STARTB  /CONTINUE
284      0264 4461      PRINT
285      0265 5231      NCMMSG
286      0266 7410      STARTB, SKP
287      0267 5274      JMP      START5
288      0270 4455      TYPE
289      0271 4716      HEADER
290      0272 1375      TAD      (NOP)   /SKIP TITLE MSG THERE AFTER
291      0273 3266      DCA      STARTB
292      0274 1023      START5, TAD      TSTNM /GET TEST #
293      0275 7700      SMA CLA          /WANT CONTROL?
294      0276 5306      JMP      START7  /NO, CONTINUE
295      0277 1053      START9, TAD      TPFLG /YES, TERMINAL THERE
296      0300 7640      SZA CLA
297      0301 5466      JMP I    TKBDST  /YES, GO TO KYBD CONTROL
298      0302 5467      JMP I    TSELECT /NO, DEFAULT TO SW REG CONTROL
299      0303 7640      START8, SZA CLA
300      0304 5277      JMP      START9  /GO TO CONTROL IF NO TEST IN TABLE
301      0305 2023      ISZ      TSTNM
302      0306 4521      START7, GETSW
303      0307 0151      AND      P400   /MASK SW3
304      0310 7640      SZA CLA          /WANT TEST SELECTION?
305      0311 5467      JMP I    TSELECT /YES, GO TO TEST SELECTION HALT
306      0312 1070      TAD      TTAT    /GET TABLE ADR
307      0313 1023      TAD      TSTNM  /ADD TEST #
308      0314 3041      DCA      TABPTR /STORE POINTER
309      0315 1441      TAD I    TABPTR /GET TEST ADDRESS
310      0316 7550      SMA SPA
311      0317 5303      JMP      START8  /TEST IN TABLE?
312      0320 3042      DCA      TSTPTR /NO, INC TEST ADR
313      0321 5442      JMP I    TSTPTR /YES, STORE TEST ADR
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321      0322 0000      /ROUTINE TO GET SWITCH SETTINGS
322      0323 7300      RGETSW, 0
323      0324 1021      CLA CLL     /CLEAR AC AND LINK
324      0325 7710      TAD      PARAM  /CHECK IF HAVE HARDWARE SWR
325      0326 5331      SPA CLA    /SKIP IF NO
326      0327 1020      JMP      .+3
327      0330 5722      TAD      SWITCH /GET SOFTWARE SWITCHES
328      0331 7604      JMP I    RGETSW /RETURN
329      0332 5722      LAS
330      0333 5722      JMP I    RGETSW /GET HARDWARE SWITCHES
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331 /ROUTINE TO DELAY ABOUT 150 MILLISECONDS
332 /USING INSTRUCTION TIMING.
333
334 DELAY, 0
335 0333 0000 CLA CLL /CLEAR
336 0334 7300 DCA DELAY0 /SET DELAY COUNT
337 0335 3345 TAD (-10
338 0336 1374 DCA DELAY1
339 0337 3346 ISZ DELAY0 /DELAY
340 0340 5340 JMP ,=1
341 0342 2346 ISZ DELAY1
342 0343 5340 JMP ,=3
343 0344 5733 JMP I DELAY /RETURN
344
345 0345 0000 DELAY0, 0000 /DELAY COUNTS
346 0346 7770 DELAY1, 7770
347
348
349
350
351 /ROUTINE TO REPORT UNEXPECTED INTERRUPTS DURING EXECUTION
352
353 IERROR, ERROR /REPORT ERROR
354 0347 4463 12
355 0350 0012 JMP I 0 /RETURN & CONTINUE IF POSSIBLE
356 0351 5400
357 0374 7770
358 0375 7000
359 0376 7574
359 0377 0020 PAGE
360
361 /OPERATOR INTERVENTION TESTS
362
363 /TEST 0 - INTERFACE & CONTROL TESTS
364
365 /TEST READY BIT, PRINTER OFF LINE - POWER OFF
366
367 TEST0, TYPE /TYPE INSTRUCTIONS
368 0400 4455 T0MSG0
369 0401 5250 HOLD /WAIT FOR OPERATOR
370 0402 4457 T0AC, CHECK /CHECK FOR CONTROL
371 0403 4464 CLA CLL /CLEAR AC AND LINK
372 0404 7300 TAD P177 /SEND RUBOUT
373 0405 1145 JMS I TPCLP
374 0406 4506 JMS I TDELAY /DELAY 150 MSEC FOR FLAG
375 0407 4516 JMS I TPSKF /SKIP ON READY
376 0410 4502 JMP T0AA /OK, READY CLEAR
377 0411 5215 ERROR /READY SET, POWER OFF
378 0412 4463 1
379 0413 0001 JMP T0AC /RETEST
380 0414 5203
381
382 /TEST READY BIT, PRINTER OFF LINE - POWER ON
383
384 T0AA, TYPE /TYPE INSTRUCTIONS, TURN POWER ON
385 0415 4455 T0MSG1
386 0416 5270

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385 0417 4457 HOLD /WAIT FOR OPERATOR
386 0420 4464 T0AB, CHECK /CHECK FOR CONTROL
387 0421 7300 CLA CLL /CLEAR AC AND LINK
388 0422 1145 TAD P177 /SEND RUBOUT
389 0423 4506 JMS I TPCLP
390 0424 4516 JMS I TDELAY /DELAY 150 MSEC FOR FLAG
391 0425 4502 JMS I TPSKF /SKIP ON READY
392 0426 5232 JMP T0B /OK, READY CLEAR
393 0427 4463 ERROR /READY SET, PRINTER OFF LINE
394 0430 0002 2
395 0431 5220 JMP T0AB /RETEST
396
397 /TEST READY BIT, PRINTER ON LINE
398
399 T0B, TYPE /TYPE INSTR, TURN ON LINE
400 0432 4455 T0MSG2
401 0433 5302 HOLD /WAIT FOR OPERATOR
402 0434 4457 T0C, CHECK /CHECK FOR CONTROL
403 0435 4464 CLA CLL /CLEAR AC AND LINK
404 0436 7300 TAD P177 /SEND RUBOUT
405 0437 1145 JMS I TPCLP
406 0440 4506 JMS I TDELAY /DELAY 150 MSEC FOR FLAG
407 0441 4516 JMS I TPSKF /SKIP ON READY
408 0442 4502 JMP T0E /READY NOT SET
409 0443 5253 JMS OP1CHK /CHECK TO SEE IF PARALLEL I/O
410 0444 4777 ,+2 /WAS PARALLEL I/O
411 0445 0447 JMP T0E /OK-READY SET
412 0446 5256 TAD P177 /RESET DATA ACCEPTED FLAG
413 0447 1145 JMS I TPCLP /GO LOAD THE BUFFER
414 0450 4506 JMS I TDELAY
415 0451 4516 JMP T0E /CONTINUE THE TEST
416 0452 5256 ERROR /READY CLEAR, PRINTER ON LINE
417 0453 4463 3
418 0454 0003 JMP T0C /RETEST
419 0455 5235
420
421 /TEST PAPER OUT SWITCH
422
423 T0E, TYPE /TYPE INSTR, PAPER OUT
424 0456 4455 T0MSG3
425 0457 5320 HOLD /WAIT FOR OPERATOR
426 0460 4457 T0F, CHECK /CHECK FOR CONTROL
427 0461 4464 PRINT
428 0462 4461 LF /SEND LF
429 0463 5440 JMS I TDELAY /DELAY FOR 150 MSEC
430 0464 4516 JMS I TPSKF /SKIP ON READY
431 0465 4502 JMP T0H /OK, READY CLEAR
432 0466 5272 ERROR /READY SET, PAPER OUT, ON LINE
433 0467 4463 4
434 0470 0004 JMP T0F /RETEST
435 0471 5261
436
437 /TEST ABILITY TO CLEAR ERROR CONDITION
438
439 T0H, TYPE /TYPE INSTR, RESET & ON LINE
440 0472 4455 T0MSG4
441 0473 5335 HOLD /WAIT FOR OPERATOR
442 0474 4457

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440 0475 4464 T0L, CHECK /CHECK FOR CONTROL
441 0476 7300 CLA CLL /CLEAR AC AND LINK
442 0477 1145 TAD P177 /SEND RUBOUT
443 0500 0500 JMS I TPCLP
444 0501 4516 JMS I TDELAY /DELAY 150 MSEC POP FLAG
445 0502 4502 JMS I TPSKF /SKIP ON READY
446 0503 7410 SKP
447 0504 5310 JMP T0K /OK, READY SET
448 0505 4463 ERROR /READY NOT SET
449 0506 0005 5
450 0507 5275 JMP T0I /RETEST
    
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/TEST ABILITY TO CLEAR READY FLAG

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454 0510 4464 T0K, CHECK /CHECK FOR CONTROL
455 0511 4503 JMS I TPCLF /CLEAR FLAG
456 0512 4502 JMS I TPSKF /SKIP ON CHAR FLAG
457 0513 5317 JMP T0L /OK, FLAG CLEAR
458 0514 4463 ERROR /FLAG DID NOT CLEAR
459 0515 0006 6
460 0516 5310 JMP T0K /RETEST
    
```

/TEST THAT SENDING CHAR WILL RESET READY FLAG

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464 0517 4464 T0L, CHECK /CHECK FOR CONTROL
465 0520 7300 CLA CLL /LOAD CHAR
466 0521 1145 TAD P177 /WAIT 150 MSEC
467 0522 4504 JMS I TPSTB /SKIP ON CHAR FLAG
468 0523 4516 JMS I TDELAY
469 0524 4502 JMS I TPSKF
470 0525 7410 SKP
471 0526 5332 JMP T0M /READY DID NOT SET
472 0527 4463 ERROR
473 0530 0007 7
474 0531 5310 JMP T0K /RETEST CLEAR & SET FLAG
    
```

/TEST AGAIN USING SINGLE INSTR

```

478 0532 4464 T0M, CHECK /CHECK FOR CONTROL
479 0533 4776 JMS SETSKP /GO SETUP FOR SKIP IOT TO BE USED
480 0534 1145 TAD P177 /SET RUBOUT
481 0535 4506 JMS I TPCLP /LOAD CHAR
482 0536 6661 T0MIOT, PSKF/DBST /SKIP ON CHAR FLAG
483 0537 5343 JMP T0N /OK, FLAG CLEAR
484 0540 4463 ERROR /FLAG DID NOT CLEAR
485 0541 0010 10
486 0542 5332 JMP T0M /RETEST
487 0543 4516 T0N, JMS I TDELAY /DELAY 150 MSEC
488 0544 4502 JMS I TPSKF /SKIP ON CHAR FLAG
489 0545 7410 SKP
490 0546 5352 JMP T00 /OK, FLAG SET
491 0547 4463 ERROR /FLAG DID NOT SET
492 0550 0011 11
493 0551 5332 JMP T0M /RETEST
494
    
```

/CHECK FOR UNEXPECTED INTERRUPTS

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495
496
497 0552 4464 T00, CHECK /CHECK FOR CONTROL
498 0553 7300 CLA CLL
499 0554 1375 TAD (T0P /SET INT RETURN
500 0555 3002 DCA ISRV
501 0556 4473 JMS I TKCC
502 0557 4477 JMS I TTCF /CLEAR CONSOLE PTR FLAG
503 0560 4503 JMS I TPCLF /CLEAR LA100 READY BIT
504 0561 7300 CLA CLL
505 0562 4505 JMS I TPSIE /DISABLE LA100 INTERRUPT
506 0563 6001 ION /ENABLE INTERRUPT SYSTEM
507 0564 7000 NOP
508 0565 7000 NOP
509 0566 6002 IOF
510 0567 5773 JMP I LT0Q /DISABLE INTERRUPT SYSTEM
511 0570 4463 T0P, ERROR /OK, CONTINUE
512 0571 0012 12 /UNEXPECTED INTERRUPT
513 0572 5352 JMP T00 /RETEST
514 0573 0600 LT0Q, T0Q
515 0575 0570
516 0576 1540
517 0577 3142
    
```

PAGE

/CHECK THAT NO INTERRUPT OCCURS WITH READY BIT CLEAR

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521 0600 4464 T0Q, CHECK /CHECK FOR CONTROL
522 0601 7300 CLA CLL
523 0602 1377 TAD (T0R /SET INTERRUPT RETURN
524 0603 3002 DCA ISRV
525 0604 4473 JMS I TKCC
526 0605 4477 JMS I TTCF /CLEAR CONSOLE PTR FLAG
527 0606 4503 JMS I TPCLF /CLEAR LA100 READY BIT
528 0607 7201 CLA IAC
529 0610 4505 JMS I TPSIE /ENABLE LA100 INTERRUPT
530 0611 6001 ION /ENABLE INTERRUPT SYSTEM
531 0612 7000 NOP /DELAY 2 INSTRUCTION TIMES
532 0613 7000 NOP
533 0614 6002 IOF /DISABLE INTERRUPT SYSTEM
534 0615 7300 CLA CLL
535 0616 4505 JMS I TPSIE /DISABLE LA100 INTERRUPT
536 0617 5225 JMP T0S
537
538 0620 7300 T0R, CLA CLL
539 0621 4505 JMS I TPSIE /DISABLE LA100 INTERRUPT
540 0622 4463 ERROR /INTERRUPT WITH READY BIT CLEAR
541 0623 0013 13
542 0624 5200 JMP T0Q /RETEST
    
```

/CHECK THAT INTERRUPT OCCURS WITH READY BIT SET

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546 0625 4464 T0S, CHECK /CHECK FOR CONTROL
547 0626 7300 CLA CLL
548 0627 1376 TAD (T0W /SET INTER RETURN
    
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549 0630 3002 DCA ISRV
550 0631 1145 TAD P177 /SEND CHAR TO SET FLAG
551 0632 4506 JMS I TPCLP
552 0633 4775 JMS OP1CHK /GO CHECK FOR PARALLEL I/O
553 0634 0640 +4 /ON PARALLEL I/O - GO DELAY
554 0635 4502 JMS I TPSKF /SKIP ON READY
555 0636 5235 JMP -1 /WAIT FOR READY
556 0637 7410 SKP
557 0640 4516 JMS I TDELAY
558 0641 4473 JMS I TKCC
559 0642 4477 JMS I TTCF /CLEAR CONSOLE PTR FLAG
560 0643 7201 CLA IAC
561 0644 4505 JMS I TPSIE /ENABLE LA180 INTERRUPT
562 0645 6001 ION /ENABLE INTERRUPT SYSTEM
563 0646 7000 NOP /WAIT 2 INSTR TIMES
564 0647 7000 NOP
565 0650 6002 IOF /DISABLE INTERRUPT SYSTEM
566 0651 7300 CLA CLL
567 0652 4505 JMS I TPSIE /DISABLE LA180 INTERRUPT
568 0653 4463 ERROR /DID NOT INTER, READY SET
569 0654 0014 14
570 0655 5225 JMP T0S /RETEST
571 0656 7300 T0W, CLA CLL
572 0657 4505 JMS I TPSIE /DISABLE LA180 INTERRUPT
573
574 /TEST NO INTERRUPT OCCURS WITH LA180 INTERRUPT ENABLED, READY SET,
575 /BUT CPU INTERRUPT SYSTEM OFF.
576
577 0660 4464 T0U, CHECK /CHECK FOR CONTROL
578 0661 7300 CLA CLL
579 0662 1374 TAD (T0V /SET INTER RETURN ADR
580 0663 3002 DCA ISRV
581 0664 1145 TAD P177 /SEND CHAR TO SET FLAG
582 0665 4506 JMS I TPCLP
583 0666 4775 JMS OP1CHK /GO CHECK FOR PARALLEL I/O
584 0667 0673 +4 /ADDRESS FOR PARALLEL I/O - DELAY
585 0670 4502 JMS I TPSKF /WAIT FOR READY
586 0671 5270 JMP -1
587 0672 7410 SKP
588 0673 4516 JMS I TDELAY /DELAY TO ALLOW FLAG TO SET
589 0674 4473 JMS I TKCC
590 0675 4477 JMS I TTCF /CLEAR CONSOLE PTR FLAG
591 0676 7201 CLA IAC
592 0677 4505 JMS I TPSIE /ENABLE LA180 INTERRUPT
593 0700 7000 NOP /WAIT 2 INSTR TIMES
594 0701 7000 NOP
595 0702 7300 CLA CLL
596 0703 4505 JMS I TPSIE /DISABLE LA180 INTERRUPT
597 0704 1125 TAD LIERR /SET INTERRUPT ERROR ADR
598 0705 3002 DCA ISRV
599 0706 5465 EXIT /EXIT TEST
600
601 0707 7300 T0V, CLA CLL
602 0710 4505 JMS I TPSIE /DISABLE LA180 INTERRUPT
603 0711 4463 ERROR /INTERRUPT WITH SYSTEM DISABLED

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604 0712 0015 15
605 0713 5260 JMP T0U /RETEST
606
607 /TEST 1 - TOP OF FORM SWITCH TEST
608
609 0714 4462 TEST1, PRTHDR /PRINT TEST HEADER
610 0715 1373 TAD (T1TAB
611 0716 3041 DCA TABPTR /STORE TABLE POINTER
612 0717 1165 TAD N30
613 0720 3034 DCA COUNT /SET DASH COUNT
614 0721 1136 TAD P55 /SET DASH CHAR
615 0722 4460 MLOAD /LOAD DASHED LINE
616 0723 4461 PRINT
617 0724 5437 CR /PRINT LINE
618 0725 4455 TYPE /TYPE INSTRUCTIONS
619 0726 5375 TIMSG3 /SET SWITCH SETTING FOR MSG
620 0727 1041 TAD TABPTR
621 0730 3332 DCA +2
622 0731 4455 TYPE
623 0732 0000 0
624 0733 4455 TYPE /FINISH INSTR
625 0734 5412 TIMSG4
626 0735 4457 HOLD /WAIT FOR OPERATOR
627 0736 4464 CHECK /CHECK FOR CONTROL
628 0737 4461 PRINT /ISSUE FF
629 0740 5442 FF
630 0741 4461 PRINT /PRINT REFERENCE LINE
631 0742 5355 TIMSG1
632 0743 1041 TAD TABPTR /SET FF LENGTH FOR MSG
633 0744 3346 DCA +2
634 0745 4461 PRINT
635 0746 0000 0
636 0747 4461 PRINT /FINISH MSG
637 0750 5361 TIMSG2
638 0751 2041 ISZ TABPTR /INC TABLE POINTER
639 0752 2041 ISZ TABPTR
640 0753 1441 TAD I TABPTR /CHECK TABLE TO SEE IF DONE
641 0754 7640 SEA CLA
642 0755 5325 JMP T1A /CONTINUE
643 0756 4461 PRINT
644 0757 5440 LF /ADVANCE PAPER
645 0760 5465 EXIT /EXIT
646
647 0773 5447
648 0774 0707
649 0775 3142
650 0776 0656
651 0777 0620

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652 /TEST 2 - PRINT SPEED TIMING TEST
653 /
654 /A SWIRL PATTERN IS PRINTED FOR ONE FULL MINUTE
655 /WHILE THE NUMBER OF LINES PRINTED IS COUNTED.
656 /TIMING WILL BE DONE BY DR0-EA OR DR0-EC CLOCK
657

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658 /OPTION IF EITHER IS AVAILABLE AND LOCATION
659 /CKFLAG IS PRESET WITH THE TIME COUNT.
660 /IF CKFLAG IS ZERO, MANUAL TIMING WILL BE USED TO
661 OBTAIN AN APPROXIMATE PRINT TIMING.
662 /IF A HARDWARE SWITCH REGISTER IS NOT AVAILABLE, THIS TEST
663 CANNOT BE RUN WITHOUT A CLOCK OPTION BEING AVAILABLE.
664 /THE PROGRAM WILL AUTOMATICALLY SKIP THIS TEST IF IT CANNOT BE RUN.
665
666 1000 4462 TEST2, BPTHOR /PRINT TEST HEADER
667 1001 3040 DCA PASCNT /CLEAR PASS COUNT (LINE COUNT)
668 1002 1054 TAD CKFLAG /CLOCK OPTION AVAILABLE?
669 1003 7640 SZA CLA
670 1004 5230 JMP T2C /YES, GO TO CLOCK SET-UP
671 1005 1021 TAD PARAM /HAVE HARDWARE SWITCH REGISTER?
672 1006 7710 SPA CLA
673 1007 5215 JMP T2A /YES, CONTINUE
674 1010 4461 PRINT /NO, PRINT ERROR MESS
675 1011 5151 T2EM
676 1012 4455 TYPE
677 1013 5151 T2EM
678 1014 5465 EXIT /EXIT TEST
679
680 /MANUAL TIMING START-UP
681
682 1015 4455 T2A, TYPE /PRINT INSTRUCTIONS
683 1016 5067 T2M1
684 1017 4455 TYPE
685 1020 5105 T2M2
686 1021 4455 TYPE
687 1022 5126 T2M3
688 1023 4521 T2B, GETSW /GET SWITCHES
689 1024 0146 AND P200 /MASK SWITCH 4
690 1025 7650 SNA CLA /START? = SWITCH UP?
691 1026 5223 JMP T2B /NO, WAIT FOR SWITCH TO GO UP
692 1027 5244 JMP T2SP /YES, START PRINTING
693
694 /CLOCK OPTION START-UP
695
696 1030 1377 T2C, TAD (6656 /SET TIME COUNT FOR ONE MINUTE
697 1031 3036 DCA LPCNT
698 1032 1120 TAD TCKSRV
699 1033 3002 DCA ISRV
700 1034 1054 TAD CKFLAG
701 1035 3037 DCA CKCNT
702 1036 4473 JMS I TKCC
703 1037 4477 JMS I T2CF
704 1040 7300 CLA CLL
705 1041 4505 JMS I TPSIE /DISABLE PRINTER INTERRUPT
706 1042 6131 CLEI /SET CLOCK INTERRUPT ENABLE
707 1043 6001 ION /INTERRUPT SYSTEM ON
708
709 /PRINTING ROUTINE FOR TEST 2
710
711 1044 7201 T2SP, CLA IAC /SET START CHAR
712 1045 1134 TAD P40

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713 1046 3032 DCA CHAR2 /SAVE IT
714 1047 1032 T2PA, TAD CHAR2 /GET START CHAR
715 1050 3031 DCA CHAR /SET CHARACTER TO BE LOADED
716 1051 1026 TAD WIDTH /SET COLUMN COUNT
717 1052 3034 DCA COUNT
718 1053 1031 T2PC, TAD CHAR /GET CHAR
719 1054 4456 LOAD /LOAD CHAR
720 1055 2034 ISZ COUNT /INC CHAR COUNT
721 1056 7410 SKP /CONTINUE LINE
722 1057 5270 JMP T2PD /SEND LF IF END OF LINE
723 1060 2031 ISZ CHAR /SET NEXT CHAR
724 1061 1174 TAD M177 /CHECK CHAR
725 1062 1031 TAD CHAR
726 1063 7640 SZA CLA
727 1064 5253 JMP T2PC /OK, CONTINUE
728 1065 1134 TAD P40 /RESET CHAR TO SPACE
729 1066 3031 DCA CHAR /STORE NEW CHAR
730 1067 5253 JMP T2PC /CONTINUE
731 1070 4461 T2PD, PRINT /SEND LF TO PRINT LINE
732 1071 5460 LF
733 1072 2040 ISZ PASCNT /INC LINE COUNT
734 1073 1054 TAD CKFLAG /USING CLOCK?
735 1074 7640 SZA CLA
736 1075 5302 JMP T2PE /YES, BYPASS MANUAL TIMING
737 1076 4521 GETSW /GET SWITCH REGISTER
738 1077 0146 AND P200 /MASK SWITCH 4
739 1100 7650 SNA CLA /STILL UP?
740 1101 5314 JMP T2SPD /NO, EXIT PRINTING ROUTINE - PRINT COUNT
741 1102 2032 T2PE, ISZ CHAR2 /SET NEW START CHAR (SWIRL)
742 1103 1174 TAD M177 /CHECK CHAR
743 1104 1032 TAD CHAR2
744 1105 7640 SZA CLA
745 1106 3247 JMP T2PA /OK, CONTINUE
746 1107 5244 JMP T2SP /RESET START CHAR
747
748 /ROUTINE TO PRINT NUMBER OF LINES PRINTED
749
750 1110 6002 T2SPDC, IOF /INTERRUPT SYSTEM OFF
751 1111 6132 CLDI /DISABLE CLOCK INTERRUPT
752 1112 1125 TAD LIERR /RESET UNEXPECTED INTERRUPT ERROR
753 1113 3002 DCA ISRV
754 1114 7300 T2SPD, CLA CLL /CLEAR AC AND LINK
755 1115 1145 TAD P177 /GET RUBOUT
756 1116 4456 LOAD /CLEAR LA180 BUFFER
757 1117 4455 TYPE /START MESS
758 1120 5171 PRSP1
759 1121 4461 PRINT
760 1122 5171 PRSP1
761 1123 1054 TAD CKFLAG /CHECK IF USED CLOCK
762 1124 7640 SZA CLA
763 1125 5332 JMP T2S1 /YES, SKIP WORD "APPROX"
764 1126 4455 TYPE /NO, ADD WORD "APPROXIMATE" TO MESS
765 1127 5202 PRSP2
766 1130 4461 PRINT
767 1131 5202 PRSP2

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768 1132 1040 T2S1, TAD PASCNT /GET LINE COUNT
769 1133 4517 JMS I TCNVRT /CONVRT NUMBER TO ASCII MMSG
770 1134 4461 PRINT /PRINT IT
771 1135 5435 CNVMSG
772 1136 4455 TYPE
773 1137 5435 CNVMSG
774 1140 4461 PRINT /PRINT MORE OF MMSG
775 1141 5206 PRSP3
776 1142 4455 TYPE
777 1143 5206 PRSP3
778 1144 1026 TAD WIDTH /GET # OF COLUMNS
779 1145 7041 CIA
780 1146 4517 JMS I TCNVRT /CONVERT IT TO ASCII MMSG
781 1147 4461 PRINT
782 1150 5435 CNVMSG
783 1151 4455 TYPE
784 1152 5435 CNVMSG
785 1153 4461 PRINT
786 1154 5222 PRSP4 /FINISH MMSG & PRINT
787 1155 4455 TYPE
788 1156 5222 PRSP4
789 1157 5465 EXIT /EXIT TEST
790
791 1177 6650 PAGE
1200

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792
793 /PRINTING TESTS
794
795
796 /TEST 20 - DATA TRANSFER PATHS TEST
797 /
798 /THIS TEST PRINTS 16 LINES OF ALTERNATING X'S AND U'S IN A
799 /CHECKERBOARD PATTERN
800
801 1200 4462 TEST20, PRTHDR /PRINT TEST HEADER
802 1201 1162 TAD M20 /SET LINE COUNT FOR 16 LINES
803 1202 3036 DCA LPCNT /STORE COUNT
804 1203 1026 T20A, TAD WIDTH /GET # COLUMNS
805 1204 3034 DCA COUNT /STORE
806 1205 7001 IAC /CHECK LINE COUNT
807 1206 0036 AND LPCNT
808 1207 7640 SZA CLA /START CHAR =?
809 1210 5216 JMP T20C /START WITH "U"
810 1211 1377 T20B, TAD (52) /GET "*" CHAR CODE
811 1212 4456 LOAD /LOAD *
812 1213 2034 ISZ COUNT /INC CHAR COUNT
813 1214 7410 SKP /CONTINUE
814 1215 5222 JMP T20D /PRINT LINE IF DONE LOAD
815 1216 1376 T20C, TAD (125) /GET "U" CHAR CODE
816 1217 4456 LOAD /LOAD CHAR
817 1220 2034 ISZ COUNT /INC CHAR COUNT
818 1221 5211 JMP T20B /CONTINUE LOAD
819 1222 4461 T20D, PRINT /PRINT LINE WHEN DONE LOAD
820 1223 5440 LF /ADVANCE PAPER
821 1224 2036 ISZ LPCNT /INC LINE COUNT

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822 1225 5203 JMP T20A /FINISH TEST
823 1226 5465 EXIT /EXIT
824
825 /TEST 21 - HEAD POSITIONING TEST
826 /
827 /THIS TEST PRINTS A SINGLE LINE OF ALTERNATING 0'S AND SPACES
828 /THEN FILLS IN THE SPACES WITH X'S ONE AT A TIME
829
830 1227 4462 TEST21, PRTHDR /PRINT TEST HEADER
831 1230 1026 TAD WIDTH /GET # COLUMNS
832 1231 3034 DCA COUNT /STORE
833 1232 1140 T21B, TAD P60 /LOAD 0
834 1233 4456 LOAD
835 1234 2034 ISZ COUNT /INC CHAR COUNT, DONE?
836 1235 7410 SKP /NO, SEND SPACE
837 1236 5243 JMP T21C /YES, SEND CR - PRINT LINE
838 1237 1134 TAD P40 /LOAD SPACE
839 1240 4456 LOAD
840 1241 2034 ISZ COUNT /INC COUNT, DONE?
841 1242 5232 JMP T21B /NO, CONTINUE LOAD
842 1243 4461 T21C, PRINT /YES, PRINT LINE
843 1244 5437 CR
844 1245 7240 CLA CMA /SET AC=-1
845 1246 3273 DCA T21W /STORE SPACE COUNT
846 1247 1273 T21D, TAD T21W /SAVE SPACE COUNT
847 1250 3034 DCA COUNT
848 1251 1134 TAD P40 /GET SPACE
849 1252 4460 MLOAD /LOAD SPACES
850 1253 1375 TAD (130) /GET X CHAR CODE
851 1254 4456 LOAD /LOAD IT
852 1255 4461 PRINT /PRINT LINE
853 1256 5437 CR
854 1257 1154 TAD M2 /ADD 2 TO SPACE COUNT
855 1260 1273 TAD T21W
856 1261 3273 DCA T21W /STORE NEW COUNT
857 1262 7240 CLA CMA /SET AC=-1
858 1263 1273 TAD T21W /SUBTRACT SPACE COUNT
859 1264 7041 CIA /MAKE IT POSITIVE
860 1265 1026 TAD WIDTH /ADD # COLUMNS
861 1266 7750 SPA SNA CLA /DONE LINE?
862 1267 5247 JMP T21D /NO CONTINUE
863 1270 4461 PRINT /ADVANCE PAPER
864 1271 5440 LF
865 1272 5465 EXIT /EXIT
866
867 1273 0000 T21W, 0
868
869 /TEST 22 - BACKSPACE TEST
870 /
871 /TWO LINES OF X'S INTERSPACED WITH DASHES
872 /WILL BE PRINTED BY PRINTING A SLASH, EXECUTING A BACKSPACE,
873 /AND THEN PRINTING A BACKSLASH TO COMPLETE EACH X CHAR,
874 /A MAX. OF 127 COLUMNS WILL BE PRINTED.
875
876 1274 4462 TEST22, PRTHDR /PRINT TEST HEADER

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877 1275 1154 TAD M2 /SET LINE COUNT
878 1276 3036 DCA LPCNT /STORE COUNT
879 1277 1026 T22A, TAD WIDTH /GET # COLUMNS
880 1300 1145 TAD P177 /OVER 127?
881 1301 7710 SPA CLA
882 1302 5305 JMP ,+3
883 1303 1026 TAD WIDTH
884 1304 7410 SKP
885 1305 1174 TAD M177 /YES, SET TO 127
886 1306 3034 DCA COUNT /STORE COUNT
887 1307 1137 T22B, TAD P57 /GET "/" CODE
888 1310 4456 LOAD /LOAD
889 1311 1130 TAD P10 /GET BACKSPACE CODE
890 1312 4456 LOAD /LOAD
891 1313 1144 TAD P134 /GET "\ " CODE
892 1314 4456 LOAD /LOAD
893 1315 2034 ISZ COUNT /INC COLUMN COUNT
894 1316 7410 SKP /CONTINUE IF NOT DONE
895 1317 5324 JMP T22C /PRINT LINE IF DONE
896 1320 1136 TAD P55 /GET DASH
897 1321 4456 LOAD /LOAD
898 1322 2034 ISZ COUNT /INC COUNT, DONE?
899 1323 5307 JMP T22B /NO, CONTINUE
900 1324 4461 T22C, PRINT /YES, PRINT LINE
901 1325 5440 LF
902 1326 2036 ISZ LPCNT /INC LINE COUNT, DONE?
903 1327 5277 JMP T22A /NO, CONTINUE
904 1330 5465 EXIT /YES, EXIT
905
906 /TEST 23 - CHARACTER GENERATOR TEST
907 /
908 /THIS TEST PRINTS A SINGLE LINE (30 CHARACTERS LONG) OF EACH
909 /PRINTABLE CHARACTER PRECEDED BY A LINE OF ALL SPACES
910
911 1331 4462 TEST23, PRTHDR /PRINT TEST HEADER
912 1332 1134 TAD P40 /SET START CHAR (SPACE)
913 1333 3031 DCA CHAR /STORE IT
914 1334 1167 T23A, TAD M36 /SET COLUMN COUNT = 30
915 1335 3034 DCA COUNT /STORE IT
916 1336 1031 TAD CHAR /GET CHAR
917 1337 4460 MLOAD /LOAD LINE
918 1340 4461 PRINT /PRINT IT
919 1341 5440 LF
920 1342 2031 ISZ CHAR /SET NEXT CHAR
921 1343 1174 TAD M177 /CHECK CHAR
922 1344 1031 TAD CHAR
923 1345 7640 SZA CLA /DONE TEST?
924 1346 5334 JMP T23A /NO, CONTINUE
925 1347 5465 EXIT /YES, EXIT
926
927 1375 0130
928 1376 0125
929 1377 0052
930 PAGE 1400

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931 /TEST 24 - NON-PRINTABLE CHARACTER TEST
932 /
933 /THIS TEST PRINTS A 30 LINE SWIRL PATTERN WITH NON-PRINTABLE CHARACTERS
934 /LOADED BEFORE AND AFTER THE PRINTING CHARACTERS TO TEST ALL AREAS OF THE
935 /CHARACTER BUFFER IN THE LA180. IF THIS TEST IS LOOPED ON,
936 /THE SWIRL PATTERN WILL CONTINUE, 30 LINES PRINTED
937 /EACH TIME THE TEST IS LOOPED.
938
939 1400 4462 TEST24, PRTHDR /PRINT TEST HEADER
940 1401 1135 TAD P41 /SET START CHAR
941 1402 3031 DCA CHAR
942 1403 1167 T24H, TAD M36
943 1404 3036 DCA LPCNT /SET LINE COUNT
944 1405 3040 DCA PASCNT /CLEAR CHAR INC COUNT
945 1406 1026 TAD WIDTH
946 1407 1150 TAD P377 /BUFFER SIZE-COLUMN COUNT
947 1410 1166 T24A, TAD M35 /DIVIDE NON-PRINT CHAR COUNT BY 29
948 1411 7510 SPA
949 1412 5215 JMP T24B
950 1413 2040 ISZ PASCNT /PASCNT=NON-PRINT CHAR INC COUNT
951 1414 5210 JMP T24A
952 1415 7300 T24B, CLA CLL /CLEAR NON-PRINT CHAR COUNT 2ND BLOCK
953 1416 3035 DCA COUNT2
954 1417 1035 T24C, TAD COUNT2 /CALCULATE # NON-PRINT CHARS, 1ST BLOCK
955 1420 7041 CIA
956 1421 1377 TAD (-377
957 1422 1026 TAD WIDTH
958 1423 4277 JMS T24S /LOAD 1ST BLOCK OF NON-PRINT CHAR
959 1424 7300 CLA CLL /CLEAR AC AND LINK
960 1425 1026 TAD WIDTH /SET # PRINTABLE CHARS (COLUMN COUNT)
961 1426 3034 DCA COUNT
962 1427 1031 TAD CHAR /SET FORST PRINT CHAR
963 1430 3032 DCA CHAR2
964 1431 1032 T24D, TAD CHAR2 /GET CHAR
965 1432 4456 LOAD /LOAD PRINTABLE CHAR
966 1433 2034 ISZ COUNT /INS CHAR COUNT
967 1434 7410 SKP /NEXT CHAR
968 1435 5246 JMP T24E
969 1436 2032 ISZ CHAR2
970 1437 1032 TAD CHAR2 /CHECK CHAR
971 1440 1174 TAD M177 /CHAR=RUBOU?
972 1441 7640 SZA CLA
973 1442 5231 JMP T24D /NO, CONTINUE
974 1443 1134 TAD P40 /YES, RESET CHAR=SPACE
975 1444 3032 DCA CHAR2
976 1445 5231 JMP T24D /CONTINUE
977 1446 1035 TAD COUNT2 /SET # NON-PPINT CHARS, 2ND BLOCK
978 1447 4277 JMS T24S /LOAD 2ND BLOCK NON-PRINT CHARS
979 1450 4461 PRINT /PRINT LINE
980 1451 5440 LF
981 1452 1035 TAD COUNT2 /IN NON-PRINT CHAR COUNT, 2ND BLOCK
982 1453 1040 TAD PASCNT
983 1454 3035 DCA COUNT2
984 1455 2031 ISZ CHAR /INC START CHAR
985 1456 1031 TAD CHAR /CHECK START CHAR

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986 1457 1174 TAD M177
987 1460 7640 SZA CLA
988 1461 5264 JMP ,+3 /OK, CONTINUE
989 1462 1134 TAD P40 /RESET START CHAR
990 1463 3031 DCA CHAR
991 1464 2036 ISZ LPCNT /INC LINE COUNT
992 1465 5217 JMP T24C /CONTINUE
993 1466 7300 T24F, CLA CLL
994 1467 1052 TAD TLOOP /LOOP ON TEST?
995 1470 7640 SZA CLA
996 1471 5276 JMP T24G /YES, CONTINUE SWIRL
997 1472 4521 GETSW
998 1473 0152 AND P1000 /LOOP ON TEST?
999 1474 7650 SNA CLA
1000 1475 5465 EXIT /NO, EXIT TEST
1001 1476 5203 T24G, JMP T24H /LOOP ON TEST

/ROUTINE TO LOAD NON-PRINTABLE CHARACTERS FOR TEST 24
1002
1003
1004
1005 1477 0000 T24S, 0
1006 1500 7550 SPA SNA /GOOD CHAR COUNT?
1007 1501 5577 JMP I T24S /NO, RETURN
1008 1502 7041 CIA /YES, NEGATE IT
1009 1503 3034 DCA COUNT /SAVE IT
1010 1504 3032 T24SC, DCA CHAR2 /SET FIRST NON-PRINT CHAR
1011 1505 1032 T24SA, TAD CHAR2 /GET CHAR
1012 1506 4456 LOAD /LOAD CHAR
1013 1507 2034 ISZ COUNT /INC COUNT
1014 1510 7410 SKP
1015 1511 5677 JMP I T24S /RETURN IF ZERO
1016 1512 2032 T24SB, ISZ CHAR2 /NEXT CHAR
1017 1513 7300 CLA CLL
1018 1514 1032 TAD CHAR2 /CHECK CHAR
1019 1515 1157 TAD M7
1020 1516 7450 SNA
1021 1517 5312 JMP T24SB /BELL, SKIP
1022 1520 1153 TAD M1
1023 1521 7450 SNA
1024 1522 5312 JMP T24SB /SKIP BS
1025 1523 1154 TAD M2
1026 1524 7450 SNA
1027 1525 5312 JMP T24SB /SKIP LF
1028 1526 1154 TAD M2
1029 1527 7450 SNA
1030 1530 5312 JMP T24SB /SKIP FF
1031 1531 1153 TAD M1
1032 1532 7450 SNA
1033 1533 5312 JMP T24SB /SKIP CR
1034 1534 1163 TAD M23
1035 1535 7650 SNA CLA /CHAR=SPACE?
1036 1536 5304 JMP T24SC /YES, RESET CHAR
1037 1537 5305 JMP T24SA /NO, CONTINUE
1038
1039 1540 0000 SETSKP, 0
1040 1541 7300 CLA CLL

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1041 1542 1021 TAD PARAM /GET HARDWARE WORD 1
1042 1543 7004 RAL /PUT OPTION 1 BIT INTO BIT 0
1043 1544 7710 SPA CLA /WAS OPTION 1 SELECTED ?
1044 1545 5351 JMP ,+4 /YES=SETUP IOT TO SKIP ON AND CLEAR DATA ACCEPTED
1045 1546 1778 TAD RPSKFB3 /NO=SETUP FOR LA100 SKIP ON CHAR IOT
1046 1547 3775 DCA TSMIOT /SAVE THE SKIP IOT
1047 1550 5740 JMP I SETSKP /RETURN TO PROGRAM TO LOAD CHAR
1048 1551 1774 TAD OPDBST /GET OPTION 1 IOT TO SKIP
1049 1552 5347 JMP , -3 /RETURN TO PROGRAM
1050
1051 1574 2643
1052 1575 0536
1053 1576 2637
1054 1577 7401
1055
1056 PAGE
1057
1058 /TEST 25 - BUFFER TEST
1059 /
1060 /THIS TEST CHECKS THE CHARACTER BUFFER OF THE LA100 WHILE PRINTING
1061 /FOUR LINES OF NUMBERS (WITH 2 BLANK LINES BETWEEN THE
1062 /FIRST AND SECOND LINE). THESE LINES CAN BE USED TO
1063 /CHECK THE PROPER PRINTING WIDTH.
1064 /ANY E PRINTED INDICATES AN INCORRECT LOAD OR BUFFER ACTION.
1065
1066 TEST25, PRTHDR /PRINT TEST HEADER
1067 TAD M20 /SET CHAR COUNT
1068 DCA COUNT
1069 TAD (105 /SET E CHAR
1070 MLOAD /LOAD BUFFER
1071 TAD P177 /
1072 LOAD /CLEAR BUFFER
1073 TAD WIDTH
1074 DCA COUNT /SET COLUMN COUNT
1075 TAD M144
1076 DCA LPCNT /SET ONES COUNT
1077 IAC /SET FIRST CHAR=1
1078 JMS T25S /LOAD ONES
1079 JMP T25A /DONE LINE-PRINT
1080 TAD M36
1081 DCA LPCNT /SET THREE'S COUNT
1082 TAD (3
1083 JMS T25S /PRINT THREE'S
1084 JMP T25A
1085 TAD M2
1086 DCA LPCNT /SET TWO'S COUNT
1087 TAD P2 /SET CHAR
1088 JMS T25S /PRINT TWO'S
1089 NOP
1090 T25A, PRINT /PRINT LINE
1091 TAD (-400 /SET CHAR COUNT
1092 DCA COUNT
1093 TAD (105 /SET E CHAR
1094 MLOAD /FILL BUFFER
1095 PRINT /PRINT BLANK LINE

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1095	1637	5440	LF			
1096	1640	1374	TAD	(-376		
1097	1641	3034	DCA	COUNT		
1098	1642	1377	TAD	(105		
1099	1643	4460	MLOAD		/LOAD BUFFER E'S	
1100	1644	1145	TAD	P177	/CLEAR BUFFER	
1101	1645	4456	LOAD		/CLEAR BUFFER	
1102	1646	4461	PRINT			
1103	1647	5440	LF		/PRINT BLANK LINE	
1104	1650	1375	TAD	(-400		
1105	1651	3034	DCA	COUNT		
1106	1652	1377	TAD	(105		
1107	1653	4460	MLOAD		/FILL BUFFER ALL E'S	
1108	1654	1026	TAD	WIDTH		
1109	1655	3034	DCA	COUNT	/SET COLUMN COUNT	
1110	1656	1373	TAD	(-143		
1111	1657	3036	DCA	LPCNT	/SET 0'S COUNT=99	
1112	1660	4345	JMS	T255	/LOAD 0'S	
1113	1661	5265	JMP	T25B	/PRINT IF DONE LINE	
1114	1662	7001	IAC		/SET 1'S	
1115	1663	4345	JMS	T255	/LOAD 1'S TILL END OF LINE	
1116	1664	7000	NOP			
1117	1665	4461	T25B, PPRINT		/PRINT LINE	
1118	1666	5440	LF			
1119	1667	1372	TAD	(-377		
1120	1670	3034	DCA	COUNT		
1121	1671	1377	TAD	(105		
1122	1672	4460	MLOAD		/FILL BUFFER WITH E'S	
1123	1673	1145	TAD	P177		
1124	1674	4456	LOAD		/CLEAR BUFFER	
1125	1675	1026	TAD	WIDTH		
1126	1676	3034	DCA	COUNT	/SET COLUMN COUNT	
1127	1677	1371	TAD	(-11		
1128	1700	3036	DCA	LPCNT	/SET GROUP COUNT	
1129	1701	3031	T25C, DCA	CHAR	/SET CHAR	
1130	1702	1031	T25D, TAD	CHAR	/CHECK CHAR	
1131	1703	1160	TAD	M12		
1132	1704	7650	SNA CLA			
1133	1705	5301	JMP	T25C	/RESET CHAR IF NECESSARY	
1134	1706	1031	TAD	CHAR	/GET CHAR	
1135	1707	4345	JMS	T255	/LOAD CHAR	
1136	1710	5315	JMP	T25E	/PRINT LINE IF DONE	
1137	1711	1160	TAD	M12	/RESET GROUP COUNT	
1138	1712	3036	DCA	LPCNT	/SET NEXT CHAR	
1139	1713	2031	ISZ	CHAR		
1140	1714	5302	JMP	T25D	/CONTINUE	
1141	1715	4461	T25E, PRINT		/PRINT LINE	
1142	1716	5440	LF			
1143	1717	1375	TAD	(-400		
1144	1720	3034	DCA	COUNT		
1145	1721	1377	TAD	(105		
1146	1722	4460	MLOAD		/FILL BUFFER WITH E'S	
1147	1723	1370	TAD	(61		
1148	1724	3031	DCA	CHAR	/SET FIRST CHAR=1	
1149	1725	1026	TAD	WIDTH		

1150	1726	3034	DCA	COUNT	/SET COLUMN COUNT	
1151	1727	1031	T25F, TAD	CHAR	/GET CHAR	
1152	1730	4456	LOAD		/LOAD IT	
1153	1731	2031	ISZ	CHAR	/LINE CHAR	
1154	1732	1031	TAD	CHAR	/CHECK CHAR	
1155	1733	1367	TAD	(-72		
1156	1734	7640	SZA CLA			
1157	1735	5340	JMP	T25G		
1158	1736	1140	TAD	P60		
1159	1737	3031	DCA	CHAR	/RESET CHAR TO 0	
1160	1740	2034	T25G, ISZ	COUNT	/INC COLUMN COUNT	
1161	1741	5327	JMP	T25F	/FINISH LINE	
1162	1742	4461	PRINT		/PRINT LINE	
1163	1743	5440	LF			
1164	1744	5465	EXIT		/EXIT TEST	
1165						
1166						
1167						
1168	1745	0000	T25S, 0			
1169	1746	1140	TAD	P60	/MAKE CHAR ASCII	
1170	1747	3032	DCA	CHAR2	/SAVE CHAR	
1171	1750	1032	TAD	CHAR2	/GET CHAR	
1172	1751	4456	LOAD		/LOAD CHAR	
1173	1752	2034	ISZ	COUNT	/INC COLUMN COUNT	
1174	1753	7410	SKP		/CONTINUE	
1175	1754	5745	JMP I	T255	/RETURN, END OF LINE	
1176	1755	2036	ISZ	LPCNT		
1177	1756	5350	JMP	T25S+3	/CONTINUE	
1178	1757	2345	ISZ	T255	/INC RETURN ADR	
1179						
1180	1760	5745	JMP I	T255	/RETURN	
1181						
1182	1767	7706				
1183	1770	0061				
1184	1771	7767				
1185	1772	7401				
1186	1773	7535				
1187	1774	7402				
1188	1775	7400				
1189	1776	0003				
1190	1777	0105				
		2000	PAGE			
1191						
1192						
1193						
1194						
1195						
1196						
1197						
1198	2000	4462	TEST26, PRTHDR		/PRINT TEST HEADER	
1199	2001	1377	TAD	(26TAB	/SET TABLE POINTER	
1200	2002	3041	DCA	TABPTR		
1201	2003	1155	T26A, TAD	M3	/STROE COUNT FOR 2 OPERPRINTS	
1202	2004	3036	DCA	LPCNT		
1203	2005	1026	T26B, TAD	WIDTH	/SET # COLUMNS	

/TEST 26 - OVERPRINT TEST

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

1204	2006	3034	DCA	COUNT	
1205	2007	1441	T26C,	TAD I	TABPTR
1206	2010	7450	SNA		/GET CHARS
1207	2011	5465	EXIT		/DONE TEST?
1208	2012	0142	AND	P77	/YES, EXIT TEST
1209	2013	1170	TAD	M40	/NO, MASK CHAR
1210	2014	7510	SPA		/MAKE ASCII
1211	2015	1143	TAD	P100	
1212	2016	1134	TAD	P40	
1213	2017	4456	LOAD		/LOAD CHAR
1214	2020	2034	ISZ	COUNT	/INC CHAR COUNT
1215	2021	7410	SKP		/CONTINUE
1216	2022	5237	JMP	T26D	/PRINT LINE
1217	2023	1441	TAD I	TABPTR	/GET CHAR PAIR AGAIN
1218	2024	7012	RTR		/GET SECOND CHAR
1219	2025	7012	RTR		
1220	2026	7012	RTR		
1221	2027	0142	AND	P77	/MASK CHAR
1222	2030	1170	TAD	M40	/MAKE ASCII
1223	2031	7510	SPA		
1224	2032	1143	TAD	P100	
1225	2033	1134	TAD	P40	
1226	2034	4456	LOAD		/LOAD IT
1227	2035	2034	ISZ	COUNT	/INC COUNT
1228	2036	5207	JMP	T26C	/CONTINUE
1229	2037	4461	T26D,	PRINT	/PRINT LINE
1230	2040	5437	CR		
1231	2041	2036	ISZ	LPCNT	/INC OVERPRINT COUNT
1232	2042	5205	JMP	T26B	/CONTINUE
1233	2043	4461	PRINT		/ADVANCE PAPER
1234	2044	5440	LF		
1235	2045	2041	ISZ	TABPTR	/INC TABLE POINTER
1236	2046	5203	JMP	T26A	/GET NEXT PAIR
1237					
1238	2047	0540	T26TAB,	0540	/E-SP
1239	2050	4000		4000	/SP-0
1240	2051	1540		1540	/W-SP
1241	2052	4043		4043	/SP-1
1242	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.

1243					
1244					
1245					
1246					
1247					
1248					
1249					
1250	2054	4462	TEST27,	PRTHDR	/PRINT TEST HEADER
1251	2055	1376	TAD	(T27TAB	/SET TABLE POINTER
1252	2056	3041	DCA	TABPTR	
1253	2057	3045	T27A,	DCA	TENS
1254	2060	3044	DCA	ONES	/CLEAR CONVERSION COUNTERS
1255	2061	1441	TAD I	TABPTR	/GET NUMBER
1256	2062	2045	ISZ	TENS	/CONVERT TO ASCII
1257	2063	1160	TAD	M12	
1258	2064	7500	SMA		

1259	2065	5262	JMP	,=3	
1260	2066	3044	DCA	ONES	
1261	2067	7240	CLA	CMA	
1262	2070	1945	TAD	TENS	
1263	2071	7450	SNA		/SKIP LEADING ZERO'S
1264	2072	5275	JMP	T27B	
1265	2073	1140	TAD	P60	
1266	2074	4456	LOAD		/LOAD TENS DIGIT
1267	2075	7300	T27B,	CLA CLL	
1268	2076	1044	TAD	ONES	
1269	2077	1141	TAD	P72	
1270	2100	4456	LOAD		/LOAD ONES DIGIT
1271	2101	1441	TAD I	TABPTR	/GET 0
1272	2102	7450	SNA		/SKIP IF NOT ZERO
1273	2103	5307	JMP	T27C	/ZERO, PRINT 131 DASHES MAX
1274	2104	1153	TAD	M1	
1275	2105	7440	SZA		/SKIP IF ONE
1276	2106	5315	JMP	T27D	
1277	2107	1026	TAD	WIDTH	/PRINT 131 DASHES MAX,
1278	2110	1133	TAD	P36	/29 MINIMUM
1279	2111	7740	SMA	SEA CLA	
1280	2112	5322	JMP	T27DA	
1281	2113	1026	TAD	WIDTH	
1282	2114	5323	JMP	T27E	
1283	2115	1160	TAD	M12	/CHECK IF WANT 28 OR 29 DASHES
1284	2116	7700	SMA	CLA	
1285	2117	5322	JMP	,+3	
1286	2120	1166	TAD	M35	/SET 29
1287	2121	7410	SKP		
1288	2122	1375	T27DA,	TAD	(-34
1289	2123	3034	T27E,	DCA	COUNT
1290	2124	1136	TAD	P55	/STORE DASH COUNT
1291	2125	4460	MLOAD		/LOAD DASH LINE
1292	2126	1441	TAD I	TABPTR	
1293	2127	7450	SNA		
1294	2130	5337	JMP	T27X	
1295	2131	7041	CIA		
1296	2132	3034	DCA	COUNT	
1297	2133	1131	TAD	P12	
1298	2134	4460	MLOAD		
1299	2135	2041	ISZ	TABPTR	
1300	2136	5257	JMP	T27A	
1301	2137	4461	T27X,	PRINT	/PRINT LINE
1302	2140	5440	LF		
1303	2141	5465	EXIT		/EXIT TEST
1304					
1305	2142	0001	T27TAB,	1	
1306	2143	0002		2	
1307	2144	0004		4	
1308	2145	0010		10	
1309	2146	0020		20	
1310	2147	0040		40	
1311	2150	0000		0	/END OF TABLE
1312					
1313	2175	7744			

1314 2176 2142
 1315 2177 2947
 2200

PAGE

1316
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 1332
 1333
 1334
 1335
 1336

/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

TEST30, PRTHDR /PRINT TEST HEADER
 TAD M30 /SET LINE COUNT
 DCA COUNT
 T30A, PRINT /PRINT X-LF
 T30M
 ISZ COUNT /DEC LINE COUNT
 JMP T30A /FINISH TEST
 EXIT /EXIT TEST
 T30M, TEXT /X//

1337
 1338
 1339
 1340

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

1341
 1342
 1343
 1344
 1345
 1346
 1347
 1348
 1349
 1350
 1351
 1352
 1353
 1354
 1355
 1356
 1357
 1358
 1359
 1360
 1361
 1362
 1363
 1364
 1365

TEST31, PRTHDR /PRINT TEST HEADER
 TAD P7
 LOAD /SEND BELL CODE
 PRINT /LOAD WORD "BELL"
 T31M1
 TAD P7
 LOAD /LOAD BELL CODE
 PRINT /LOAD WORD "TEST"
 T31M2
 TAD P7
 LOAD /LOAD
 PRINT /SEND CR
 CR
 TAD P7
 LOAD /LOAD BELL CODE
 PRINT /SEND LF
 LF
 TAD P7 /LOAD BELL CODE
 LOAD
 PRINT /SEND CR
 CR
 EXIT /EXIT TEST
 T31M1, TEXT /BELL/
 2241 1414

1366 2242 0000
 2243 4024
 2244 0523
 2245 2400

T31M2, TEXT / TEST/

1367
 1368
 1369
 1370
 1371
 1372
 1373
 1374
 1375
 1376
 1377
 1378
 1379
 1380
 1381
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 1390
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 1399
 1400
 1401
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 1416
 1417

/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 LA100.

TEST60, CLA CLL /CLEAR
 DCA PASCNT /CLEAR PASS COUNT
 T60A, PRTHDR /PRINT TEST HEADER ON BLANK LINES
 TAD P41 /SET FIRST CHAR
 DCA CHAR /STORE IT
 T60B, TAD WIDTH /GET # COLUMNS
 DCA COUNT /STORE IT
 TAD CHAR /GET CHAR
 MLOAD /LOAD LINE
 PRINT /PRINT LINE
 LF
 TAD (-5 /SET OVERPRINT COUNT
 DCA LPCNT
 T60C, TAD WIDTH /SET # COLUMNS
 DCA COUNT
 TAD CHAR /GET CHAR
 MLOAD /LOAD LINE
 PRINT /PRINT LINE
 CR
 ISZ LPCNT /INC OVERPRINT COUNT, DONE?
 JMP T60C /NO, DO AGAIN
 PRINT /YES, ADVANCE PAPER
 LF
 ISZ CHAR /SET NEXT CHAR
 TAD M177 /CHECK IT
 TAD CHAR
 SEZ CLA /CHAR=RUBOUT?
 JMP T60B /NO, CONTINUE THIS PASS
 ISZ PASCNT /YES, INC PASS COUNT
 NOP
 PRINT /PRINT PASS COUNT MSG
 PASMMSG
 DCA THOUS /CLEAR CONVERSION COUNTERS
 TAD PASCNT /GET PASS COUNT & CONVERT TO DECIMAL
 ISZ THOUS
 TAD (-1750
 SMA
 JMP ,=3
 TAD (1750

1418	2315	3040	DCA	PASCNT	
1419	2316	1137	TAD	P57	
1420	2317	1947	TAD	THOUS	
1421	2320	4456	LOAD		
1422	2321	1240	TAD	PASCNT	
1423	2322	4517	JMS I	TCNVRT	
1424	2323	4461	PRINT		
1425	2324	5435	CNVMSG		
1426	2325	4461	PRINT		/PRINT LINE
1427	2326	5440	LF		
1428	2327	5250	JMP	T60A	/CONTINUE TEST
1429					
1430	2375	1750			
1431	2376	6030			
1432	2377	7773			
		2400			

PAGE

1433					
1434					/TEST 61 - SCOPE DRIVE ROUTINE
1435					/
1436					/THIS TEST WILL LOAD A CHARACTER SET IN SW REG BITS 05-11
1437					/IF SWITCH 04 IS DOWN, FULL LINES WILL BE LOADED & PRINTED
1438					/A LINEFEED WILL BE INSERTED AUTOMATICALLY IF LOADING PRINTABLE CHARACTERS.
1439					/IF SWITCH 04 IS UP, THE CHARACTER WILL BE LOADED ONCE & THE
1440					/PROGRAM WILL HALT; NO LINE FEEDS OF CARRIAGE RETURNS WILL BE SENT BY THE PROGRAM.
1441					
1442	2400	4462	TEST61,	PRTHDR	/PRINT HEADER
1443	2401	5225	JMP	T61C	/CHECK SWITCH 4 FIRST
1444	2402	1026	T61A,	TAD	WIDTH
1445	2403	3034	DCA	COUNT	/GET # COLUMNS
1446	2404	4521	T61B,	GETSW	/STORE IT
1447	2405	0145	AND	P177	/GET SW REG
1448	2406	3031	DCA	CHAR	/MARK CHAR
1449	2407	1031	TAD	CHAR	/SAVE IT
1450	2410	4456	LOAD		/GET CHAR
1451	2411	1160	TAD	M12	/LOAD IT
1452	2412	1031	TAD	CHAR	/CHECK CHAR
1453	2413	7450	SNA		
1454	2414	5225	JMP	T61C	/CHAR = LF?
1455	2415	1155	TAD	M3	/YES, RESET COLUMN COUNT
1456	2416	7450	SNA		
1457	2417	5225	JMP	T61C	/CHAR = CR?
1458	2420	1163	TAD	M23	/YES, RESET COLUMN COUNT
1459	2421	7700	SMA	CLA	
1460	2422	2034	ISE	COUNT	/NON-PRINTABLE CHAR?
1461	2423	7000	NOP		/NO, INC COLUMN COUNT
1462	2424	5230	JMP	T61D	
1463	2425	7300	T61C,	CLA	CLL
1464	2426	1026	TAD	WIDTH	/CHECK SW 04
1465	2427	3034	DCA	COUNT	/CLEAR
1466	2430	7000	T61D,	LAS	/GET # COLUMNS
1467	2431	0146	AND	P200	/STORE IT
1468	2432	7650	SNA	CLA	/GET SW REG
1469	2433	5236	JMP	T61E	/MASH SW 04
1470	2434	7402	HLT		/SWITCH 4 UP?
1471	2435	5204	JMP	T61B	/NO, CONTINUE
					/YES, HALT
					/GET NEXT CHAR

1472	2436	1034	T61E,	TAD	COUNT	/GET COLUMN COUNT
1473	2437	7510	SPA			/DONE LOAD?
1474	2440	5204	JMP	T61B		/NO, CONTINUE
1475	2441	7650	SNA	CLA		/TOO MANY LOADED?
1476	2442	5245	JMP	T61F		/NO, CONTINUE
1477	2443	1145	TAD	P177		/YES, SET RUBOUT
1478	2444	4456	LOAD			/CLEAR BUFFER
1479	2445	4461	T61F,	PRINT		/PRINT LOADED CHARACTERS
1480	2446	5440	LF			
1481	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.

1489					
1490	2450	4462	TEST62,	PRTHDR	/PRINT TEST HEADER
1491	2451	1053	TAD	TPFLG	/CHECK IF TERM EXISTS
1492	2452	7650	SNA	CLA	
1493	2453	5341	JMP	TERR	/EXIT IF NONE
1494	2454	4455	TYPE		/TYPE INSTR
1495	2455	5244	TCHAR		
1496	2456	4472	JMS I	TKSF	/WAIT FOR KYBD FLAG
1497	2457	5256	JMP	.-1	
1498	2460	4464	CHECK		/CHECK CHAR FOR CONTROL
1499	2461	4475	JMS I	TKRB	/READ CHAR
1500	2462	4501	JMS I	TTL6	/ECHO CHAR
1501	2463	4476	JMS I	TTSF	
1502	2464	5263	JMP	.-1	
1503	2465	3031	DCA	CHAR	/SAVE CHAR
1504	2466	4455	TYPE		/SEND CP-LF
1505	2467	5441	CRLF		
1506	2470	1026	T62B,	TAD	WIDTH
1507	2471	3034	DCA	COUNT	/SET COLUMN COUNT
1508	2472	1031	TAD	CHAR	/GET CHAR
1509	2473	4460	HLOAD		/LOAD LINE
1510	2474	4461	PRINT		
1511	2475	5440	LF		/PRINT LINE
1512	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 MSG WILL BE PRINTED.

1513					
1514					
1515					
1516					
1517					
1518					
1519					
1520					
1521	2477	4462	TEST63,	PRTHDR	/PRINT TEST HEADER
1522	2500	1053	TAD	TPFLG	/CHECK IF TERM EXISTS
1523	2501	7650	SNA	CLA	
1524	2502	5341	JMP	TERR	/EXIT IF NONE
1525	2503	4455	TYPE		/TYPE INSTR
1526	2504	5244	TCHAR		

```

1527 2505 4455 TYPE
1528 2506 4441 CRLF
1529 2507 4472 T63B, JMS I TKSF
1530 2510 5307 JMP =-1
1531 2511 4464 CHECK
1532 2512 4475 JMS I TKRB
1533 2513 4145 AND P177
1534 2514 3031 DCA CHAR
1535 2515 1031 TAD CHAR
1536 2516 4501 T63A, JMS I TTLS
1537 2517 4476 JMS I TTSF
1538 2520 5317 JMP =-1
1539 2521 4456 LOAD CHAR
1540 2522 1031 TAD CHAR
1541 2523 1161 TAD M15
1542 2524 7650 SNA CLA
1543 2525 5336 JMP T63E
1544 2526 1031 T63C, TAD CHAR
1545 2527 1160 TAD M12
1546 2530 7650 SNA CLA
1547 2531 5336 JMP T63E
1548 2532 1031 T63D, TAD CHAR
1549 2533 1377 TAD (-14)
1550 2534 7640 SZA CLA
1551 2535 3307 JMP T63B
1552 2536 4455 T63E, TYPE
1553 2537 5441 CRLF
1554 2540 5307 JMP T63B
1555 TERR, PRINT
1556 2541 4461 NCMRG
1557 2542 5231 EXIT
1558 2543 5465
1559 2577 7764 PAGE
2600

```

```

/SEND CR-LF
/WAIT FOR KYBD FLAG
/CHECK CHAR FOR CONTROL
/READ CHAR
/MASK BIT 8
/ECHO CHAR
/LOAD CHAR
/CR-LF AFTER CR
/CR-LF AFTER LF
/CR-LF AFTER FF
/PRINT ERROR MESS ON LA100
/EXIT TEST

```

/TTY I=O INSTRUCTIONS

```

1560
1561
1562
1563 2600 0000 RKSF, 0
1564 2601 6031 KSF
1565 2602 7410 SKP
1566 2603 2200 ISZ RKSF
1567 2604 5600 JMP I RKSF
1568
1569 2605 0000 RKCC, 0
1570 2606 6032 KCC
1571 2607 5605 JMP I RKCC
1572
1573 2610 0000 RKRS, 0
1574 2611 6034 KRS
1575 2612 5610 JMP I RKRS
1576
1577 2613 0000 RKR B, 0
1578 2614 6036 KRB
1579 2615 5613 JMP I RKR B
1580

```

```

/SKIP IF FLAG IS SET
/INC RETURN ADR
/RETURN
/CLEAR FLAG
/RETURN
/READ BUFFER (STATIC)
/RETURN
/CLEAR AC, READ BUFFER & CLEAR FLAG
/RETURN

```

```

1581 2616 0000 RTSF, 0
1582 2617 6041 TSP
1583 2620 7410 SKP
1584 2621 2216 ISZ RTSF
1585 2622 5616 JMP I RTSF
1586
1587 2623 0000 RTCF, 0
1588 2624 6042 TCF
1589 2625 5623 JMP I RTCF
1590
1591 2626 0000 RTPC, 0
1592 2627 6044 TPC
1593 2630 5626 JMP I RTPC
1594
1595 2631 0000 RTLS, 0
1596 2632 6046 TLS
1597 2633 5631 JMP I RTLS
1598 /PRINTER INSTRUCTIONS
1599
1600 2634 0000 RPSKF, 0
1601 2635 4777 JMS OP1CHK
1602 2636 2643 OPDBST
1603 2637 6661 PSKF
1604 2640 7410 SKP
1605 2641 2234 ISZ RPSKF
1606 2642 5634 JMP I RPSKF
1607 2643 6570 OPDBST, DBST
1608 2644 5634 JMP I RPSKF
1609 2645 5241 JMP =-4
1610
1611 2646 0000 RPCLF, 0
1612 2647 4777 JMS OP1CHK
1613 2650 2653 OP1CLF
1614 2651 6662 PCLF
1615 2652 5646 JMP I RPCLF
1616 2653 6570 OP1CLF, DBST
1617 2654 5646 JMP I RPCLF
1618 2655 5646 JMP I RPCLF
1619
1620 2656 0000 RPSTB, 0
1621 2657 4777 JMS OP1CHK
1622 2660 2663 OPL0D1
1623 2661 6664 PSTB
1624 2662 5656 JMP I RPSTB
1625 2663 7040 OPL0D1, CMA
1626 2664 6574 DBTD
1627 2665 7040 CMA
1628 2666 6577 DBSS
1629 2667 5656 JMP I RPSTB
1630
1631 2670 0000 RPSIE, 0
1632 2671 4777 JMS OP1CHK
1633 2672 2675 OPSIE
1634 2673 6665 PSIE
1635 2674 5670 JMP I RPSIE

```

```

/SKIP IF FLAG IS SET
/INC RETURN ADR
/RETURN
/CLEAR FLAG
/RETURN
/LOAD BUFFER
/RETURN
/PRINT CHAR
/RETURN
/GO CHECK TO SEE IF RUNNING ON PAR I/O
/ON PARALLEL I/O
/SKIP ON CHARACTER FLAG
/INCREMENT RETURN ADDRESS FOR SKIP
/RETURN
/SKIP ON DATA ACCEPTED AND CLEAR IT
/FLAG NOT SET RETURN
/BUMP RETURN AND THEN RETURN
/GO CHECK FOR PARALLEL I/O
/ADDRESS FOR PARALLEL I/O ROUTINE
/CLEAR CHARACTER FLAG
/RETURN
/SKIP ON DATA ACCEPTED AND CLEAR IT
/RETURN FLAG WAS NOT SET
/RETURN FLAG IS NOW A ZERO
/GO CHECK FOR PARALLEL I/O
/ADDRESS FOR PARALLEL I/O ROUTINE
/LOAD BUFFER
/RETURN TO PROGRAM
/NEGATE THE WORD FOR PARALLEL I/O
/LOAD THE 12 BIT PARALLEL I/O
/RESET THE WORD TO ORIGINAL WORD
/ISSUE A DATA STROBE PULSE
/RETURN TO PROGRAM
/GO CHECK FOR PARALLEL I/O
/ADDRESS FOR PARALLEL I/O ROUTINE
/ENABLE INTERRUPTS
/RETURN

```

```

/MAINDEC-00-DILAC-B-L PAL10 V142A 20-DEC-76 9:16 PAGE 1-30
1636 2675 7440 OPSCIE, SZA /CHECK DATA BIT 11
1637 2676 6575 DASE /SET DATA BIT 11
1638 2677 7450 SNA
1639 2700 6576 DRCE /CLEAR PARALLEL I/O INT ENA
1640 2701 5670 JMP I RPSIE /RETURN TO THE PROGRAM
1641
1642 2702 0000 RPCLP, 0
1643 2703 4777 JMS OP1CHK /GO CHECK FOR PARALLEL I/O
1644 2704 2707 OPLD2 /ADDRESS FOR PARALLEL I/O ROUTINE
1645 2705 6666 PCLP /CLEAR FLAG AND LOAD BUFFER
1646 2706 5702 JMP I RPCLP /RETURN TO THE PROGRAM
1647 2707 6570 OPLD2, DBST /SKIP ON DATA ACCEPTED AND CLEAR IT
1648 2710 7000 NOP /USED INCASE FLAG WAS SET
1649 2711 7040 CMA /NEGATE THE WORD TO LOAD FOR PAR I/O
1650 2712 6574 DBTD /LOAD THE PARALLEL I/O BUFFER
1651 2713 7040 CMA /RESET THE WORD BACK TO ORIGINAL WORD
1652 2714 6577 DBSS /ISSUE A DATA STROBE
1653 2715 5702 JMP I RPCLP /RETURN BACK TO PROGRAM
1654
1655 /ROUTINE TO MODIFY I-O INSTRUCTIONS FOR SELECTED IOT CODES
1656 /ON CONSOLE TERMINAL & LA100 PRINTER
1657
1658 2716 0000 MIOT, 0
1659 2717 7300 CLA CLL /CLEAR
1660 2720 1156 TAD M4 /SET LOOP COUNT
1661 2721 3034 DCA COUNT
1662 2722 1376 TAD (IOTAB-1) /SET TABLE POINTER
1663 2723 3010 DCA AUIPTR
1664 2724 1030 TAD IOTSEL /GET IOT SELECTION
1665 2725 0172 AND M100 /MASK XMIT IOT
1666 2726 7110 CLL RAR
1667 2727 7112 CLL RTR
1668 2730 3033 MIOTB, DCA SAVE /STORE IOT
1669 2731 1410 MIOTA, TAD I AUIPTR /GET TABLE ENTRY
1670 2732 7450 SNA /DONE TTY IOT'S?
1671 2733 5350 JMP MIOTC /YES, DO PRINTER
1672 2734 3041 DCA TABPTR /NO, STORE INSTR ADR
1673 2735 1441 TAD I TABPTR /GET INSTR
1674 2736 0375 AND (7007) /MASK INSTR CODE
1675 2737 1033 TAD SAVE /ADD IOT
1676 2740 3441 DCA I TABPTR /STORE NEW IO INSTR
1677 2741 2034 ISZ COUNT /INC COUNT
1678 2742 5331 JMP MIOTA /CONTINUE THIS IOT
1679 2743 1030 TAD IOTSEL /GET IOT SELECTION
1680 2744 0142 AND P77 /MASK RCVR IOT
1681 2745 7106 CLL RTL
1682 2746 7104 CLL RAL
1683 2747 5330 JMP MIOTB /CONTINUE
1684 2750 1410 MIOTC, TAD I AUIPTR /GET TABLE ENTRY
1685 2751 7450 SNA /DONE?
1686 2752 5716 JMP I MIOT /YES, RETURN
1687 2753 3041 DCA TABPTR /NO, STORE INSTR ADR
1688 2754 1441 TAD I TABPTR /GET INSTR
1689 2755 0375 AND (7007) /MASK INSTR CODE
1690 2756 1027 TAD PTRIOT /ADD IOT

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/MAINDEC-00-DILAC-B-L PAL10 V142A 20-DEC-76 9:16 PAGE 1-31
1691 2757 3441 DCA I TABPTR /STORE NEW INSTR
1692 2760 5350 JMP MIOTC /CONTINUE
1693
1694 2775 7007
1695 2776 4534
1696 2777 3142
1697 3000
1698
1699
1700
1701 3000 6133 CKSRV, CLSK /SKIP ON CLOCK FLAG
1702 3001 5213 JMP CKEXIT /RETURN IF NOT CLOCK INTERRUPT
1703 3002 2037 ISZ CKCNT /INC CLOCK COUNT
1704 3003 5213 JMP CKEXIT /RETURN IF COUNT IS NOT ZERO
1705 3004 2036 ISZ LPCNT /INC TIME COUNT
1706 3005 7410 SRP /CONTINUE IF NOT ZERO
1707 3006 5615 JMP I CKSTOP /END OF TIME - PRINT TIMING MESSG
1708 3007 3216 DCA ISAVE /SAVE AC
1709 3010 1054 TAD CKFLAG /RESET CLOCK COUNT
1710 3011 3037 DCA CKCNT
1711 3012 1216 TAD ISAVE /RESTORE AC
1712 3013 6001 CKEXIT, ION /INTERRUPT SYSTEM ON
1713 3014 5400 JMP I 0000 /RETURN TO TEST
1714
1715 3015 1110 CKSTOP, T2SPDC /RETURN ADR - PRINT TIMING MESSG
1716 3016 0000 ISAVE, 0 /SAVE AC
1717
1718 /TEST EXIT ROUTINE
1719
1720 3017 4507 REXIT, JMS I TKBFG /CHECK FOR KYBD FLAG
1721 3020 4521 GETSW /GET SW REG
1722 3021 0152 AND P1000 /MASK SW2
1723 3022 7640 SZA CLA /LOOP ON TEST?
1724 3023 5237 JMP EXIT3 /YES, RETURN TO TEST
1725 3024 4521 GETSW /GET SW REG
1726 3025 0151 AND P400 /MASK SW3
1727 3026 7640 SZA CLA /WANT SW REG CONTROL?
1728 3027 5467 JMP I TSELCT /YES, SELECT TEST HALT
1729 3030 1052 TAD TLOOP /KYBD CNTRL - LOOP ON TEST?
1730 3031 7640 SZA CLA
1731 3032 5237 JMP EXIT3 /YES, RETURN TO TEST
1732 3033 1051 TAD TRONE /KYBD CNTRL - RUN TEST ONCE?
1733 3034 7640 SZA CLA
1734 3035 5510 JMP I TSEL /YES, SELECT TEST
1735 3036 2023 ISZ TSTNM /INC TEST NUMBER
1736 3037 1070 TAD TTAT /GET TABLE ADR
1737 3040 1023 TAD TSTNM /ADD TEST NUMBER
1738 3041 3041 DCA TABPTR /STORE POINTER
1739 3042 1441 TAD I TABPTR /GET TEST ADR
1740 3043 7550 SNA SPA /SKIP IF OK
1741 3044 5247 JMP EXIT2 /CHECK IF NOT OK
1742 3045 3042 DCA TSTPTR /STORE ADR
1743 3046 5442 JMP I TSTPTR /GO TO TEST
1744 3047 7700 EXIT2, SZA CLA /-1 IN TABLE?

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1745 3050 5236 JMP EXIT1 /NO, INC TEST #
1746 3051 1377 TAD (20) /RESTART PRINTING TEST SEQUENCE
1747 3052 3023 DCA TSTNM
1748 3053 5237 JMP EXIT3

/SELECT TEST FROM CPU SW REG BITS 06-11
1750
1751
1752 3054 6002 SELECT, IOF /DISABLE INTERRUPTS
1753 3055 6132 CLDI
1754 3056 7300 CLA CLL
1755 3057 4505 JMS I TPSIE
1756 3060 3050 DCA STRONE /CLEAR CONTROL FLAGS
1757 3061 3051 DCA TRONE
1758 3062 3052 DCA TLOOP
1759 3063 1125 TAD LIERR /RESET INTERRUPT ERROR
1760 3064 3002 DCA ISRV
1761 3065 4507 JMS I TKBFG /CHECK IF KYBD FLAG
1762 3066 7402 HLT /WAIT FOR OPERATOR TO SELECT TEST
/PRESS CONTINUE WHEN READY
1763
1764 3067 4521 GETSW /GET SW REG
1765 3070 0151 AND P400 /MASK SW3
1766 3071 7640 SEA CLA /WANT TO RUN TEST ONCE & HALT?
1767 3072 7040 CMA /YES, SET FLAG
1768 3073 3050 DCA STRONE /STORE FLAG
1769 3074 4521 GETSW /GET SW REG
1770 3075 0142 AND P77 /SAVE TEST #
1771 3076 3023 DCA TSTNM /STORE TEST #
1772 3077 1070 TAD TTAT /GET TABLE ADDRESS
1773 3100 1023 TAD TSTNM /ADD TEST NUMBER
1774 3101 3041 DCA TABPTR /STORE POINTER
1775 3102 1441 TAD I TABPTR /GET TEST ADR
1776 3103 7550 SNA SPA /CHECK IT - OK?
1777 3104 5254 JMP SELECT /NO, GET NEW SELECTION
1778 3105 3042 DCA TSTPTR /OK, STORE ADR
1779 3106 5442 JMP I TSTPTR /GO TO TEST

/ROUTINE TO CHECK FOR KYBD OR SW REG CONTROL
1780
1781 /CALL: CHECK = JMS I TCHECK
1782
1783
1784 3107 0000 RCHECK, 0
1785 3110 3033 DCA SAVE /SAVE AC
1786 3111 4507 JMS I TKBFG /CHECK FOR KYBD FLAG
1787 3112 4521 GETSW /GET SW REG
1788 3113 0151 AND P400 /MASK SW3
1789 3114 7640 SEA CLA /SW3 UP?
1790 3115 7001 IAC /YES, SET AC # +1
1791 3116 1050 TAD STRONE /ADD ONE RUN FLAG
1792 3117 7640 SEA CLA /CHANGE IN SWITCH SETTING?
1793 3120 5467 JMP I TSELCT /YES, SELECT TEST
1794 3121 1033 TAD SAVE /RESTORE AC
1795 3122 5707 JMP I RCHECK /NO, RETURN

/ROUTINE TO WAIT FOR OPERATOR ACTION
1796
1797
1798
1799

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1800 3123 0000 RHOLD, 0
1801 3124 3341 DCA HOLDCH /SAVE AC
1802 3125 1053 TAD TPFLG /GET TERMINAL THERE?
1803 3126 7650 SNA CLA /BRANCH IF YES
1804 3127 5336 JMP RHOLDA /HALT IF NO TERMINAL
1805 3130 4455 TYPE /TYPE WAIT MESS
1806 3131 4777 WTMMSG
1807 3132 1341 TAD HOLDCH /RESTORE AC
1808 3133 4472 JMS I TKSF /WAIT FOR KYBD FLAG
1809 3134 5333 JMP ,=1
1810 3135 5723 JMP I RHOLD /RETURN
1811 3136 1341 RHOLDA, TAD HOLDCH /RESTORE AC
1812 3137 7402 HLT /HALT
1813 3140 5723 JMP I RHOLD /RETURN
1814
1815 3141 0000 HOLDCH, 0 /SAVE AC
1816
1817 /ROUTINE TO CHECK FOR PARALLEL I/O
1818
1819 3142 0000 OP1CHK, 0
1820 3143 3356 DCA SAVEAC /SAVE THE ENTERING AC
1821 3144 1021 TAD PARAM /GET HARDWARE WORD 1
1822 3145 7004 RAL /PUT OPTION 1 BIT INTO BIT 0
1823 3146 7710 SPA CLA /IS LA100 RUNNING ON PARALLEL I/O
1824 3147 5353 JMP ,+4 /YES-GO GET ADDRESS FOR PARALLEL I/O
1825 3150 2342 ISZ OP1CHK /BUMP RETURN POINTER
1826 3151 1356 TAD SAVEAC /RESTORE THE AC
1827 3152 5742 JMP I OP1CHK /RETURN TO IOT SUBROUTINE
1828 3153 1742 TAD I OP1CHK /GET ADDRESS OF PARALLEL I/O
1829 3154 3342 DCA OP1CHK /SAVE IT FOR RETURN
1830 3155 5351 JMP ,=4 /RETURN TO EXECUTE PARALLEL I/O CODE
1831
1832 3156 0000 SAVEAC, 0
1833
1834 3177 0020 PAGE
1835 3200
/ROUTINE TO CHECK FOR KYBD FLAG
1836 /WHEN LOOKING FOR CONTROL FROM THE CONSOLE DEVICE KEYBOARD
1837 /ALSO CHECKS FOR DYNAMIC SOFTWARE SWITCH REGISTER CONTROL WHEN
1838 /USING SOFTWARE SWITCHES
1839
1840
1841 3200 0000 KYBDF, 0
1842 3201 7300 CLA CLL /CLEAR
1843 3202 1053 TAD TPFLG /GET TERMINAL FLAG
1844 3203 7650 SNA CLA /TERMINAL THERE?
1845 3204 5600 JMP I KYBDF /NO, RETURN
1846 3205 4472 JMS I TKSF /KYBD FLAG SET?
1847 3206 5600 JMP I KYBDF /NO, RETURN
1848 3207 4475 JMS I TKRB /YES, READ CHAR
1849 3210 0145 AND P177 /MASK BIT 0
1850 3211 3324 DCA KYBDC /SAVE CHAR
1851 3212 1021 TAD PARAM /USING SOFTWARE SWITCH REG?
1852 3213 7710 SPA CLA
1853 3214 5313 JMP KFA /NO, CONTINUE

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1854	3215	1324	TAD	KYBDC	/YES, GET CHAR
1855	3216	1157	TAD	M7	/CHAR = BEL <007> ?
1856	3217	7640	SZA CLA		
1857	3220	5313	JMP	KFA	/NO, CHECK CHAR AGAIN FOR OTHER CONTROLS
1858	3221	7300	CLA CLL		/CLEAR AC AND LINK
1859	3222	3325	DCA	TTYIN	/CLEAR NEW SWITCH SETTINGS
1860	3223	3326	DCA	INFLAG	/CLEAR INPUT FLAG
1861	3224	4455	TYPE		/TYPE MESH
1862	3225	4766	DSMSG1		
1863	3226	1020	TAD	SWITCH	/GET CURRENT SOFTWARE SWITCH SETTING
1864	3227	4523	JMS I	TPOCT	/TYPE IT
1865	3230	4455	TYPE		/TYPE REST OF MESH
1866	3231	4772	DSMSG2		
1867	3232	4472	JMS I	TKSF	/KYBD FLAG?
1868	3233	5232	JMP	,=1	/NO, WAIT
1869	3234	4475	JMS I	TKRB	/YES, READ CHAR
1870	3235	0145	AND	P177	/MASK CHAR - MAKE 7-BIT ASCII
1871	3236	3324	DCA	KYBDC	/SAVE CHAR
1872	3237	1164	TAD	M25	/CHECK CHAR
1873	3240	1324	TAD	KYBDC	
1874	3241	7640	SZA CLA		/CHAR = CONTROL-U
1875	3242	5246	JMP	KFC	/NO, CHECK AGAIN
1876	3243	4455	TYPE		/YES, TYPE CONTROL-U, CR-LF
1877	3244	5445	CNTLU		
1878	3245	5221	JMP	KFB	/RESTART ROUTINE
1879	3246	1161	TAD	M15	/CHECK IF CHAR = CR?
1880	3247	1324	TAD	KYBDC	
1881	3250	7640	SZA CLA		/CHAR = CR?
1882	3251	5262	JMP	KFD	/NO, CHECK AGAIN
1883	3252	4455	TYPE		/YES, ECHO CR-LF
1884	3253	5441	CRLF		
1885	3254	1326	TAD	INFLAG	/CHECK INPUT FLAG
1886	3255	7650	SNA CLA		
1887	3256	5600	JMP I	KYBDF	/LEAVE SW SETTINGS ALONE IF NO INPUT
1888	3257	1325	TAD	TTYIN	/SET NEW SWITCH SETTINGS
1889	3260	3020	DCA	SWITCH	
1890	3261	5600	JMP I	KYBDF	/RETURN TO TEST
1891	3262	1160	TAD	M12	/CHECK IF CHAR = LF
1892	3263	1324	TAD	KYBDC	
1893	3264	7640	SZA CLA		
1894	3265	5276	JMP	KFE	/NO, CHECK AGAIN
1895	3266	4455	TYPE		/YES, ECHO CR-LF
1896	3267	5441	CRLF		
1897	3270	1326	TAD	INFLAG	/CHECK INPUT FLAG
1898	3271	7650	SNA CLA		
1899	3272	5510	JMP I	TTSEL	/LEAVE SW SETTINGS ALONE IF NO INPUT
1900	3273	1325	TAD	TTYIN	/SET NEW SWITCH SETTINGS
1901	3274	3020	DCA	SWITCH	
1902	3275	5510	JMP I	TTSEL	/SELECT TEST
1903	3276	1324	TAD	KYBDC	/GET CHAR
1904	3277	4522	JMS I	PDIGIT	/PRINT OCTAL DIGIT ALWAYS AS BEING STORED
1905	3300	1324	TAD	KYBDC	/GET CHAR AGAIN
1906	3301	0127	AND	P7	/MASK OCTAL DIGIT FROM ASCII CODE
1907	3302	3324	DCA	KYBDC	/SAVE IT
1908	3303	1325	TAD	TTYIN	/GET CURRENT SWITCH SETTING

1909	3304	7104	CLL RAL		/ROTATE SWITCH SETTINGS TO ADD NEW ONE
1910	3305	7104	CLL RAL		
1911	3306	7104	CLL RAL		
1912	3307	1324	TAD	KYBDC	/ADD NEW SWITCHES
1913	3310	3325	DCA	TTYIN	/SAVE NEW SETTING
1914	3311	2326	ISZ	INFLAG	/SET INPUT FLAG
1915	3312	5232	JMP	KFF	/CONTINUE
1916	3313	1324	TAD	KYBDC	/GET CHAR AGAIN
1917	3314	1174	TAD	M177	/CHAR = RUBOUT?
1918	3315	7650	SNA CLA		
1919	3316	5510	JMP I	TTSEL	/YES, GET TEST SELECTION
1920	3317	1324	TAD	KYBDC	/NO, GET CHAR AGAIN
1921	3320	1155	TAD	M3	/CHAR = CNTL C ?
1922	3321	7650	SNA CLA		
1923	3322	5466	JMP I	TKBDST	/YES, GET # COLUMNS
1924	3323	5600	JMP I	KYBDF	/NO, RETURN
1925					
1926	3324	0000	KYBDC,	0	/INPUT CHAR
1927	3325	0000	TTYIN,	0	/SOFTWARE SWITCH INPUT
1928	3326	0000	INFLAG,	0	/INPUT FLAG
1929		3400	PAGE		
1930					
1931					
1932	3400	4451	KBTAB,	READQ	/INPUT ERROR
1933	3401	3422	KYBDAA		/3 DIGIT # INPUT
1934	3402	3433	KYBDA		/2 DIGIT # INPUT
1935	3403	3447	KYBDB		/1 DIGIT # INPUT
1936	3404	4451	READQ		/INPUT ERROR
1937					
1938					
1939					
1940					
1941	3405	4455	KYBDST,	TYPE	/TYPE COLUMNS MESH
1942	3406	4746	COLUMN		
1943	3407	3026	DCA	WIDTH	/CLEAR COLUMN COUNT
1944	3410	4511	JMS I	READ	/READ # COLUMNS
1945	3411	1377	TAD	(READT-1	/GET TABLE ADR
1946	3412	3010	DCA	AUTPTR	/SET TABLE POINTER
1947	3413	1034	TAD	COUNT	/GET CHAR COUNT FROM INPUT ROUTINE
1948	3414	7041	CIA		/MAKE IT POSITIVE
1949	3415	1376	TAD	(KBTAB	/ADD TABLE STARTING ADR
1950	3416	3033	DCA	SAVE	/SAVE TABLE ENTRY ADR
1951	3417	1433	TAD I	SAVE	/GET TABLE ENTRY
1952	3420	3033	DCA	SAVE	/SAVE ADR FOR CONVERSION ROUTINE
1953	3421	5433	JMP I	SAVE	/CONVERT INPUT NUMBER TO BINARY (OCTAL)
1954	3422	1410	KYBDAA,	TAD I	AUTPTR
1955	3423	4514	JMS I	CHKNR	/CHECK IF NUMBER & MAKE OCTAL
1956	3424	7450	SNA		/ZERO?
1957	3425	5233	JMP	KYBDA	/YES, CONTINUE
1958	3426	7041	CIA		/NEGATE #
1959	3427	3034	DCA	COUNT	/STORE IN COUNT
1960	3430	1173	TAD	M144	/CONVERT TO BINARY
1961	3431	2034	ISZ	COUNT	
1962	3432	5230	JMP	,=2	
1963	3433	3026	KYBDA,	DCA	WIDTH
					/STORE #

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/MAINDEC-08-DILAC-B-L PAL10 V142A 20-DEC-76 9116 PAGE 1-36
1964 3434 1410 TAD I AUTPTR /GET NEXT DIGIT
1965 3435 4514 JMS I CHKNR /CHECK IF #
1966 3436 7450 SNA SNA /ZERO?
1967 3437 5247 JMP KYBDB /YES, CONTINUE
1968 3440 7041 CIA CIA /NEGATE #
1969 3441 3034 DCA COUNT /STORE IN COUNT
1970 3442 1160 TAD M12 /CONVERT TO BINARY
1971 3443 2034 ISZ COUNT
1972 3444 5242 JMP *-2
1973 3445 1026 TAD WIDTH /ADD TO CURRENT TOTAL
1974 3446 3026 DCA WIDTH /STORE NEW #
1975 3447 1410 KYBDB, TAD I AUTPTR /GET LAST DIGIT
1976 3450 4514 JMS I CHKNR /CHECK IF #
1977 3451 7041 CIA CIA /NEGATE IT
1978 3452 1026 TAD WIDTH /ADD TO CURRENT TOTAL
1979 3453 3026 DCA WIDTH /STORE WIDTH
1980 3454 1126 TAD P2 /CHECK COLUMN SELECTION
1981 3455 1026 TAD WIDTH
1982 3456 7740 SMA SEA CLA /# COLUMNS <2?
1983 3457 5512 JMP I TREADQ /YES, INPUT ERROR
1984 3460 1147 TAD P204
1985 3461 1026 TAD WIDTH /# COLUMNS >132 (10)?
1986 3462 7710 SPA CLA /YES, INPUT ERROR
1987 3463 5512 JMP I TREADQ /NO, GO TO TEST SELECT
1988 3464 5310 JMP I TTSEL

/ROUTINE TO SELECT TEST FROM CONSOLE DEVICE KYBD
/AND DETERMINE TEST ACTION BY INPUT CONTROL CHAR
/TEST NUMBER MUST BE A 3 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

1999 3465 6002 TSEL, IOF /DISABLE INTERRUPTS
2000 3466 6132 CLDI
2001 3467 7300 CLA CLL
2002 3470 4505 JMS I TPSIE
2003 3471 3051 DCA TRONE /CLEAR PROGRAM CONTROL FLAGS
2004 3472 3052 DCA TLOOP
2005 3473 3050 DCA STRONE
2006 3474 1125 TAD LIERR /SET INTERRUPT ERROR ADR
2007 3475 3002 DCA ISRV
2008 3476 4455 TYPE /TYPE SELECT TEXT MESS
2009 3477 4755 SELTST
2010 3500 4511 JMS I READ /GET SELECTION
2011 3501 1524 TAD I LREADT /FIRST CHAR = CONTROL-C ?
2012 3502 1155 TAD M3
2013 3503 7650 SNA CLA
2014 3504 5466 JMP I TKBDST /YES, GET # COLUMNS
2015 3505 2034 ISZ COUNT /CORRECT # CHAR'S INPUT?
2016 3506 5512 JMP I TREADQ /NO, INPUT ERROR
2017 3507 1377 TAD (READT-1) /GET TABLE ADR
2018 3510 3010 DCA AUTPTR /SET POINTER

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/MAINDEC-08-DILAC-B-L PAL10 V142A 20-DEC-76 9116 PAGE 1-37
2019 3511 1410 TAD I AUTPTR /GET FIRST DIGIT
2020 3512 4513 JMS I CHKOCT /CHECK IF OCTAL
2021 3513 7106 CLL RTL /SHIFT TO CORRECT POSITION
2022 3514 7104 CLL RAL
2023 3515 3023 DCA TSTNM /STORE
2024 3516 1410 TAD I AUTPTR /GET SECOND DIGIT
2025 3517 4513 JMS I CHKOCT /CHECK & MAKE OCTAL
2026 3520 1023 TAD TSTNM /ADD TO CURRENT #
2027 3521 3023 DCA TSTNM /STORE SELECTED TEST #
2028 3522 1070 TAD TTAT /GET TEST ADR TABLE ADR
2029 3523 1023 TAD TSTNM /ADD TEST #
2030 3524 3041 DCA TABPTR /STORE POINTER
2031 3525 1441 TAD I TABPTR /GET TEST ADR
2032 3526 7550 SNA SPA /TEST IN TABLE?
2033 3527 5512 JMP I TREADQ /NO = INVALID TEST #
2034 3530 3042 DCA TSTPTR /YES, STORE TEST ADR
2035 3531 1410 TAD I AUTPTR /GET CONTROL CHAR
2036 3532 3033 DCA SAVE /SAVE CONTROL CHAR
2037 3533 1171 TAD M56 /CHECK IF PERIOD
2038 3534 1033 TAD SAVE
2039 3535 7640 SEA CLA /PERIOD?
2040 3536 5342 JMP TSEL1 /NO, CONTINUE
2041 3537 7240 CLA CMA /YES, SET ONE-RUN FLAG
2042 3540 3051 DCA TRONE
2043 3541 5355 JMP TSELX /GO TO TEST
2044
2045 3542 1033 TSEL1, TAD SAVE /GET CHAR
2046 3543 0375 AND (137 /ALLOW LOWER CASE
2047 3544 1374 TAD (-114 /CHECK CHAR
2048 3545 7440 SEA /CHAR=LF?
2049 3546 5352 JMP TSEL2 /NO, CONTINUE
2050 3547 7240 CLA CMA /YES, SET LOOP ON TEST FLAG
2051 3550 3052 DCA TLOOP
2052 3551 5355 JMP TSELX /GO TO TEST
2053 3552 1157 TSEL2, TAD M7 /CHECK CHAR
2054 3553 7640 SEA CLA /CHAR=?
2055 3554 5512 JMP I TREADQ /INVALID INPUT, READ AGAIN
2056 3555 4455 TSELX, TYPE /YES, TYP CR-LF AND GO TO TEST
2057 3556 5441 CRLF
2058 3557 5442 JMP I TSTPTR
2059
2060 3574 7664
2061 3575 0137
2062 3576 3400
2063 3577 4503
PAGE
2064
2065 /ERROR ROUTINE, ERROR MESS IS IN FORM:
2066 /
2067 /TEST #XX, PC=XXXX, ERROR #XXXX, MESSAGE>>>>>>
2068
2069 ERROR, #
2070 CLA CMA /GET ERROR PC
2071 TAD ERROR
2072 DCA ERRPC /SAVE IT

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/MAINDEC-08-DILAC-B-L PAL10 V142A 20-DEC-76 9116 PAGE 1-38

2073 3604 1600 TAD I REPROR /GET ERROR NUMBER
2074 3605 3024 DCA ERRNM /SAVE IT
2075 3606 4521 GETSW /GET SW REG
2076 3607 7004 RAL /GET SW 1
2077 3610 7710 SPA CLA /WANT ERROR MESSG?
2078 3611 5250 JMP IERRT /NO, SKIP PRINT OUT
2079 3612 1053 TAD TPFLG /CHECK IF TERMINAL EXISTS
2080 3613 7650 SNA CLA /NO, SKIP PRINT OUT
2081 3614 5250 JMP IERRT /PRINT FIRST PART OF MESSG
2082 3615 4455 TYPE
2083 3616 5036 ETSTNO
2084 3617 1023 TAD TSTNM /GET TEST #
2085 3620 7012 RTR /GET FIRST DIGIT
2086 3621 7010 RAR
2087 3622 4522 JMS I PDIGIT /PRINT IT
2088 3623 1023 TAD TSTNM /GET TEST #
2089 3624 4522 JMS I PDIGIT /PRINT SECOND DIGIT
2090 3625 4455 TYPE /TYPE MORE OF MESSG
2091 3626 5043 PCNSG
2092 3627 1025 TAD ERRPC /GET ERROR PC
2093 3630 4523 JMS I TPOCT /PRINT IT
2094 3631 4455 TYPE /TYPE MORE OF MESSG
2095 3632 5047 ERR
2096 3633 1024 TAD ERRNM /GET ERROR #
2097 3634 4523 JMS I TPOCT /TYPE IT
2098 3635 4455 TYPE /TYPE SPACES
2099 3636 5055 ERRS
2100 3637 1377 TAD (ENAT-1 /GET ERROR MESSG ADR TABLE
2101 3640 1024 TAD ERRNM /ADD ERROR #
2102 3641 3245 DCA RSAVE /STORE POINTER
2103 3642 1645 TAD I RSAVE /GET MESSG ADR
2104 3643 3245 DCA RSAVE /SET FOR TYPE
2105 3644 4455 TYPE /TYPE END OF MESSG
2106 3645 0000 RSAVE, 0
2107 3646 4455 TYPE /TYPE CR-LF
2108 3647 5441 CRLF
2109 3650 4521 IERRT, GETSW /GET SW REG
2110 3651 7700 SMA CLA /STOP ON ERROR?
2111 3652 5255 JMP ,+3 /NO, RETURN
2112 3653 1024 TAD ERRNM /YES, GET ERROR #
2113 3654 4457 HOLD /STOP
2114 3655 2200 ISZ RERROR /SET RETURN ADR
2115 3656 7300 CLA CLL /CLEAR AC AND LINK
2116 3657 5600 JMP I RERROR /RETURN
2117
2118 /ROUTINE TO PRINT AN OCTAL DIGIT ON THE CONSOLE DEVICE
2119
2120 3660 0000 RPDIGT, 0
2121 3661 0127 AND P7 /MASK DIGIT
2122 3662 1140 TAD P60 /MAKE ASCII
2123 3663 4515 JMS I GOUT /PRINT IT
2124 3664 5660 JMP I RPDIGT /RETURN
2125
2126 /ROUTINE TO CONVERT 4 DIGIT OCTAL NUMBER TO ASCII AND TYPE ON CONSOLE
2127

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/MAINDEC-08-DILAC-B-L PAL10 V142A 20-DEC-76 9116 PAGE 1-39

2128
2129 3665 0000 POCT, 0
2130 3666 3312 DCA OCTSAV /SAVE NUMBER
2131 3667 1312 TAD OCTSAV /GET NUMBER AGAIN
2132 3670 7012 RTR /GET FIRST DIGIT
2133 3671 7012 RTR
2134 3672 7012 RTR
2135 3673 7012 RTR
2136 3674 7010 RAR
2137 3675 4522 JMS I PDIGIT /PRINT IT
2138 3676 1312 TAD OCTSAV /GET NUMBER
2139 3677 7012 RTR /GET SECOND DIGIT
2140 3700 7012 RTR
2141 3701 7012 RTR
2142 3702 4522 JMS I PDIGIT /PRINT IT
2143 3703 1312 TAD OCTSAV /GET NUMBER
2144 3704 7012 RTR /GET THIRD DIGIT
2145 3705 7010 RAR
2146 3706 4522 JMS I PDIGIT /PRINT IT
2147 3707 1312 TAD OCTSAV /GET NUMBER
2148 3710 4522 JMS I PDIGIT /PRINT LAST DIGIT
2149 3711 5665 JMP I POCT /RETURN
2150
2151 3712 0000 OCTSAV, 0
2152
2153 /ROUTINE TO CONVERT OCTAL NUMBER TO 3 DIGIT DECIMAL NUMBER IN ASCII STRING
2154 /RETURN WITH CONVERT NUMBER STRING IN CNVMSG,
2155
2156 3713 0000 CNVRT, 0
2157 3714 3361 DCA CNVNM /SAVE NUMBER
2158 3715 3046 DCA HUNDS /CLEAR CONVERSION COUNTERS
2159 3716 3045 DCA TENS
2160 3717 3044 DCA ONES
2161 3720 1361 TAD CNVNM /GET NUMBER
2162 3721 2046 ISZ HUNDS /GET HUNDREDS DIGIT
2163 3722 1173 TAD M144
2164 3723 7500 SMA
2165 3724 5321 JMP ,=3
2166 3725 1376 TAD (144
2167 3726 2045 ISZ TENS /GET TENS DIGIT
2168 3727 1160 TAD M12
2169 3730 7500 SMA
2170 3731 5326 JMP ,=3
2171 3732 3044 DCA ONES /STORE ONES DIGIT -12
2172 3733 1375 TAD (CNVMSG /SET MESSG ADR
2173 3734 3362 DCA MSGPTR
2174 3735 1046 TAD HUNDS /GET HUNDREDS DIGIT
2175 3736 1137 TAD P57 /MAKE ASCII
2176 3737 7006 RTL /SET FIRST CHAR
2177 3740 7006 RTL
2178 3741 7006 RTL
2179 3742 0172 AND M100 /MASK OTHER BITS
2180 3743 3762 DCA I MSGPTR /STORE CHAR IN MESSG
2181 3744 1045 TAD TENS /GET TENS DIGIT
2182 3745 1137 TAD P57 /MAKE ASCII

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2183	3746	1762	TAD I	MSGPTR	/ADD FIRST CHAR
2184	3747	3762	DCA I	MSGPTR	/STORE CHAR PAIR
2185	3750	2362	ISZ	MSGPTR	/INC MESS POINTER
2186	3751	1944	TAD	ONES	/GET ONES DIGIT
2187	3752	1141	TAD	P72	/MAKE ASCII
2188	3753	7006	RTL		/ROTATE TO CORRECT POSITION
2189	3754	7006	RTL		
2190	3755	7006	RTL		
2191	3756	8172	AND	M100	/MASK OTHER BITS (NULL = TERMINATOR)
2192	3757	3762	DCA I	MSGPTR	/STORE CHAR
2193	3760	5713	JMP I	CNVRT	/RETURN
2194					
2195	3761	0000	CNVNM, 0		/SAVE NUMBER
2196	3762	0000	MSGPTR, 0		/MESS POINTER
2197					
2198	3775	5435			
2199	3776	8144			
2200	3777	4677			
		4000			
2201					
2202					
2203					
2204					
2205					
2206					
2207	4000	0000	RTYPE, 0		
2208	4001	7300	CLA CLL		/CLEAR
2209	4002	1053	TAD	TPFLG	/GET TERMINAL FLAG
2210	4003	7640	SZA CLA		/TERMINAL THERE?
2211	4004	5207	JMP	,+3	/YES, CONTINUE
2212	4005	2200	ISZ	RTYPE	/INC RETURN ADR
2213	4006	5600	JMP I	RTYPE	/RETURN
2214	4007	1600	TAD I	RTYPE	/GET MESS ADR
2215	4010	3043	DCA	MSGADR	/STORE
2216	4011	1443	RT1, TAD I	MSGADR	/GET CHAR PAIR
2217	4012	7112	CLL RTR		
2218	4013	7112	CLL RTR		
2219	4014	7112	CLL RTR		
2220	4015	4222	JMS	OUT	/PRINT CHAR
2221	4016	1443	TAD I	MSGADR	/GET CHAR PAIR
2222	4017	4222	JMS	OUT	/PRINT CHAR
2223	4020	2043	ISZ	MSGADR	/ADR NEXT CHAR PAIR
2224	4021	5211	JMP	RT1	/CONTINUE
2225					
2226	4022	0000	OUT, 0		
2227	4023	0142	AND	P77	/MASK CHAR
2228	4024	7450	SNA		/CONTINUE IF NOT END
2229	4025	5205	JMP	RT2	/ZERO, RETURN
2230	4026	3033	DCA	SAVE	/SAVE CHAR
2231	4027	1033	TAD	SAVE	/GET CHAR
2232	4030	1377	TAD	(-53	/CHECK CHAR
2233	4031	7450	SNA		/WANT CR-LF?
2234	4032	5244	JMP	OUTCL	/YES, DO CR-LF
2235	4033	1162	TAD	M20	/CHECK CHAR
2236	4034	7650	SNA CLA		/WANT LF?

2237	4035	5251	JMP	OUTLF	/YES, DO LF
2238	4036	1033	TAD	SAVE	/GET CHAR AGAIN
2239	4037	0134	AND	P40	/MAKE ASCII
2240	4040	7050	SNA CLA		
2241	4041	1143	TAD	P100	
2242	4042	1033	TAD	SAVE	
2243	4043	5253	JMP	OUTCHR	/PRINT CHAR
2244					
2245	4044	7300	OUTCL, CLA CLL		/CLEAR
2246	4045	1132	TAD	P15	/GET CR
2247	4046	4501	JMS I	TTL6	/PRINT
2248	4047	4476	JMS I	TTSF	/WAIT FOR READY
2249	4050	5247	JMP	,-1	
2250	4051	7300	OUTLF, CLA CLL		/CLEAR
2251	4052	1131	TAD	P12	/GET LF
2252	4053	4501	OUTCHR, JMS I	TTL6	/PRINT CHR
2253	4054	4476	JMS I	TTSF	/WAIT FOR READY
2254	4055	5254	JMP	,-1	
2255	4056	7300	CLA CLL		/CLEAR
2256	4057	5622	JMP I	OUT	/RETURN
2257					
2258					
2259					
2260					
2261	4060	0000	RLOAD, 0		
2262	4061	4464	CHECK		/CHECK FOR CONTROL
2263	4062	7300	RLA, CLA CLL		/CHECK READY TIME
2264	4063	3303	DCA	RLDC	
2265	4064	1376	TAD	(-300	
2266	4065	3304	DCA	RLDCC	
2267	4066	2303	ISZ	RLDC	
2268	4067	5275	JMP	RLC	
2269	4070	2304	ISZ	RLDCC	
2270	4071	5275	JMP	RLC	
2271	4072	4463	ERROR		/PRINTER NOT READY
2272	4073	0016	16		
2273	4074	5660	JMP I	RLOAD	/EXIT
2274	4075	4502	JMS I	TPSKF	/CHECK FOR PRINTER READY
2275	4076	5266	JMP	RLB	/WAIT FOR READY
2276	4077	1033	TAD	SAVE	
2277	4100	4506	JMS I	TPCLP	/LOAD CHAR
2278	4101	7300	CLA CLL		/CLEAR AC AND LINK
2279	4102	5660	JMP I	RLOAD	/RETURN
2280					
2281	4103	0000	RLDC, 0		/DELAY COUNT.
2282	4104	0000	RLDCC, 0		
2283					
2284					
2285					
2286					
2287					
2288					
2289					
2290					
2291	4105	0000	RMLOAD, 0		

2292	4106	3033	DCA	SAVE	/SAVE CHAR
2293	4107	1033	TAD	SAVE	/GET CHAR
2294	4110	4456	LOAD		/LOAD CHAR
2295	4111	2034	ISZ	COUNT	/INC COUNT
2296	4112	1034	TAD	COUNT	/CHECK IF WAS ZERO
2297	4113	7710	SPA CLA		/SKIP IF WAS ZERO OR IS ZERO
2298	4114	5307	JMP	RMLOAD+2	/CONTINUE
2299	4115	5705	JMP I	RMLOAD	/RETURN
2300	4176	7500			
2301	4177	7725			
		4200			

PAGE

2302
2303 /ROUTINE TO PRINT ASCII MESSAGES ON THE LA180 PRINTER
2304 /SPECIAL CHARACTERS ARE LISTED AT THE BEGINNING OF THE
2305 /PROGRAM MESSAGE AREA.
2306 /CALL: PRINT - CALL TO SUBROUTINE
2307 / MESAADR = MESSAGE ADDRESS
2308 /RETURN WITH CLEAR AC AND LINK
2309

2310	4200	0000	RPRINT,	0	
2311	4201	7300	CLA	CLL	/CLEAR
2312	4202	1600	TAD I	RPRINT	/GET MESSG ADR
2313	4203	3043	DCA	MSGADR	/STORE
2314	4204	2200	ISZ	RPRINT	/INC RETURN ADR
2315	4205	1443	RP1,	TAD I	MSGADR
2316	4206	7112	CLL	RTR	/GET CHAR PAIR
2317	4207	7112	CLL	RTR	
2318	4210	7112	CLL	RTR	
2319	4211	4216	JMS	PRT	/LOAD CHAR
2320	4212	1443	TAD I	MSGADR	/GET PAIR AGAIN
2321	4213	4216	JMS	PRT	/LOAD CHAR
2322	4214	2043	ISZ	MSGADR	/SET NEXT CHAR ADR
2323	4215	5205	JMP	RP1	/CONTINUE
2324					
2325	4216	0000	PRT,	0	
2326	4217	0142	AND	P77	/MASK CHAR
2327	4220	7450	SNA		/CONTINUE IF NOT END
2328	4221	5600	JMP I	RPRINT	/ZERO, RETURN
2329	4222	3033	DCA	SAVE	/SAVE CHAR
2330	4223	1033	TAD	SAVE	/GET AGAIN
2331	4224	1377	TAD	(=41	/CHECK CHAR
2332	4225	7450	SNA		/WANT FF?
2333	4226	5246	JMP	PRFFF	/YES, DO FF
2334	4227	1160	TAD	M12	/CHECK AGAIN
2335	4230	7450	SNA		/WAND CRLF?
2336	4231	5254	JMP	PRTCL	/YES, DO CRLF
2337	4232	1376	TAD	(=17	/CHECK AGAIN
2338	4233	7450	SNA		/WANT CR ONLY?
2339	4234	5251	JMP	PRTCR	/YES, DO CR
2340	4235	1153	TAD	M1	/CHECK AGAIN
2341	4236	7650	SNA CLA		/WANT LF ONLY?
2342	4237	5257	JMP	PRTLF	/YES, DO LF
2343	4240	1033	TAD	SAVE	/GET CHAR AGAIN
2344	4241	0134	AND	P40	/MAKE ASCII
2345	4242	7650	SNA CLA		

2346	4243	1143	TAD	P100	
2347	4244	1033	TAD	SAVE	
2348	4245	5260	JMP	PRTCHR	/LOAD CHAR
2349					
2350	4246	7300	PRFFF,	CLA CLL	/CLEAR
2351	4247	1375	TAD	(14	/GET FF
2352	4250	5260	JMP	PRTCHR	/GO LOAD FF
2353	4251	7300	PRTCR,	CLA CLL	/CLEAR
2354	4252	1132	TAD	P15	/GET CR
2355	4253	5260	JMP	PRTCHR	/GO LOAD CR
2356	4254	7300	PRTCL,	CLA CLL	/CLEAR
2357	4255	1132	TAD	P15	/GET CR
2358	4256	4456	LOAD		/LOAD CR
2359	4257	1131	PRTLF,	TAD	P12
2360	4260	4456	PRTCHR,	LOAD	/LOAD CHAR
2361	4261	5616	JMP I	PRT	/RETURN
2362					
2363					
2364					
2365					
2366	4262	0000	RPRHDR,	0	
2367	4263	7300	CLA	CLL	/CLEAR
2368	4264	1145	TAD	P177	/SET RUBOUT
2369	4265	4456	LOAD		/CLEAR LA180 CHAR BUFFER
2370	4266	1331	TAD	SVTST	/GET SAVED TEST #
2371	4267	7041	CIA		/NEGATE IT
2372	4270	1023	TAD	TSTNM	/ADD CURRENT TEST #
2373	4271	7650	SNA CLA		/CHECK IF PRINTED THIS # LAST
2374	4272	5326	JMP	HDRX	/YES, PRINT BLANK LINE & EXIT
2375	4273	1023	TAD	TSTNM	/NO, STORE NEW NUMBER
2376	4274	3331	DCA	SVTST	
2377	4275	4461	PRINT		/LOAD TEST # MESSG
2378	4276	5020	TSTNO		
2379	4277	1023	TAD	TSTNM	/GET TEST #
2380	4300	7012	RTR		/GET FIRST DIGIT
2381	4301	7010	RAR		
2382	4302	0127	AND	P7	/MAKE ASCII
2383	4303	1140	TAD	P60	
2384	4304	4456	LOAD		/LOAD IT
2385	4305	1023	TAD	TSTNM	/GET TEST #
2386	4306	0127	AND	P7	/GET LAST DIGIT
2387	4307	1140	TAD	P60	/MAKE ASCII
2388	4310	4456	LOAD		/LOAD IT
2389	4311	4461	PRINT		/PRINT LINE
2390	4312	5440	LF		
2391	4313	1164	TAD	M25	/CHECK IF TEST 25
2392	4314	1023	TAD	TSTNM	
2393	4315	7640	SZA CLA		/IS IT?
2394	4316	5326	JMP	HDRX	/NO, PRINT BLANK LINE & EXIT
2395	4317	1026	TAD	WIDTH	/GET NUMBER OF COLUMNS
2396	4320	7041	CIA		/MAKE POSITIVE
2397	4321	4517	JMS I	TCNVRT	/CONVERT NUMBER TO DECIMAL, ASCII STRING
2398	4322	4461	PRINT		/PRINT IT
2399	4323	5435	CNVMSG		
2400	4324	4461	PRINT		

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2401 4325 5030          COLMN
2402 4326 4461 HDRX,  PRINT      /BLANK LINE
2403 4327 5440          LF
2404 4330 5662          JMP I  RPRHDR      /RETURN
2405
2406 4331 0000 SVTST, 0      /SAVE TEST # FOR CHECK
2407
2408 4375 0014
2409 4376 7761
2410 4377 7737
      4400

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PAGE

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2411 /ROUTINE TO READ 4 CHARS FROM THE CONSOLE KEYBOARD
2412 /
2413 /RUBOUTS DELETE CHARACTERS
2414 /CONTROL-U ("U) RESTARTS INPUT ROUTINE
2415
2416 TREAD, 0
2417 4400 0000 READ0, CLA CLL      /CLEAR
2418 4401 7300 DCA      /CLEAR RUBOUT FLAG
2419 4402 3303 READ1, TAD RFLAG  /SET # CHARS TO READ
2420 4403 1156 TAD M4      /STORE
2421 4404 3034 DCA COUNT  /GET CHAR STORE TABLE ADR
2422 4405 1124 TAD LREADT  /SET POINTER
2423 4406 3041 DCA TABPTR  /KYBD FLAG SET?
2424 4407 4472 READ2, JMS I TRSF  /NO, WAIT
2425 4410 5207 JMP      *-1
2426 4411 4475 JMS I TKRB   /YES, READ CHAR
2427 4412 0145 AND P177    /MAKE ASCII
2428 4413 3441 DCA I TABPTR /SAVE CHAR
2429 4414 1170 TAD M40     /CHECK CHAR
2430 4415 1441 TAD I TABPTR
2431 4416 7650 SNA CLA    /CHAR=SPACE?
2432 4417 5207 JMP READ2   /YES, IGNORE IT
2433 4420 1164 TAD M25    /CHAR = CONTROL-U
2434 4421 1441 TAD I TABPTR
2435 4422 7650 SNA CLA    /YES, TYPE IT AND RESTART
2436 4423 5254 JMP READU   /CHECK CHAR
2437 4424 1174 TAD M177
2438 4425 1441 TAD I TABPTR  /CHAR=RUBOUT?
2439 4426 7650 SNA CLA    /YES, DELETE LAST CHAR
2440 4427 5257 JMP READD   /CHECK FOR CR- END OF INPUT
2441 4430 1161 TAD M15
2442 4431 1441 TAD I TABPTR  /CHAR=CR?
2443 4432 7650 SNA CLA    /YES, RETURN
2444 4433 5600 JMP I TREAD /CHECK RUBOUT FLAG
2445 4434 1303 TAD RFLAG   /RECEIVED RUBOUT?
2446 4435 7650 SNA CLA    /NO, CONTINUE
2447 4436 5241 JMP +3      /GET BACKSLASH
2448 4437 1144 TAD P134   /PRINT IT
2449 4440 4515 JMS I GOUT  /PRINT IT
2450 4441 3303 DCA RFLAG   /CLEAR RUBOUT FLAG
2451 4442 1441 TAD I TABPTR /GET CHAR
2452 4443 4501 JMS I TTLS  /ECHO CHAR
2453 4444 4476 JMS I TTSF
2454 4445 5244 JMP      *-1

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2455 4446 2041 ISZ TABPTR  /INC TABLE POINTER
2456 4447 2034 ISZ COUNT  /INC CHAR COUNT
2457 4450 5207 JMP READ2   /READ CHAR
2458
2459 4451 4455 READQ, TYPE    /TYPE QUESTION MASK
2460 4452 5443 QUES
2461 4453 5201 JMP READ0   /READ NEW STRING
2462 4454 4455 READU, TYPE    /TYPE CONTROL-U
2463 4455 5445 CNTLU
2464 4456 5201 JMP READ0   /RESTART ROUTINE
2465 4457 7240 READD, CLA CMA  /SET AC=-1
2466 4460 1034 TAD COUNT  /ADD COUNT
2467 4461 3034 DCA COUNT  /STORE NEW COUNT
2468 4462 1377 TAD (4     /CHECK CHAR COUNT
2469 4463 1034 TAD COUNT
2470 4464 7710 SPA CLA    /LESS THAN =5?
2471 4465 5203 JMP READ1   /YES, RESTART READ ROUTINE
2472 4466 7240 CLA CMA    /SET AC=-1
2473 4467 1041 TAD TABPTR  /SUBTRACT ONE FROM TABLE POINTER
2474 4470 3041 DCA TABPTR  /STORE NEW POINTER
2475 4471 1303 TAD RFLAG   /CHECK RUBOUT FLAG
2476 4472 7640 SZA CLA    /SET?
2477 4473 5276 JMP +3      /YES, SKIP BACKSLASH
2478 4474 1144 TAD P134   /NO, PRINT BACKSLASH
2479 4475 4515 JMS I GOUT
2480 4476 1441 TAD I TABPTR  /GET DELETED CHAR
2481 4477 4515 JMS I GOUT  /PRINT IT
2482 4500 7240 CLA CMA    /SET RUBOUT FLAG
2483 4501 3303 DCA RFLAG   /CHECK RUBOUT FLAG
2484 4502 5207 JMP READ2   /READ NEXT CHAR
2485
2486 4503 0000 RFLAG, 0
2487
2488 4504 0000 READT, 0
2489 4505 0000 0
2490 4506 0000 0
2491 4507 0000 0
2492
2493 /ROUTINE TO CHECK FOR OCTAL DIGIT INPUT
2494
2495 4510 0000 TCKOUT, 0
2496 4511 4320 JMS TCKNR   /CHECK IF NUMBER FIRST
2497 4512 0130 AND P10     /CHECK IF OCTAL
2498 4513 7640 SZA CLA    /* = 8 OR 9?
2499 4514 5312 JMP I TREADO /YES, INPUT ERROR
2500 4515 1033 TAD SAVE    /OK, GET #
2501 4516 0127 AND P7      /MAKE OCTAL
2502 4517 5710 JMP I TCKOUT /RETURN
2503
2504
2505
2506 /ROUTINE TO CHECK INPUTTED CHAR IF A NUMBER
2507
2508
2509 4520 0000 TCKNR, 0

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2510 4521 3033 DCA SAVE /SAVE CHAR
2511 4522 1376 TAD (-60 /CHECK CHAR
2512 4523 1033 TAD SAVE
2513 4524 7710 SPA CLA /NUMBER?
2514 4525 5512 JMP I TREADQ /NO, INPUT ERROR
2515 4526 1375 TAD (-72 /CHECK AGAIN
2516 4527 1033 TAD SAVE
2517 4530 7700 SMA CLA /NUMBER?
2518 4531 5512 JMP I TREADQ /NO, INPUT ERROR
2519 4532 1033 TAD SAVE /SET CHAR
2520 4533 0374 AND (17 /MASK NOT EQUAL
2521 4534 5720 JMP I TCHKNR /RETURN
2522
2523
2524 4535 2601 IOTAB, RKSP+1 /I=0 INSTRUCTION ADDRESS TABLE
2525 4536 2606 RKCC+1
2526 4537 2611 RKRS+1
2527 4540 2614 RKPB+1
2528 4541 2617 RTSF+1
2529 4542 2624 RTCF+1
2530 4543 2627 RTPC+1
2531 4544 2632 RTLS+1
2532 4545 0000 /END OF TTY IOT'S
2533 4546 2637 RPSKF+3
2534 4547 2651 RPCLF+3
2535 4550 2661 RPSTB+3
2536 4551 2673 RPSIE+3
2537 4552 2705 RPCLP+3
2538 4553 0000 /END OF TABLE
2539
2540
2541 4574 0017
2542 4575 7706
2543 4576 7720
2544 4577 0004
4600

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PAGE

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2545 /TEST ADDRESS TABLE
2546 /
2547 /0 = NON-EXISTENT TEST, SKIP IN SEQUENCE
2548 /-1 = END OF TEST SEQUENCE, RESTART WITH TEST #20
2549
2550
2551 4600 0400 TAT, TEST0
2552 4601 0714 TEST1
2553 4602 1000 TEST2
2554 4603 0000 0 /TEST3
2555 4604 0000 0 /TEST4
2556 4605 0000 0 /TEST5
2557 4606 0000 0 /TEST6
2558 4607 0000 0 /TEST7
2559 4610 0000 0 /TEST10
2560 4611 0000 0 /TEST11
2561 4612 0000 0 /TEST12
2562 4613 0000 0 /TEST13
2563 4614 0000 0 /TEST14

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2564 4615 0000 0 /TEST15
2565 4616 0000 0 /TEST16
2566 4617 0000 0 /TEST17
2567 4620 1200 TEST20
2568 4621 1227 TEST21
2569 4622 1274 TEST22
2570 4623 1331 TEST23
2571 4624 1400 TEST24
2572 4625 1600 TEST25
2573 4626 2000 TEST26
2574 4627 2054 TEST27
2575 4630 2200 TEST30
2576 4631 2212 TEST31
2577 4632 7777 -1 /TEST32 ..... END OF TEST SEQUENCE
2578 4633 0000 0 /TEST33
2579 4634 0000 0 /TEST34
2580 4635 0000 0 /TEST35
2581 4636 0000 0 /TEST36
2582 4637 0000 0 /TEST37
2583 4640 0000 0 /TEST40
2584 4641 0000 0 /TEST41
2585 4642 0000 0 /TEST42
2586 4643 0000 0 /TEST43
2587 4644 0000 0 /TEST44
2588 4645 0000 0 /TEST45
2589 4646 0000 0 /TEST46
2590 4647 0000 0 /TEST47
2591 4650 0000 0 /TEST50
2592 4651 0000 0 /TEST51
2593 4652 0000 0 /TEST52
2594 4653 0000 0 /TEST53
2595 4654 0000 0 /TEST54
2596 4655 0000 0 /TEST55
2597 4656 0000 0 /TEST56
2598 4657 0000 0 /TEST57
2599
2600 4660 2246 TEST60
2601 4661 2400 TEST61
2602 4662 2450 TEST62
2603 4663 2477 TEST63
2604 4664 0000 0 /TEST64
2605 4665 0000 0 /TEST65
2606 4666 0000 0 /TEST66
2607 4667 0000 0 /TEST67
2608 4670 0000 0 /TEST70
2609 4671 0000 0 /TEST71
2610 4672 0000 0 /TEST72
2611 4673 0000 0 /TEST73
2612 4674 0000 0 /TEST74
2613 4675 0000 0 /TEST75
2614 4676 0000 0 /TEST76
2615 4677 0000 0 /TEST77
2616
2617
2618

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2619 /ERPOR MESSAGE ADDRESS TABLE
2620
2621 4700 5476 EMAT, ERR1
2622 4701 5511 ERR2
2623 4702 5527 ERR3
2624 4703 5546 ERR4
2625 4704 5561 ERR5
2626 4705 5602 ERR6
2627 4706 5617 ERR7
2628 4707 5640 ERR10
2629 4710 5655 ERR11
2630 4711 5676 ERR12
2631 4712 5711 ERR13
2632 4713 5733 ERR14
2633 4714 5755 ERR15
2634 4715 5777 ERR16
2635
2636 /PROGRAM MESSAGES
2637
2638 /SPECIAL CHARACTERS AND FUNCTIONS:
2639
2640 / + = CRLF
2641 / ! = CR
2642 / , = LF
2643 / | = FF
2644
2645 4716 5315 HEADER, TEXT '+MAINDEC-08-DILAC-B+LA100 PRINTER DIAGNOSTIC+;'
4717 0111
4720 1604
4721 0503
4722 5560
4723 7055
4724 0411
4725 1401
4726 0395
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
2646 4746 5343 COLUMN, TEXT '+* COLUMNS *'
4747 4003
4750 1714
4751 2515
4752 1623

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4753 4075
4754 4000
2647 4755 5323 SELTST, TEXT '+SELECT TEST #'
4756 0514
4757 0503
4760 2440
4761 2405
4762 2324
4763 4043
4764 4040
4765 0000
2648 4766 5323 DMSG1, TEXT '/+SWR = /'
4767 2732
4770 4075
4771 4000
2649 4772 4040 DMSG2, TEXT '/ NEW = /'
4773 4016
4774 0527
4775 4075
4776 4000
2650 4777 2701 WMSG, 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
2651 5020 7373 TSTNO, TEXT ';;TEST NUMBER'
5021 2405
5022 2324
5023 4016
5024 2515
5025 0205
5026 2240
5027 4000
2652 5030 4040 COLUMN, TEXT ' COLUMNS;'
5031 0317
5032 1425
5033 1516
5034 2373
5035 0000
2653 5036 5324 ETSTNO, TEXT '+TEST #'
5037 0523
5040 2440
5041 4340

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2654	5042 0000		
	5043 5440	PCMSG, TEXT	',' PC='
	5044 4020		
	5045 0375		
2655	5046 0000		
	5047 5440	ERR, TEXT	',' ERROR #'
	5050 4035		
	5051 2222		
	5052 1722		
	5053 4043		
2656	5054 0000		
	5055 5440	ERRS, TEXT	',' '
	5056 4000		
2657	5057 7305	PASMSG, TEXT	';END OF PASS #'
	5060 1604		
	5061 4017		
	5062 0640		
	5063 2001		
	5064 2323		
	5065 4040		
2658	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		
2659	5104 0000		
	5105 2025	T2M2, TEXT	'PUT SWITCH 4 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		
2660	5125 0000		
	5126 2025	T2M3, TEXT	'PUT SWITCH 4 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		
2661	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		
2662	5171 5320	PRSP1, TEXT	'+PRINT SPEED IS '
	5172 2211		
	5173 1624		
	5174 4023		
	5175 2005		
	5176 0504		
	5177 4011		
	5200 2340		
	5201 0000		
2663	5202 0120	PRSP2, TEXT	'APPROX '
	5203 2022		
	5204 1730		
	5205 4000		
2664	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		
2665	5222	4040	PRSP4, TEXT	' CHARS/LINE+'
	5223	0310		
	5224	0122		
	5225	2357		
	5226	1411		
	5227	1605		
	5230	5300		
2666				
2667	5231	7316	NMSG, TEXT	';NO CONSOLE TERMINAL;'
	5232	1740		
	5233	0317		
	5234	1623		
	5235	1714		
	5236	0540		
	5237	2405		
	5240	2215		
	5241	1116		
	5242	0114		
2668	5243	7300	TCHAR, TEXT	'CHAR = '
	5244	0310		
	5245	0122		
	5246	4075		
	5247	4000		
2669	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		
2670	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		
2671	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		
2672	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		
2673	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		
2674	5355	5555	T1MSG1, TEXT	'-----'
	5356	5555		
	5357	5540		
	5360	0000		
2675	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		

2676	5375 2305	TIMSG3, 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		
2677	5412 4040	TIMSG4, TEXT	' INCHES & DEPRESS TOF RESET SWITCH+'
	5413 1116		
	5414 0310		
	5415 0523		
	5416 4046		
	5417 4004		
	5420 0520		
	5421 2705		
	5422 2323		
	5423 4024		
	5424 1706		
	5425 4022		
	5426 0523		
	5427 0524		
	5430 4023		
	5431 2711		
	5432 2403		
	5433 1053		
	5434 0000		
2678	5435 4040	CNVMSG, TEXT	/ /
	5436 4000		
2679	5437 7200	CR, TEXT	'1'
2680	5440 7300	LF, TEXT	'.'
2681	5441 5300	CRLF, TEXT	'.'
2682	5442 4100	FF, TEXT	'1'
2683	5443 5377	QUES, TEXT	'?'
	5444 5300		
2684	5445 3625	CNTLU, TEXT	'/'U+/'
	5446 5300		
2685			
2686	5447 4063	TITAB, TEXT	' 3 '
	5450 4000		
2687	5451 6356	TEXT	'3,5'
	5452 6500		
2688	5453 4064	TEXT	' 4 '
	5454 4000		
2689	5455 6556	TEXT	'5,5'
	5456 6500		
2690	5457 4066	TEXT	' 6 '
	5460 4000		
2691	5461 4067	TEXT	' 7 '
	5462 4000		

2692	5463 4070	TEXT	' 8 '
	5464 4000		
2693	5465 7056	TEXT	'8,5'
	5466 6500		
2694	5467 6161	TEXT	'11 '
	5470 4000		
2695	5471 6162	TEXT	'12 '
	5472 4000		
2696	5473 6164	TEXT	'14 '
	5474 4000		
2697			
2698	5475 0000	0	/END OF TABLE
2699			
2700		/ERROR MESSAGES	
2701			
2702	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		
2703	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		
2704	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		

2705 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
2706 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
2707 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
2708 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
2709 5637 0400 ERR10, TEXT /PCLP DID NOT CLEAR READY/
5640 2003
5641 1420
5642 4004
5643 1104
5644 4016
5645 1724
5646 4003
5647 1405
5650 0122
5651 4022
5652 0501
5653 0431
5654 0000
2710 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
2711 5676 2516 ERR12, TEXT /UNEXPECTED INTERRUPT/
5677 0530
5700 2005
5701 0324
5702 0504
5703 4011
5704 1024
5705 0522
5706 2225
5707 2024
5710 0000
2712 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
 2713 5733 1617 ERR14, TEXT /NO INTER - READY SET, ENABLED & ION/
 5734 4011
 5735 1624
 5736 0522
 5737 4855
 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
 2714 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
 2715 5777 2022 ERR16, TEXT /PRINTER NOT READY/
 6000 1116
 6001 2405
 6002 2240
 6003 1617
 6004 2440
 6005 2205
 6006 0104
 6007 3100
 2716
 2717
 2718

2719

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	PCMSG	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	HDRX	4326	MIOTC	2750	PRTCHR	4260
CNVMSG	5435	HEADER	4716	MLOAD	4460	PRTCL	4254
CNVNM	3761	HOLD	4457	MSGADR	0043	PRTCR	4251
CNVRT	3713	HOLDCH	3141	MSGPRT	3762	PRTFF	4246
COLUMN	5030	HUNDS	0046	NCMSG	5231	PRTHDR	4462
COLUMNH	4746	IERROR	0347	OCTSAV	3712	PRTLFL	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	OPDDBST	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	READQ	4451
DBTD	6574	KFF	3232	P100	0143	READT	4504
DELAY	0333	KYBDA	3433	P1000	0152	READU	4454
DELAY0	0345	KYBDA	3422	P12	0131	RERROR	3600
DELAY1	0346	KYBDB	3447	P134	0144	RESTART	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	RKR8	2613
ERR12	5676	LREADT	0124	P40	0134	RKR8	2610
ERR13	5711	LT0Q	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	P7	0127	RLDCC	4104
ERR4	5546	M177	0174	P72	0141	RLOAD	4060
ERR5	5561	M2	0154	P77	0142	RLOAD	4105

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
RTL5	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	TEXT	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	TKBDBT	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	TMIOU	0071
SWITCH	0020	T24G	1476	T61D	2430	TMLOAD	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	T63D	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	TREADQ	0112
T0M	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	TSELECT	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

