

IDENTIFICATION

Product Code: Maindec-08-D71A-D
Product Name: 680 DCS Expanded Static Test
Date Created: May 15, 1967
Maintainer: Diagnostic Group
Author: E. Kenney



1 ABSTRACT

The 680 DCS Expanded Static Test consists of two independent test sequences intended to verify correct operation of the IOT instructions and control logic associated with the 680 Data Communications System. Test failures will result in a processor halt at a halt location associated with the failing test. Each test halt is interpreted as to failing test sequence, suggested failure source (where possible), and program restart instructions.

2 REQUIREMENTS

2.1 Storage

| <u>Test</u> | <u>Starting Address</u> | <u>End Address</u> | |
|----------------------|-------------------------|--------------------|-------------|
| Line Clock Test | 0200 | 0513 | (Section 4) |
| IOT and Control Test | 0674 | 2706 | (Section 5) |

2.2 Equipment

Minimum configuration PDP-8
 Minimum configuration 680 DCS (i.e., 681 Data Line Interface and 685 Multiplexer Control)

3 PROGRAM LOADING

- a. If the Binary Loader is resident in memory proceed to step b. Otherwise load the Binary Loader into memory.
- b. Set the AC switch register to 7777 and depress the LOAD ADDRESS key. Then depress the START key.
- c. Place the 680 DCS Expanded Static Test in the keyboard reader and turn the reader on.
- d. When the binary program tape has been completely read into memory, the AC should contain zero indicating correct program tape checksum.

4 LINE CLOCK TEST

4.1 General Description

The line clock test verifies correct execution of the three IOT instructions associated with a specified clock number, and correct operation of the logic associated with each clock.

The three IOT Instructions are listed below:

| <u>IOT</u> | <u>Octal Value</u> | <u>Operation</u> |
|------------|--------------------|--|
| TTXSKP | 64Y1 | Skip if specified clock flag is set |
| TTXON | 64Y4 | Reset and enable specified clock flag |
| TTXOFF | 64Y2 | Reset and disable specified clock flag |

NOTE: X = 1, 2, 3, or 4 and Y = 2, 3, 4, or 5, respectively

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With SR 2 set, the time intervals in microseconds of eight successive clock interrupts will be typed on the Model 33 Teleprinter.

The following chart lists the correct interrupt time intervals for various clock speeds:

| <u>Crystal Frequency</u> | <u>Line Baud Rate</u> | <u>Bit Time</u> | <u>Interrupt Time Interval (μsec)</u> |
|--------------------------|-----------------------|-----------------|---------------------------------------|
| 14.08 kc | 110 | 9.09 ms | 1136 |
| 9.6 kc | 75 | 13.3 ms | 1665 |
| 6.4 kc | 50 | 20.0 ms | 2500 |
| 5.76 kc | 45 | 22.2 ms | 2780 |

NOTE: The interrupt time intervals will be reported within a tolerance of 1 percent.

The following example is the interrupt time interval report for clock no. 1 (110 baud):

```
CLOCK 1
1132  1124  1132  1132  1124  1132  1132  1132
```

4.2 Operating Procedure

- a. Set SR to 0200 and depress LOAD ADDRESS
- b. Select number of clock to be tested (SR 9, 10, and 11):
Clock No. 1 - SR 11 set; SR 9 and 10 reset
Clock No. 2 - SR 10 set; SR 9 and 11 reset
Clock No. 3 - SR 10 and 11 set; SR 9 reset
Clock No. 4 - SR 9 set; SR 10 and 11 reset
- c. Select desired program control according to the following Switch Register Summary.
SR0 Set - Halt when error occurs
Reset - Bypass halt and continue to cycle
SR1 Set - Normal test sequence consists of
 1. Reset and disable all clocks (TTXOFF)
 2. Reset and enable specified clock (TTXON)
 3. Enter Interrupt timer loop and wait for clock interrupt
 4. Verify interrupt from specified clock and repeat steps 2 and 3, indefinitely (Interrupt time intervals are not stored or reported.)Reset - Normal test sequence consists of
 1. Reset and disable all clocks (TTXOFF)
 2. Reset and enable specified clock (TTXON)
 3. Enter interrupt time loop and wait for clock interrupt
 4. Verify interrupt from specified clock and store interrupt time interval
Repeat steps 2, 3, and 4, eight times
 5. After eight clock interrupts, reset and disable clock and return to interrupt timer loop to verify correct execution of the TTXOFF instruction
 6. When the interrupt timer expires (4MS), the eight stored interrupt time intervals may be typed (SR 2 set) and the test sequence is restarted at step 1 (SR 3 reset)

- SR2 Set - Type eight successive clock interrupt time intervals
Reset - Bypass type routine
- SR3 Set - Halt at completion of clock test (step 6)
Reset - Continuously cycle through steps 1-6
- SR4 Set - Ring bell if error is detected
Reset - Bypass bell

d. Depress START. Clock test will now cycle. Note: Since the program stores the clock number specified in SR 9, 10, and 11 each time it recycles, the number of the clock to be tested may be changed while the clock test is cycling.

4.3 Description of Clock Test Error Halts

All clock test halts are referenced by an absolute octal memory address (halt location), and a mnemonic tag (halt tag). The Description of Halt associated with each program halt provides a statement of conditions leading to the halt and the program sequence following depression of CONTINUE.

NOTE: Except where otherwise specified, selection of bypass error halt (SR0 Reset) will result in the program sequence described for Continue.

| <u>Halt Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|----------------------|-----------------|--|
| 206 | ECT1 | Operator selected nonexistent clock number (i.e., neither clock no. 1, 2, 3, or 4 was specified). Select desired clock number and depress CONTINUE. (SR 0 will not cause this halt to be bypassed.) |
| 072 | ECT2 | Interrupt resulting from incorrect clock flag. AC contains number of clock causing error. Depress CONTINUE to reset and disable all clock flags, enable the clock specified by SR 9, 10, and 11, and restart clock test. Note: If error halts are bypassed (SR 0 reset) the clock causing the error will be reset and disabled and the clock test will continue. |
| 134 | ECT3 | Interrupt resulting from source other than the 680 clock flags (1, 2, 3, and 4) or the Model 33 Teleprinter flag. Depress CONTINUE to restart clock test at location 200. |
| 257 | ECT4 | Specified clock did not generate an interrupt within 4 ms after being enabled. Depress CONTINUE to restart clock test at location 200. |

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| <u>Halt Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|----------------------|-----------------|---|
| 466 | ECT5 | Specified clock generated an interrupt within 4 ms after being disabled. Depress CONTINUE to reset and disable clock and reenter interrupt timer. |
| 512 | ECT | End of clock test (SR 3 set). Depress CONTINUE to restart clock test at location 200. |

5 IOT AND CONTROL TEST

5.1 General Description

The IOT and control test is divided into 3 groups of related subtests involving:

- a. 681 and 685 device selection (40 and 41, respectively).
- b. IOT instructions (listed below) line selection register (LSR) and control logic associated with the 685.

| <u>IOT</u> | <u>Octal Value</u> | <u>Operation</u> |
|------------|--------------------|--|
| TTCL | 6411 | Clear the LSR to 0 |
| TTSL | 6412 | Load LSR from AC and clear AC to 0 (AC 5-11 inclusive or to LSR 0-6) |
| TTRL | 6414 | Load AC from LSR (LSR 0-6 inclusive OR to AC 5-11) |
| TTINCR | 6401* | Increment the LSR by 1 |

*Decoded in 681

- c. IOT instructions (listed below) and control logic associated with the 681 Data Line Interface.

| <u>IOT</u> | <u>Octal Value</u> | <u>Operation</u> |
|------------|--------------------|--|
| TTI | 6402 | Transfer data from the 681 to the computer's MB register |
| TTO | 6404 | Transfer data from the AC to the 685 |

Execution of the IOT and control test does not require any connection of input data lines to output data lines. (Line no. 177 will be addressed during any tests requiring a mark level on the input data line.)

5.2 Operating Procedure

- a. Set SR to 0674 and depress LOAD ADDRESS.
- b. Select desired program control according to the following Switch Register Summary:

| | |
|-----|---|
| SR0 | Set - Halt when error occurs |
| | Reset - Disregard error, bypass halt and continue to cycle |
| SR1 | Set - Scope mode (don't test for error, loop in current test) |
| | Reset - Normal test cycle |

- SR2 Set - Verify mode (test for errors, cycle in current test)
Reset - Cycle through all tests
- SR3 Set - Halt at completion of all tests
Reset - Repeat all tests
- SR4 Set - Ring bell if error is detected
Reset - Bypass bell
- SR5 Set - Ring bell after 680 complete test cycles (approximately 10 sec.)
Reset - Bypass bell

c. Depress START - The IOT and control test will be executed

5.3 Description of IOT and Control Test Error Halts

All test halts are referenced by an absolute octal memory address (halt location) and a mnemonic tag (halt tag). The Description of Halt associated with each program halt provides a statement of conditions leading to the halt and the program sequence following depression of CONTINUE.

NOTE: All 680 clocks are disabled during execution of the IOT and control test; the interrupt system is enabled (ION).

a. All error halts are listed below their associated subtest mnemonic and starting address.

- NOTE: DST = 681-685 Device selection test group
- LSR = 685 Line selection register test group
- TS681 = 681 IOT and control test group

| <u>Octal Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|-----------------------|-----------------|--|
| 160 | BADINT | Interrupt occurred from source other than the Model 33 Teleprinter flag. Depress CONTINUE to clear and disable all 680 clock flags and return to the particular test in progress. (Note: The return address is stored in location 0) |
| | | Test DSTA - (location 674) |
| 722 | ERDST1 | AC before execution = 4000; the 685 is addressed via IOT 6414 (TTRL). Expected contents of AC = 4000; actual results are displayed in the AC IOT 6414 should affect AC 5-11 only. If resulting AC = 2000, IOT 6414 may have been decoded in 681 as IOT 6404 Depress CONTINUE to repeat test DSTA |

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| <u>Octal Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|-----------------------|-----------------|--|
| 746 | ERDST2 | <p>Test DSTB - (location 724)</p> <p>AC before execution = 0000; the 681 is addressed via IOT 6404 (TTO). Expected contents of AC = 0000; actual results are displayed in the AC If AC 5-11 \neq 0, IOT 6404 may have been decoded in 685 as IOT 6414 Depress CONTINUE to repeat test DSTB</p> <p>Test LSRA - (location 1000)</p> |
| 1017 | ERLSR1 | <p>AC before execution = 7777; the 685 is addressed via IOT 6412 (TTSL). Expected contents of AC = 0000; actual results are displayed in the AC IOT 6412 should clear the AC to 0 at IOP2 time Depress CONTINUE to repeat test LSRA</p> <p>Test LSRB - (location 1023)</p> |
| 1044 | ERLSR2 | <p>AC before execution = 7777; the 685 is addressed via IOT 6411 (TTCL). Expected contents of AC = 7777; actual results are displayed in the AC IOT 6411 should not effect the AC Depress CONTINUE to repeat test LSRB</p> <p>Test LSRC - (location 1046)</p> |
| 1067 | ERLSR3 | <p>AC before execution = 7777; the 685 is addressed via IOT 6414 (TTRL). Expected contents of AC = 7777; actual results are displayed in the AC The inclusive OR transfer of the LSR to AC should not affect the contents of the AC (regardless of the contents of the LSR) Depress CONTINUE to repeat test LSRC</p> <p>Test LSRD - (location 1071)</p> |
| 1113 | ERAC1 | <p>IOT 6412 (TTSL) associated with this subtest failed to clear the AC Depress CONTINUE to reexecute test LSRA</p> |
| 1121 | ERLSR4 | <p>With the AC preset to 7777, IOT 6412 (TTSL) is issued to load the LSR with 177 and clear the AC to 0 With the AC = 0000, IOT 6414 (TTRL) is issued to load the AC with the contents of the LSR. Expected contents of AC = 0177; actual results are displayed in the AC. Error could be a result of incorrect execution of IOT 6412 or IOT 6414, or both Depress CONTINUE to repeat test LSRD</p> |

| <u>Octal Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|-----------------------|-----------------|---|
| | | Test LSRE - (location 1125) |
| 1156 | ERAC2 | IOT 6412 (TTSL) associated with this subtest failed to clear the AC Depress CONTINUE to reexecute test LSRA |
| 1164 | ERLSR5 | The LSR is loaded with 177 twice, via two sequential IOT 6412 instructions (TTSL). With the AC = 0000, IOT 6414 (TTRL) is issued to load the AC with the contents of LSR. Expected contents of LSR and AC = 0177; actual results are displayed in the AC. Error indicates problem in inclusive OR gating of LSR flip-flops Depress CONTINUE to repeat test LSRE |
| | | Test LSRF - (location 1200) |
| 1227 | ERAC3 | IOT 6412 (TTSL) associated with this subtest failed to clear the AC Depress CONTINUE to reexecute test LSRA |
| 1235 | ERLSR6 | The LSR is sequentially loaded with 177 and 000 via two IOT 6412 (TTSL) instructions With the AC = 0000, IOT 6414 (TTRL) is issued to load the AC with the contents of the LSR. Expected contents of LSR and AC = 0177; actual results are displayed in the AC Error indicates problem in inclusive OR gating of LSR flip-flops Depress CONTINUE to repeat test LSRF |
| | | Test LSRG - (location 1240) |
| 1262 | ERAC4 | IOT 6412 (TTSL) associated with this subtest failed to clear the AC Depress CONTINUE to reexecute test LSRA |
| 1267 | ERLSR7 | The LSR is loaded with 177 via IOT 6412 (TTSL). IOT 6411 (TTCL) and 6414 (TTRL) are sequentially issued to reset the LSR to 0 and transfer the LSR to the AC Expected contents of LSR and AC = 000; actual results are displayed in the AC Error indicates incorrect execution of IOT 6411 (TTCL) Depress CONTINUE to repeat test LSRG |
| | | Test LSRH - (location 1271) |
| 1315 | ERAC5 | IOT 6412 (TTSL) associated with this subtest failed to clear the AC Depress CONTINUE to reexecute test LSRA |

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| <u>Octal Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|-----------------------|-----------------|--|
| 1323 | ERLSR8 | The LSR is cleared to 0 via IOT 6411 (TTCL). With the AC = 0125, IOT 6412 (TTSL) is issued to set LSR 0, 2, 4, and 6 to 1. IOT 6414 (TTRL) is then issued to load the AC with the contents of the LSR Expected contents of LSR and AC = 125; actual results are displayed in the AC Depress CONTINUE to repeat test LSRH |
| 1353 | ERAC6 | Test LSRI - (location 1327) IOT 6412 (TTSL) associated with this subtest failed to clear the AC Depress CONTINUE to reexecute test LSRA |
| 1361 | ERLSR9 | The LSR is cleared to 0 via IOT 6411 (TTCL). With the AC = 0052, IOT 6412 (TTSL) is issued to set LSR 1, 3 and 5 to 1. IOT 6414 (TTRL) is then issued to load the AC with the contents of the LSR Expected contents of LSR and AC = 052; actual results are displayed in the AC Depress CONTINUE to repeat test LSRI Test LSRJ - (location 1400) |
| 1431 | ELSR10 | The LSR is sequentially cleared, loaded and read for all bit configurations (000-177) via IOT 6417 The expected contents of LSR and AC following execution of IOT 6417 are displayed in the AC Depress CONTINUE to cause the actual results to be displayed in the AC Depress CONTINUE again to repeat test LSRJ with the failing bit configuration Note: Selection of scope mode (SR1) causes the error check to be bypassed and the current bit configuration to be cycled continuously Selection of verify mode (SR2) allows the error check to be performed and all bit configurations (000-177) to be cycled continuously Test LSRK - (location 1441) |
| 1500 | ELSR11 | The LSR is initially cleared to 0 via IOT 6411 (TTCL) The LSR is now incremented from 001 through 000, via successive IOT 6401 (TTINCR) instructions. The contents of the LSR are read and compared following each IOT 6401 instruction The expected contents of the LSR are displayed in the AC Depress CONTINUE to cause the actual results to be displayed in the AC Depress CONTINUE again to repeat test LSRK for the failing bit configuration |

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| <u>Octal Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|-----------------------|-----------------|--|
| | | <p>Note: Selection of scope mode (SR1) causes the error check to be bypassed and the current bit configuration to be cycled continuously Selection of verify mode (SR2) allows the error check to be performed and the LSR to be continuously incremented from 001 through 000</p> <p>TS681A - (location 1600)</p> <p>The 681 Data line Interface is addressed via IOT 6400 (NOP). The 681 should take no action and the next instruction in sequence should be executed.</p> |
| 1625 | ERTTO1 | <p>The instruction immediately following IOT 6400 was not executed Error could be a result of incorrect generation of skip enable Depress CONTINUE to repeat test TS681A</p> |
| 1631 | ERTTO2 | <p>Two instructions immediately following IOT 6400 were not executed Error indicates that IOT 6400 was incorrectly interpreted as IOT 6402 (TTI) Depress CONTINUE to repeat test TS681A</p> |
| 1635 | ERTTO3 | <p>The link bit was cleared to 0 indicating that IOT 6400 was incorrectly interpreted as IOT 6404 (TTO) Depress CONTINUE to repeat test TS681A</p> <p>TS681B - (location 1641)</p> <p>With the AC = 0000 and the Link = 1, IOT 6404 (TTO) is issued. Following execution of IOT 6404 the AC and Link should contain 0.</p> |
| 1663 | ERTTO4 | <p>The Link contained 1 following execution of IOT 6404 The resulting contents of the AC and Link are displayed Check operation of zero Link and RAR in the 681 Depress CONTINUE to repeat test TS681B</p> |
| 1670 | ERTTO5 | <p>The Link was reset but AC0 was set to 1. The resulting contents of the Link and AC are displayed Check operation of zero Link Depress CONTINUE to repeat test TS681B</p> <p>TS681C - (location 1672)</p> |
| 1715 | ERTTO6 | <p>With the AC = 4001 and Link = 1, IOT 6404 (TTO) is issued. If IOT 6404 is executed correctly the Link will be cleared to 0, AC 11 will be inhibited from shifting into the Link and AC 0-10 will be shifted one place to the right. The expected test results are AC = 2000 and Link = 0; the actual test results are displayed</p> |

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| <u>Octal Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> | | | | | | | | | | |
|-----------------------|------------------------------|---|-------------------|-----------------|-----------|------------------|-----------|-------------------------|------------|------------------------------|------------|--|
| 1723 | ERTTO7 | <p>Link was not reset to 0. Assuming TS681B was executed correctly, this error indicates failure of Link rotate disable Depress CONTINUE to repeat test TS681C</p> <p>AC did not contain 2000 indicating incorrect execution of RAR Depress CONTINUE to repeat test TS681C</p> <p>TS681D - (location 1727)</p> <p>With the AC = 5252 and Link = 0, IOT 6404 (TTO) is issued. Expected test results are AC = 2525 and Link = 0. The actual test results are displayed</p> | | | | | | | | | | |
| 1751 | ERTTO8 | <p>Link was set to 1. Check for incorrect execution of CML Depress CONTINUE to repeat test TS681D</p> | | | | | | | | | | |
| 1760 | ERTTO9 | <p>AC did not contain 2525 following execution of IOT 6404. Check execution of RAR Depress CONTINUE to repeat test TS681D</p> <p>TS681E - (location 2000)</p> <p>This test verifies correct execution format of IOT 6402 (TTI) IOT 6402 instruction format:</p> <table border="0"> <tr> <td>Location A (6402)</td> <td>TTI Instruction</td> </tr> <tr> <td>A+1 (LSW)</td> <td>Line Status Word</td> </tr> <tr> <td>A+2 (CAW)</td> <td>Character Assembly Word</td> </tr> <tr> <td>A+3 (XXXX)</td> <td>Next Instruction in Sequence</td> </tr> <tr> <td>A+4 (XXXX)</td> <td></td> </tr> </table> | Location A (6402) | TTI Instruction | A+1 (LSW) | Line Status Word | A+2 (CAW) | Character Assembly Word | A+3 (XXXX) | Next Instruction in Sequence | A+4 (XXXX) | |
| Location A (6402) | TTI Instruction | | | | | | | | | | | |
| A+1 (LSW) | Line Status Word | | | | | | | | | | | |
| A+2 (CAW) | Character Assembly Word | | | | | | | | | | | |
| A+3 (XXXX) | Next Instruction in Sequence | | | | | | | | | | | |
| A+4 (XXXX) | | | | | | | | | | | | |
| 2020 | ERTTI1 | <p>The contents of A+1 were incorrectly interpreted as an instruction. Check for generation of the S cycle and its associated control functions (e.g., TTSET, PC → MA, Enable, Spec. cycle) Depress CONTINUE to repeat test TS681E</p> | | | | | | | | | | |
| 2024 | ERTTI2 | <p>Location A+1 was correctly interpreted as the LSW but A+2 was incorrectly interpreted as an instruction. Check for correct operation of skip bus in enable during the S cycle Depress CONTINUE to repeat test TS681E</p> | | | | | | | | | | |
| 2030 | ERTTI3 | <p>The instruction in location A+4 was the first instruction executed after completion of the TTI instruction. Since A+3 was not executed check for incorrect (extra) skip enable during the S cycle Depress CONTINUE to repeat test TS681E</p> | | | | | | | | | | |

| <u>Octal Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|-----------------------|-----------------|---|
| | | <p>TS681F - (location 2034) See IOT 6402 format (pg. 10)</p> <p>With the LSW and CAW preset to 2000, IOT 6402 (TTI) is issued</p> <p>Correct execution of IOT 6402 should result in the contents of LSW shifted one position to the right with LSW0 = 0 (resulting LSW = 1000). The CAW should be unmodified (resulting CAW = 2000)</p> <p>Note: The LSR is loaded with 177 before the test is executed</p> |
| 2073 | ERTTI4 | <p>Resulting LSW \neq 1000. Actual results are displayed in the AC. Check operation of shift MB</p> <p>Depress CONTINUE to repeat test TS681F</p> |
| 2104 | ERTTI5 | <p>The LSW was shifted correctly but LSW0 = 1 indicates a start level on the Teletype data in lead. Check operation of MBO shift enable. (Resulting LSW is displayed in the AC)</p> <p>Depress CONTINUE to repeat test TS681F</p> |
| 2115 | ERTTI6 | <p>LSW 9, 10, and 11 were \neq 0 following execution of IOT 6402 indicating incorrect execution of count MB</p> <p>Depress CONTINUE to repeat test TS681F</p> |
| 2121 | ERTTI7 | <p>Resulting LSW \neq 1000. Actual results are displayed in the AC. Check for a combination of the above three error conditions</p> <p>Depress CONTINUE to repeat test TS681F</p> |
| 2127 | ERTTI8 | <p>CAW was modified; results are displayed in the AC</p> <p>Check for incorrect generation of C cycle. (C cycle should be executed only when LSW0 = 1 and LSW 9, 10, and 11 = 0, 1, 1, respectively)</p> <p>Depress CONTINUE to repeat test TS681F</p> |
| | | <p>TS681G - (location 2200) See IOT 6402 format (pg. 10)</p> <p>With the CAW preset to 4000 and the LSW present to the condition required for entry into the C cycle (LSW = 4003), IOT 6402 (TTI) is issued. Correct execution of IOT 6402 should result in LSW = 4004 and CAW = 6000</p> <p>Note: The LSR is preloaded with 177</p> |
| 2234 | ERTTI9 | <p>LSW \neq 4004. Check operation of count MB, shift MB and MBO shift enable. (The actual LSW results are displayed in the AC)</p> <p>Depress CONTINUE to repeat test TS681G</p> |

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| <u>Octal Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|-----------------------|-----------------|---|
| 2246 | ETTI10 | CAW \neq 6000. (Actual CAW results are displayed in the AC). Check C cycle execution (e.g., shift MB, MB0 shift enable, TTSET, etc.) Depress CONTINUE to repeat test TS681G |
| 2252 | ETTI11 | CAW \neq 6000, contents of location A+3 were modified (Actual results of CAW are displayed in the AC) Check for incorrect skip enable during the S cycle Depress CONTINUE to repeat test TS681G TS681H - (location 2262) See IOT 6402 format, (pg. 10) IOT 6402 (TTI) is issued with successive LSW counts of 4, 5, 6, 7, 0, 1 and 2 (i.e., 4004 - 4002) The LSW and CAW are examined after each TTI execution to insure correct execution of count MB and correct LSW count interpretation Note: The LSR is preloaded with 177 |
| 2340 | ETTI12 | LSW0 was reset to 0 (resulting LSW is displayed in AC) Check operation of S cycle MB shift Depress CONTINUE to repeat test TS681H |
| 2347 | ETTI13 | The LSW count was not correct following execution of IOT 6402. The expected contents of the LSW are displayed in the AC Depress CONTINUE to display the actual LSW results Depress CONTINUE again to retest failing count |
| 2361 | ETTI14 | The CAW was modified indicating incorrect entry into C cycle. (Expected contents of CAW = 4000, actual CAW results displayed in AC) Depress CONTINUE to retest failing count Note: Selection of scope mode (SR1) causes the error check to be bypassed and the current LSW count to be cycled continuously Selection of verify mode (SR2) allows error check to be performed and LSW counts 4 through 2 to be continuously tested TS681I - (location 2400) This test verifies correct operation of MB0 (1) shift enable and MB1-11 (1) shift |
| 2440 | ERMBS1 | Incorrect MB shift results. Expected results are displayed in the AC Depress CONTINUE to display the actual MB shift results in the AC Depress CONTINUE again to retest failing MB shift Note: Selection of scope mode (SR1) causes the MB shift error check to be bypassed and the current MB shift configuration to be cycled continuously |

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| <u>Octal Location</u> | <u>Halt Tag</u> | <u>Description of Halt</u> |
|-----------------------|-----------------|---|
| | | Selection of verify mode (SR2) allows the MB shift error check to be performed and the full MB shift test to be cycled continuously TS681J - (location 2456) |
| 2517 | ERMBS2 | This test verifies correct operation of MB1-11 (0) shift Incorrect MB shift results. Expected results are displayed in the AC Depress CONTINUE to display the actual MB shift results in the AC Depress CONTINUE again to retest failing MB shift (See note for TS681I) TS681K - (location 2600) |
| 2654 | ERMBS3 | This test verifies correct operation of MB shift via a shift pattern of alternate 1s and 0s Incorrect MB shift results. Expected results are displayed in the AC Depress CONTINUE to display the actual MB shift results in the AC Depress CONTINUE again to retest failing MB shift (See note for TS681I) |
| 2674 | ENDTST | End of Static Test. Depress CONTINUE to repeat all tests. |

6 MISCELLANEOUS

It is suggested that the IOT and Control Test be run with appropriate voltage margins before attempting to execute the 680 DCS Data and Control Test (MAINDEC-08-D72A-D).

7 PROGRAM LISTING

/680 DCS EXPANDED STATIC TEST

/IOT INSTRUCTION DEFINITIONS

TT10FF=6422
TT20FF=6432
TT30FF=6442
TT40FF=6452

TT10N=6424
TT20N=6434
TT30N=6444
TT40N=6454

TT1SKP=6421
TT2SKP=6431
TT3SKP=6441
TT4SKP=6451

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/SWITCH REGISTER SETTINGS FOR IOT AND CONTROL TEST:

/

/SR0 - HALT ON ERROR

/SR1 - SCOPE MODE (DON'T TEST FOR ERROR, LOOP IN CURRENT TEST)

/SR2 - VERIFY MODE (TEST FOR ERRORS, LOOP IN CURRENT TEST)

/SR3 - HALT AT COMPLETION OF STATIC TEST

/SR4 - SIGNAL ERROR WITH BELL

/SR5 - SIGNAL COMPLETION OF 4096 TEST CYCLES:

/SWITCH REGISTER SETTINGS FOR 680 CLOCK TEST:

/SR0 - HALT ON ERROR

/SR1 - SCOPE MODE

/SR2 - TYPE 8 SUCCESSIVE INTERRUPT TIME INTERVALS, (SR1 RESET)

/SR3 - HALT AT COMPLETION OF CLOCK TEST

/SR4 - SIGNAL ERROR WITH BELL

/PAGE ZERO: CONSTANTS AND SUBROUTINES

```

#0
0000 0000 0
0001 3010 INTRPT,      DCA KEEPAC      /STORE AC
0002 7010      PAR
0003 3011      DCA STORL      /STORE LINC
0004 5142      JMP CHTPTR      /TEST FOR TELEPRINTER FLAG

0005 0345 CLSRR,      JMPCL1-1
0006 0000 COUNT,      0      /CONTAINS CLOCK INTERRUPT COUNT IN MSEC
0007 0000 FSTPAS,      0      /EQUALS ZERO TO SIGNIFY 1ST CLOCK INTERRUPT
0010 0000 KEEPAC,      0
0011 0000 STORL,      0
0012 0000 INTSTA,      0
0013 0200 MSKSR4,      0200
0014 0207 BELL,      0207
0015 4000 MSKSR0,      4000
  
```


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```

*0020
/DECODE SWITCH REGISTER 0
0020 0000 SR0, 0
0021 7604 CLA OSR
0022 0015 AND MSKSR0
0023 7640 SZA CLA
0024 2020 ISZ SR0 /ADD ONE TO RETURN ADDRESS IF SR0 IS SET
0025 7604 CLA OSR
0026 0013 AND MSKSR4
0027 7640 SZA CLA /RING BELL?
0030 5032 JMP .+2 /YES
0031 5420 JMP I SR0 /NO
0032 6002 IOF
0033 1014 TAD BELL
0034 6046 TLS
0035 6041 6041 /SKIP ON TELEPRINTER FLAG
0036 5035 JMP .-1
0037 7300 CLA CLL
0040 6001 ION
0041 5420 JMP I SR0

/DECODE SWITCH REGISTER 1
0042 0000 SR1, 0
0043 7604 CLA OSR
0044 0050 AND MSKSR1
0045 7640 SZA CLA
0046 2042 ISZ SR1 /ADD ONE TO RETURN ADDRESS IF SR1 IS SET
0047 5442 JMP I SR1
0050 2000 MSKSR1, 2000

/DECODE SWITCH REGISTER 2
0051 0000 SR2, 0
0052 7604 CLA OSR
0053 0057 AND MSKSR2
0054 7640 SZA CLA
0055 2051 ISZ SR2 /ADD ONE TO RETURN ADDRESS IF SR2 IS SET
0056 5451 JMP I SR2
0057 1000 MSKSR2, 1000

/DECODE SWITCH REGISTER 3
0060 0000 SR3, 0
0061 7604 CLA OSR
0062 0066 AND MSKSR3
0063 7640 SZA CLA
0064 2060 ISZ SR3 /ADD ONE TO RETURN ADDRESS IF SR3 IS SET
0065 5460 JMP I SR3
0066 0400 MSKSR3, 0400

```

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/COME HERE IF WRONG CLOCK INTERRUPTS

```

/CLOCK1 IN ERROR
0067 4020 ERCL1,      JMS SR0          /DO WE WISH TO HALT? (SR0 SET)
0070 5074      JMP .+4              /DON'T HALT
0071 1126      TAD ONE
0072 7402 ERCT2,      HLT          /HALT AND DISPLAY ERROR CLOCK NUMBER
0073 5477      JMP I ARSTRT        /RE-INITIALIZE CLOCK TEST
0074 6422      TT1OFF              /RESET AND DISABLE CLOCK FLAG1
0075 5500      JMP I AINTON        /RETURN TO TIMER
0076 0232 ACLFLG,      CLRFLG
0077 0200 ARSTRT,      SELECT
0100 0233 AINTON,      INTON-1

/CLOCK2 IN ERROR
0101 4020 ERCL2,      JMS SR0          /DO WE WISH TO HALT? (SR0 SET)
0102 5106      JMP .+4              /DON'T HALT
0103 1127      TAD TWO
0104 5072      JMP ECT2            /HALT AND DISPLAY ERROR CLOCK NUMBER
0105 5477      JMP I ARSTRT        /RE-INITIALIZE CLOCK TEST
0106 6432      TT2OFF              /RESET AND DISABLE CLOCK FLAG2
0107 5500      JMP I AINTON        /RETURN TO TIMER

/CLOCK3 IN ERROR
0110 4020 ERCL3,      JMS SR0          /DO WE WISH TO HALT? (SR0 SET)
0111 5115      JMP .+4              /DON'T HALT
0112 1130      TAD THREE
0113 5072      JMP ECT2            /HALT AND DISPLAY ERROR CLOCK NUMBER
0114 5477      JMP I ARSTRT        /RE-INITIALIZE CLOCK TEST
0115 6442      TT3OFF              /RESET AND DISABLE CLOCK FLAG 3
0116 5500      JMP I AINTON        /RETURN TO TIMER

/CLOCK4 IN ERROR
0117 4020 ERCL4,      JMS SR0          /DO WE WISH TO HALT? (SR0 SET)
0120 5124      JMP .+4              /DON'T HALT
0121 1131      TAD FOUR
0122 5072      JMP ECT2            /HALT AND DISPLAY ERROR CLOCK NUMBER
0123 5477      JMP I ARSTRT        /RE-INITIALIZE CLOCK TEST
0124 6452      TT4OFF              /RESET AND DISABLE CLOCK FLAG 4
0125 5500      JMP I AINTON        /RETURN TO TIMER

0126 0001 ONE,        0001
0127 0002 TWO,        0002
0130 0003 THREE,     0003
0131 0004 FOUR,      0004

```

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```

/INTERRUPT FROM UNDETERMINED SOURCE
0132 4020 NOFLAG,      JMS SR0      /DO WE WISH TO HALT?
0133 5477     JMP I ARSTRT      /DON'T HALT
0134 7402 ECT3,        HLT        /UNDETERMINED INTERRUPT SOURCE
0135 5477     JMP I ARSTRT

0136 0000 TIMEOUT,     0          /CLOCK INTERRUPT AND TIME-OUT STATUS
0137 0000 CLOCK,      0          /CONTAINS NUMBER OF CLOCK BEING TESTE
0140 0000 STORAC,     0
0141 0000 AUXAC,      0

0142 6041 CHTPTR,     TSF          /SKIP IF TELEPRINTER FLAG SET
0143 5153     JMP CHKINT
0144 6042     TCF                /CLEAR TELEPRINTER FLAG

/RESUME NORMAL PROGRAM SEQUENCE
0145 7300 RNPS,      CLA CLL
0146 1011     TAD STORL
0147 7004     RAL                /RESTORE LINC BIT
0150 1010     TAD KEEPAC        /RESTORE AC
0151 6001     ION
0152 5400     JMP I INTRPT-1

/TEST INTERRUPT STATUS
0153 1136 CHKINT,     TAD TIMEOUT
0154 7500     SMA                /SKIP IF INTERRUPT ERROR HAS OCCURRED
0155 5405     JMP I CLSRR        /TEST FOR SPECIFIED CLOCK FLAG
0156 4020     JMS SR0          /HALT ON ERROR?
0157 5161     JMP .+2           /NO
0160 7402 RADINT,     HLT        /HALT DUE TO INTERRUPT ERROR

/CLEAR AND DISABLE ALL 680 CLOCK FLAGS
0161 6422     TT1OFF
0162 6432     TT2OFF
0163 6442     TT3OFF
0164 6452     TT4OFF
0165 5145     JMP RNPS

```

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/680 DCS EXPANDED STATIC TFST

/LINE CLOCK TEST

*200

/OPERATOR MUST SPECIFY CLOCK NUMBER 1, 2, 3 OR 4

```

0200 7604 SELECT,      CLA OSR                /BRING S.R. INTO A.C.
0201 7342   AND MASK1                    /DISREGARD AC0-AC8
0202 3137   DCA Z CLOCK                  /STORE CLOCK SELECTION
0203 1137   TAD Z CLOCK
0204 7440   SZA                          /VERIFY THAT CLOCK 1-4 IS SELECTED
0205 5210   JMP .+3
0206 7402   ECT1,      HLT                /OPERATOR SELECTED NON EXISTANT CLOCK
0207 5200   JMP SELECT
0210 1343   TAD M5
0211 7500   SMA                          /SKIP ON MINUS AC
0212 5206   JMP .-4

```

/OPERATOR SELECTED EXISTANT CLOCK-PROCEED WITH TEST

/SET UP CLOCK SUBROUTINE ADDRESS POINTER

```

0213 7300   RESTRT,     CLA CLL
0214 1345   TAD JMPADD
0215 1137   TAD Z CLOCK
0216 3005   DCA Z CLSUBR                  /CLSUBR NOW POINTS TO CORRECT CLOCK
                                           /SUBROUTINE
0217 3136   DCA Z TIMEOUT                  /RESET TIME-OUT ADDRESS POINTER
0220 3007   DCA FSTPAS                    /RESET FIRST PASS INDICATOR

```

/RESET AND DISABLE ALL CLOCK FLAGS, (64X2)

```

0221 6422   TT1OFF
0222 6432   TT2OFF
0223 6442   TT3OFF
0224 6452   TT4OFF

```

/ENABLE SELECTED CLOCK

```

0225 1137   TAD Z CLOCK
0226 7106   CLL RTL
0227 7004   RAL
0230 1352   TAD ALLCLK
0231 3232   DCA CLRFLG
0232 6424   CLRFLG,     6424                /THIS INSTRUCTION IS MODIFIED TO ENABLE
0233 1007   TAD Z FSTPAS                    /SPECIFIED CLOCK
0234 6001   INTON,     ION                  /ENABLE THE INTERRUPT SYSTEM
0235 7640   SZA CLA
0236 5241   JMP TIMER+1                    /DON'T RESET COUNT IF FSTPAS IS ONE
0237 5240   JMP TIMER

```

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/CLOCK INTERRUPT TIMER

```

0240 3006 TIMER,          DCA COUNT                      /RESET INTERRUPT TIMER
0241 1354   TAD M412
0242 3353   DCA PASS                      /PRESET INTERRUPT TIME OUT COUNTER
0243 1006 ADD,          TAD COUNT
0244 1355   TAD TIME                      /TIME EQUALS 15 MICROSECONDS (DECIMAL)
0245 3006   DCA COUNT
0246 7000   NOP
0247 2353   ISZ PASS                      /GO TO TIME OUT ROUTINE IF PASS EQUALS 0
0250 5243   JMP ADD

```

/COME HERE IF INTERRUPT TIME OUT RESULTS

```

0251 6002   IOF                      /DISABLE INTERRUPT SYSTEM
0252 1136   TAD Z TIMEOUT              /EXAMINE TIME OUT STATUS INDICATOR
0253 7440   SZA
0254 5744   JMP I AEXIT                /TIME OUT EXPECTED

```

/TIMEOUT NOT EXPECTED

```

0255 4020   JMS Z SR0                      /DO WE HALT ON ERRORS? (S.R.0 SET)
0256 5213   JMP RESTRT                  /NO! RESTART TEST
0257 7402   ECT4,          HLT          /NO INTERRUPT FROM SELECTED CLOCK
/OPERATOR MAY RESTART TEST BY DEPRESSING CONTINUE
0260 5213   JMP RESTRT

```

/INTERRUPT SUBROUTINE-CLOCK1

```

0261 6431   CLOCK1,          TT2SKP          /SKIP IF WRONG CLOCK FLAG SET (CLOCK
0262 5264   JMP .+2
0263 5101   JMP Z ERCL2              /CLOCK 2 FLAG SET
0264 6441   TT3SKP                  /SKIP IF WRONG CLOCK FLAG SET, (CLOCK 3)
0265 5267   JMP .+2
0266 5110   JMP Z ERCL3              /CLOCK 3 FLAG SET
0267 6451   TT4SKP                  /SKIP IF WRONG CLOCK FLAG SET, (CLOCK 4)
0270 5272   JMP .+2
0271 5117   JMP Z ERCL4              /CLOCK 4 FLAG SET
/VERIFY THAT SPECIFIED CLOCK CAUSED INTERRUPT
0272 6421   TT1SKP
0273 5132   JMP Z NOFLAG              /NO CLOCK FLAG SET
0274 5741   JMP I CLOKOK              /INTERRUPT CAUSED BY CORRECT CLOCK

```

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```

/INTERRUPT SUBROUTINE - CLOCK 2
0275 6421 CLOCK2, TT1SKP /SKIP IF WRONG CLOCK FLAG SET, (CLOCK1)
0276 5300 JMP .+2
0277 5067 JMP Z ERCL1 /CLOCK 1 FLAG SET
0300 6441 TT3SKP /SKIP IF WRONG CLOCK FLAG SET (CLOCK 3)
0301 5303 JMP .+2
0302 5110 JMP Z ERCL3 /CLOCK 3 FLAG SET
0303 6451 TT4SKP /SKIP IF WRONG CLOCK FLAG SET (CLOCK 4)
0304 5306 JMP .+2
0305 5117 JMP Z ERCL4 /CLOCK 4 FLAG SET
/VERIFY THAT SPECIFIED CLOCK CAUSED INTERRUPT
0306 6431 TT2SKP
0307 5132 JMP Z NOFLAG /NO CLOCK FLAG SET
0310 5741 JMP I CLOKOK /INTERRUPT CAUSED BY CORRECT CLOCK

/INTERRUPT SUBROUTINE - CLOCK 3
0311 6421 CLOCK3, TT1SKP /SKIP IF WRONG CLOCK FLAG SET, (CLOCK 1)
0312 5314 JMP .+2
0313 5067 JMP Z ERCL1 /CLOCK 1 FLAG SET
0314 6431 TT2SKP /SKIP IF WRONG CLOCK FLAG SET, (CLOCK 2)
0315 5317 JMP .+2
0316 5101 JMP Z ERCL2 /CLOCK 2 FLAG SET
0317 6451 TT4SKP /SKIP OF WRONG CLOCK FLAG SET (CLOCK 4)
0320 5322 JMP .+2
0321 5117 JMP Z ERCL4 /CLOCK 4 FLAG SET
/VERIFY THAT SPECIFIED CLOCK CAUSED INTERRUPT
0322 6441 TT3SKP
0323 5132 JMP Z NOFLAG /NO CLOCK FLAG SET
0324 5741 JMP I CLOKOK /INTERRUPT CAUSED BY CORRECT CLOCK

/INTERRPT SUBROUTINE - CLOCK 4
0325 6421 CLOCK4, TT1SKP /SKIP IF WRONG CLOCK FLAG SET (CLOCK )
0326 5330 JMP .+2
0327 5067 JMP Z ERCL1 /CLOCK 1 FLAG SET
0330 6431 TT2SKP /SKIP IF WRONG CLOCK FLAG SET (CLOCK 2)
0331 5333 JMP .+2
0332 5101 JMP Z ERCL2 /CLOCK 2 FLAG SET
0333 6441 TT3SKP /SKIP IF WRONG CLOCK FLAG SET (CLOCK 3)
0334 5336 JMP .+2
0335 5110 JMP Z ERCL3 /CLOCK 3 FLAG SET
/VERIFY THAT SPECIFIED CLOCK CAUSED INTERRUPT
0336 6451 TT4SKP
0337 5132 JMP Z NOFLAG /NO CLOCK FLAG SET
0340 5741 JMP I CLOKOK /INTERRUPT CAUSED BY CORRECT CLOCK

0341 0400 CLOKOK, COMCLK

```

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```

0342 0007 MASK1,      0007
0343 7773 M5,        -5
0344 0470 AEXIT,     EXIT

                                /INTERRUPT ADDRESS POINTER
0345 0345 JMPADD,     JMPCL1-1

                                /JUMP TO SPECIFIED CLOCK SUBROUTINE
0346 5261 JMPCL1,     JMP CLOCK1
0347 5275     JMP CLOCK2
0350 5311     JMP CLOCK3
0351 5325     JMP CLOCK4

0352 6414 ALLCLK,     6414
0353 0000 PASS,      0                                /NO INTERRUPT TIME OUT COUNTER
0354 7366 M412,     -412
0355 0017 TIME,     17                                /OCTAL TIME, IN MICROSECONDS, REQUIRED
                                                /FOR ONE TIMER LOOP

```

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```

*400
/INTERRUPT ROUTINE - ALL CLOCKS
0400 7300 COMCLK,      CLL CLA
0401 1136 TAD Z TIMOUT      /CHECK CLOCK INTERRUPT STATUS
0402 7640 SZA CLA
0403 5264 JMP INTERR          /JUMP TO ERROR ROUTINE
0404 1007 TAD Z FSTPAS      /IS THIS THE 1ST INTERRUPT?
0405 7640 SZA CLA
0406 5217 JMP NORMAL          /THIS IS NOT THE 1ST INTERRUPT

/FIRST INTERRUPT FROM SPECIFIED CLOCK
0407 1234 TAD M10
0410 3237 DCA INTCNT        /PRESET PASS COUNTER
0411 1241 TAD ATABLE
0412 3240 DCA STORE          /PRESET ADDRESS OF COUNT STORAGE
0413 2007 ISZ Z FSTPAS
0414 1235 TAD P142          /PRESET COUNT BEFORE RE-ENTERING TIMER
0415 3006 DCA Z COUNT
0416 5476 JMP I Z ACLFLG      /RETURN TO INTERRUPT TIMER

/COME HERE FOR NORMAL INTERRUPT PASS
0417 4042 NORMAL,      JMS Z SR1          /SCOPE MODE? (SR1 SET)
0420 5223 JMP .+3          /NO
0421 3006 DCA Z COUNT      /YES; ENABLE AND CLEAR CLOCK FLAG AND
0422 5476 JMP I Z ACLFLG      /RETURN TO TIMER

0423 2240 ISZ STORE
0424 1006 TAD Z COUNT
0425 3640 DCA I STORE      /STORE INTERRUPT TIME INTERVAL
0426 2237 ISZ INTCNT        /IS THIS THE EIGHTH INTERRUPT PASS?
0427 5231 JMP .+2          /NO
0430 5252 JMP LSTPAS        /YES, DISABLE CLOCK FLAG
0431 1236 TAD P161
0432 3006 DCA Z COUNT      /PRESET COUNT BEFORE RE-ENTERING TIMER
0433 5476 JMP I Z ACLFLG      /RETURN TO TIMER

/PG2 - CONSTANTS AND VARIABLES
0434 7770 M10,          -10
0435 0142 P142,         0142
0436 0161 P161,         0161
0437 0000 INTCNT,       0
0440 0000 STORE,        0
0441 0441 ATABLE,       TIMTBL-1

0442 0000 TIMTBL,       0          /INTERRUPT TIME INTERVALS FOR EIGHT
0443 0000 0             /SUCCESSIVE PASSES WILL BE STORED IN
0444 0000 0             /THIS TABLE
0445 0000 0
0446 0000 0
0447 0000 0
0450 0000 0
0451 0000 0

```


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```

/COME HERE FOR EIGHTH INTERRUPT PASS
0452 2136 LSTPAS, ISZ Z TIMOUT /UPDATE INTERRUPT AND TIME-OUT STATUS
0453 1137 TAD Z CLOCK
0454 7106 CLL RTL
0455 7004 RAL
0456 1263 TAD TTXOFF
0457 3260 DCA .+1
0460 6422 DISABL, TT1OFF /INSTRUCTION IS MODIFIED FOR SPECIFIED CLOCK
0461 3006 DCA Z COUNT /RESET INTERRUPT TIMER
0462 5500 JMP I Z AINTON /RETURN TO TIMER

0463 6412 TTXOFF, 6412

/COME HERE IF INTERRUPT OCCURS AFTER
/CLOCK HAS BEEN DISABLED

0464 4020 INTERR, JMS Z SR0 /DO WE HALT ON ERROR? (SR.0 SFT)
0465 5260 JMP DISABLE /NO. DISABLE CLOCK AND CONTINUE
0466 7402 ECT5, HLT /INTERRUPT FROM SPECIFIED CLOCK AFTER
/CLOCK HAD BEEN DISABLED

0467 5260 JMP DISABLE

/EXIT FROM CLOCK TEST
0470 4051 EXIT, JMS Z SR2 /DO WE TYPE?
0471 5310 JMP NOTYPE /NO
/TYPE INTERRUPT TIME INTERVALS
0472 1234 TAD M10
0473 3237 DCA INTCNT /PRESET PASS COUNTER
0474 1241 TAD ATABLE
0475 3240 DCA STORE /PRESET ADDRESS OF COUNT STORAGE
0476 6046 TLS /INITIALIZE TTY
0477 4314 JMS CRLF
0500 4332 JMS HEADER
0501 4314 JMS CRLF
0502 2240 GETNXT, ISZ STORE
0503 1640 TAD I STORE /GET TIME TO BE TYPED
0504 4763 JMS I ADEC /CONVERT TIME TO DECIMAL AND TYPE
0505 2237 ISZ INTCNT
0506 5302 JMP GETNXT
0507 4314 JMS CRLF

/ALL TIMES ARE NOW TYPED
0510 4060 NOTYPE, JMS SR3 /DO WE REPEAT CLOCK TEST? (SR3 RESET)
0511 5477 JMP I ARSTR /YES, REPEAT
0512 7402 ECT, HLT /END OF 680 CLOCK TEST
0513 5477 JMP I ARSTR /DEPRESS CONTINUE TO REPEAT CLOCK TEST

```

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```

/SEND CR AND LF
0514 0000 CRLF,      0
0515 1322   TAD CR
0516 4324   JMS TYPE
0517 1323   TAD LF
0520 4324   JMS TYPE
0521 5714   JMP I CRLF

0522 0215 CR,      215
0523 0212 LF,      212
```

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```

/TRANSMIT SUBROUTINE
0524 0000 TYPE,      0
0525 6041 TSF
0526 5325 JMP .-1
0527 6046 TLS /TRANSMIT CONTENTS OF AC4-AC11
0530 7300 CLA CLL
0531 5724 JMP I TYPE
/TYPE CLOCK NUMBER
0532 0000 HEADER,   0
0533 1352 TAD ALETR
0534 3353 DCA GETLTR
0535 1137 TAD Z CLOCK
0536 1362 TAD ASCI
0537 3361 DCA LETTR+5
0540 1351 TAD M6
0541 3350 DCA FINISH
0542 1753 TAD I GETLTR /PLACE ASCII CHARACTER IN AC
0543 4324 JMS TYPE
0544 2353 ISZ GETLTR
0545 2350 ISZ FINISH /HAS THE LAST CHAR BEEN TYPED
0546 5342 JMP .-4 /NO, TYPE NEXT
0547 5732 JMP I HEADER /YES, RETURN TO MAIN PROGRAM

0550 0000 FINISH,   0

0551 7772 M6,      -6
0552 0554 ALETR,   LETTR
0553 0000 GETLTR,   0

0554 0303 LETTR,    0303 /C
0555 0314 0314 /L
0556 0317 0317 /O
0557 0303 0303 /C
0560 0313 0313 /K
0561 0000 0000 /1,2,3, OR 4

0562 0260 ASCI,    0260
0563 0600 ADEC,    DEC

```

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PAUSE

/680 DCS EXPANDED STATIC TEST - TAPE 2
*600

/OCTAL TO DECIMAL CONVERSION ROUTINE

```

0600 0000 DEC,      0
0601 3222   DCA WORK          /STORE OCTAL TIME
0602 3223   DCA ANSR
0603 1224   TAD ADRAKA
0604 3225   DCA PUTBAK
0605 1226   TAD ASURTR
0606 3227   DCA AWAY
0607 4241   JMS CONVRT        /TYPE THOUSANDS
0610 4241   JMS CONVRT        /TYPE HUNDREDS
0611 4241   JMS CONVRT        /TYPE TENS
0612 1222   TAD WORK
0613 1230   TAD ASCII
0614 4632   JMS I ATYPE       /TYPE UNITS
0615 1231   TAD SPACE
0616 4632   JMS I ATYPE
0617 1231   TAD SPACE
0620 4632   JMS I ATYPE       /TYPE TWO SPACES
0621 5600   JMP I DEC         /GO GET NEXT OCTAL TIME

0622 0000 WORK,      0
0623 0000 ANSR,      0
0624 0633 ADRAKA,    ADRAK
0625 0000 PUTBAK,    0
0626 0636 ASURTR,    SURTR
0627 0000 AWAY,      0
0630 0260 ASCII,     0260
0631 0240 SPACE,     0240
0632 0524 ATYPE,     TYPE

0633 1750 ADPAK,      1750          /+1000
0634 0144  0144          /+100
0635 0012  0012          /+12
0636 6030 SURTR,       6030          /-1000
0637 7634  7634          /-100
0640 7766  7766          /-10

```

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```

0641 0000 CONVRT,      0
0642 1222 TAD WORK
0643 1627 TAD I AWAY          /SUBTRACT 1000, 100, OR 10
0644 7420 SNL
0645 5251 JMP .+4
0646 2223 ISZ ANSR
0647 7100 CLL
0650 5243 JMP .-5
0651 1625 TAD I PUTBAK      /ADD BACK 1000, 100, OR 10
0652 3222 DCA WORK          /STORE REMAINDER
0653 1223 TAD ANSR
0654 1230 TAD ASCII          /CONVERT RESULTS TO ASCII CODE
0655 4632 JMS I ATYFE
0656 3223 DCA ANSR          /CLEAR ANSR.
0657 2227 ISZ AWAY
0660 2225 ISZ PUTBAK
0661 5641 JMP I CONVRT

```

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*674

/IOT INSTRUCTION DEFINITIONS

TTCL=6411 /CLEAR LSR TO ZERO. (685)
 TTSL=6412 /INCLUSIVE OR AC5-11 WITH LSR0-6 (685)
 TTRL=6414 /INCLUSIVE OR LSR0-6 WITH AC6-11 (685)
 TTINCR=6401 /INCREMENT LSR BY 1 (681 AND 685)
 TTI=6402 /RECEIVE DATA (681)
 TTO=6404 /TRANSMIT DATA (681)

/681-685 DEVICE SELECTION TEST. (TEST DST)

/DSTA
 0674 7300 ST685, CLA CLL /VERIFY THAT DEV. SEL. 41 DOES NOT
 /SELECT 681
 0675 1351 TAD C4000
 0676 3136 DCA Z TIMEOUT /PRESET INTERRUPT STATUS
 0677 6001 ION
 0700 1351 TAD C4000
 0701 6414 TTRL /SELECT 685. AC0 SHOULDN'T BE AFFECTED
 0702 6352 AND C6000
 0703 3140 DCA Z STORAC /STORE CONTENTS OF AC
 0704 4042 JMS Z SR1 /SCOPE REPEAT? (SR1 SET)
 0705 5307 JMP .+2 /NO
 0706 5274 JMP ST685 /YES
 0707 1140 TAD Z STORAC
 0710 1353 TAD M4000 /DOES AC EQUAL 4000?
 0711 7440 SZA
 0712 5316 JMP ERDSTA /NO
 0713 4051 JMS Z SR2 /YES, VERIFY REPEAT? (SR2 SET)
 0714 5324 JMP DSTH /NO
 0715 5274 JMP ST685 /YES, REPEAT DSTA
 /DSTA FAILED
 0716 4020 ERDSTA, JMS Z SR0 /HALT ON ERROR? (SR0 SET)
 0717 5313 JMP .-4 /NO
 0720 7100 CLL
 0721 1140 TAD Z STORAC /YES
 0722 7402 ERDST1, HLT
 0723 5274 JMP ST685 /IOT 6414 SHOULD NOT EFFECT AC0
 /REPEAT DSTA

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```

0724 7300 /DSTR
DSTB,          CLA CLL          /VERIFY THAT DEV. SEL. 40 DOES NOT
                                /SELECT 685
0725 1354 TAD C177
0726 6412 TTSL                    /LOAD ONES INTO LSR
0727 7300 CLA CLL
0730 6404 TIO                    /SHOULD LEAVE AC EQUAL TO ZERO
0731 3140 DCA Z STORAC          /STORE AC
0732 4042 JMS Z SR1            /SCOPE REPEAT? (SR1 SET)
0733 5335 JMP .+2                /NO
0734 5324 JMP DSTB              /YES
0735 1140 TAD Z STORAC          /DOES AC EQUAL ZERO?
0736 7440 SZA
0737 5343 JMP ERDSTB            /NO
0740 4051 JMS Z SR2            /YES; VERIFY REPEAT? (SR2 SET)
0741 5350 JMP ERDSTB            /NO
0742 5324 JMP DSTB              /REPEAT DSTB

                                /DSTR FAILED
0743 4020 ERDSTB,          JMS Z SR0          /HALT ON ERROR? (SR0 SET)
0744 5340 JMP .-4                /NO
0745 1140 TAD Z STORAC          /YES
0746 7402 ERDSTB,          HLT                    /AC=0 BEFORE IOT 6404 WAS EXECUTED
0747 5324 JMP DSTB              /REPEAT DSTB

0750 5755 EXDST,          JMP I ALSRTS          /ENTER LINE SEL. REG. TEST

0751 4000 C4000,          4000
0752 6000 C6000,          6000
0753 4000 M4000,          -4000
0754 0177 C177,          0177
0755 1000 ALSRTS,          LSRTST

                                /RING BELL AFTER 680 TEST CYCLFS IF SR5 IS SET
0756 7604 RING,          CLA OSR
0757 0374 AND MSKSR5
0760 7650 SNA CLA
0761 5274 JMP ST685                /SR5 RESET

0762 2375 ISZ RNGCNT
0763 1375 TAD RNGCNT
0764 1376 TAD M1253
0765 7640 SZA CLA
0766 5274 JMP ST685
0767 3375 DCA RNGCNT
0770 1373 TAD BELCHA
0771 6046 TLS                    /RING BELL
0772 5274 JMP ST685

0773 0207 BELCHA,          0207
0774 0100 MSKSR5,          0100
0775 0000 RNGCNT,          0
0776 6525 M1253,          -1253

```

MAINDEC-08-D71A-LA

*1000

/685 LINE SELECTION REGISTER TEST (LSRTST)
/TEST LSRA

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1000 7340 LSRTST,      CLL CLA CMA          /7777 TO AC
1001 6412      TTSL                      /AC SHOULD BE CLEARED TO ZERO
1002 3140      DCA Z STORAC              /STORE AC
1003 4042      JMS Z SR1                  /SCOPE REPEAT? (SR1 SET)
1004 5206      JMP .+2                    /NO
1005 5200      JMP LSRTST                /YES
1006 1140      TAD Z STORAC              /DOES AC EQUAL ZERO?
1007 7440      SZA
1010 5214      JMP ERLSRA                /NO
1011 4051      JMS Z SR2                  /YES; VERIFY REPEAT? (SR2 SET)
1012 5223      JMP LSRH                  /NO, ENTER NEXT TEST
1013 5200      JMP LSRTST                /YES, REPEAT TEST LSRA

1014 4020      /TEST LSRA FAILED
1015 5211      ERLSRA,      JMS Z SR0          /HALT ON ERROR? (SR0 SET)
1016 1140      JMP .-4                    /NO
1017 7402      TAD Z STORAC
1018 5200      FRLSR1,      HLT              /IOT 6412 DID NOT CLEAR AC TO 0
1019 5200      JMP LSRTST                /REPEAT TEST LSRA

1021 7777      C7777,      7777
1022 6001      M7777,      -7777

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1023 7340      /TEST LSRB
1024 6411      LSRB,      CLL CLA CMA          /7777 TO AC
1025 3140      TTCL                      /AC SHOULD NOT BE AFFECTED
1026 4042      DCA Z STORAC              /STORE AC
1027 5231      JMS Z SR1                  /SCOPE MODE? (SR1 SET)
1028 5231      JMP .+2                    /NO
1029 5223      JMP LSRB                  /YES
1030 1140      TAD Z STORAC
1031 1222      TAD M7777                  /DOES AC EQUAL 7777?
1032 7440      SZA
1033 5240      JMP ERLSRB                /NO
1034 4051      JMS Z SR2                  /YES; VERIFY REPEAT? (SR2 SET)
1035 5246      JMP LSRC                  /NO, ENTER NEXT TEST
1036 5223      JMP LSRB                  /YES, REPEAT LSRB

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1040 4020      /TEST LSRB FAILED
1041 5235      ERLSRB,      JMS Z SR0          /HALT ON ERROR? (SR0 SET)
1042 7100      JMP .-4                    /NO
1043 1140      CLL
1044 7402      TAD Z STORAC
1045 5223      FRLSR2,      HLT              /AC = 7777 BEFORE IOT 6411 WAS EXECUTED
1046 5223      JMP LSRB

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/TEST LSRC - READ LSR INTO AC, (INCLUSIVE OR)
1046 7240 LSRC,          CLA CMA          /7777 TO AC
1047 6414     TTRL          /AC SHOULD NOT BE AFFECTED
1050 3140     DCA Z STORAC
1051 4042     JMS Z SR1          /SCOPE REPEAT? (SR1 SET)
1052 5254     JMP .+2          /NO
1053 5246     JMP LSRC          /YES
1054 1140     TAD Z STORAC
1055 1222     TAD M7777          /DOES AC EQUAL 7777?
1056 7440     SZA
1057 5263     JMP FRLSRC          /NO
1060 4051     JMS Z SR2          /YES; VERIFY REPEAT? (SR2 SET)
1061 5271     JMP LSRC          /NO, ENTER NEXT TEST
1062 5246     JMP LSRC          /YES, REPEAT TEST LSRC

/TEST LSRC FAILED
1063 4020     FRLSRC,        JMS Z SR0          /HALT ON ERROR? (SR0 SET)
1064 5260     JMP .-4
1065 7100     CLL
1066 1140     TAD Z STORAC
1067 7402     FRLSR3,        HLT          /AC = 7777 BEFORE IOT 6414 WAS EXECUTED
1070 5246     JMP LSRC

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```

/TEST LSR0 - TRY TO LOAD AND READ LSR
L071 7340 LSR0,      CLL CLA CMA      /7777 TO AC
L072 6412 TTSL      /AC5-11 TO LSR, THEN RESET AC
L073 7440 SZA      /WAS AC RESET TO ZERO?
L074 6311 JMP FRACD      /NO
L075 6414 DCNTNU,   TTRL      /YES, NOW READ LSR INTO AC5-11
L076 6140 DCA Z STORAC
L077 4042 JMS Z SR1      /SCOPE REPEAT? (SR1 SET)
L100 6302 JMP ,+2      /NO
L101 6271 JMP LSR0      /YES
L102 1140 TAD Z STORAC
L103 1324 TAD M177      /DOES AC EQUAL 0177?
L104 7440 SZA
L105 6315 JMP FRLSR0     /NO
L106 6051 DNEXT,    JMS Z SR2      /YES, VERIFY REPEAT? (SR2 SET)
L107 6325 JMP LSRE
L110 6271 JMP LSR0      /NO, ENTER NEXT TEST
                               /YES, REPEAT TEST LSR0

/TTSL INSTRUCTION DID NOT CLEAR AC
L111 6020 FRACD,    JMS Z SR0      /HALT ON ERROR? (SR0 SET)
L112 6275 JMP DCNTNU     /NO
L113 7402 ERAC1,   HLT      /HALT, NO AC INTERPRETATION
L114 6200 JMP LSPTST     /REPEAT TEST LSRA

/TEST LSR0 FAILED
L115 4020 FRLSR0,   JMS Z SR0      /HALT ON ERROR? (SR0 SET)
L116 6306 JMP DNEXT      /NO
L117 7100 CLL
L120 1140 TAD Z STORAC
L121 7402 FRLSR4,   HLT      /AC AND LSR SHOULD EQUAL 177
L122 6271 JMP LSR0      /REPEAT TEST LSR0

L123 6177 C1770,    0177
L124 7601 M177,     -0177

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```

/TEST LSRE - CHECK LSR INCLUSIVE OR LOADING
1125 7300 LSRE,      CLA CLL
1126 1323 TAD C177D
1127 6412 TTSL          /AC5-11 TO LSR, THEN RESET AC
1130 3141 DCA Z AUXAC  /STORE AC
1131 1323 TAD C177D
1132 6412 TTSL
1133 7440 SZA          /WAS AC RESET?
1134 5354 JMP FRACE          /NO
1135 1141 TAD Z AUXAC  /WAS AC RESET BY 1ST TTSL?
1136 7440 SZA
1137 5354 JMP FRACE          /NO
1140 6414 ENFXT1,     TTRL          /AC WAS RESET, NOW READ LSR
1141 3140 DCA Z STORAC /STORE RESULTS OF READ
1142 4042 JMS Z SR1          /SCOPE REPEAT? (SR1 SET)
1143 5345 JMP .+2          /NO
1144 5325 JMP LSRE          /YES
1145 1140 TAD Z STORAC
1146 1324 TAD M177          /DOES AC EQUAL 0177?
1147 7440 SZA
1150 5360 JMP FRLSRE          /NO
1151 4051 ENEXT2,     JMS Z SR2          /YES, VERIFY REPEAT? (SR2 SET)
1152 5766 JMP I ALSRF          /NO, ENTER NEXT TEST
1153 5325 JMP LSRE          /YES, REPEAT TEST LSRE

/AC NOT RESET BY TTSL
1154 4020 FRACE,      JMS Z SR0          /HALT ON ERROR? (SR0 SET)
1155 5340 JMP ENEXT1          /NO
1156 7402 FRAC2,     HLT
1157 5200 JMP LSRTST          /YES, REPEAT LSRA

/TEST LSRE FAILED
1160 4020 ERLSRE,     JMS Z SR0          /HALT ON ERROR? (SR0 SET)
1161 5351 JMP ENEXT2          /NO
1162 7100 CLL
1163 1140 TAD Z STORAC
1164 7402 FRLSR5,    HLT          /AC AND LSR SHOULD EQUAL 177
1165 5325 JMP LSRE

1166 1200 ALSRF,     LSRF

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#1200

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/TEST LSRF - SUCCESSIVELY LOAD LSR WITH 177 AND 000.
1270 7340 LSRF,      CLL CLA CMA      /7777 TO AC
1271 7412 TTSL                /AC5-11 TO LSR
1272 8141 BCA Z AUXAC          /STORE AC
1273 8412 TTSL                /AC5-11 (0) TO LSR
1274 7440 SZA                  /IS AC STILL ZERO
1275 8225 JMP FRACF            /NO
1276 1141 TAD Z AUXAC          /WAS AC RESET BY 1ST TTSL?
1277 7440 SZA
1278 8225 JMP FRACF            /NO
1279 8414 FNEXT1,      TTSL      /AC PROPERLY RESET, NOW READ LSR
1280 8140 BCA Z STORAC        /STORE READ RESULT
1281 4042 JMS Z SR1            /SCOPE REPEAT? (SR1 SET)
1282 8216 JMP .+2                /NO
1283 8200 JMP LSRF              /YES
1284 1140 TAD Z STORAC
1285 1237 TAD M177A            /DOES AC EQUAL 177?
1286 7440 SZA                  /SKIP IF EQUAL
1287 8231 JMP FRI SRF          /NO
1288 4051 FNEXT2,      JMS Z SR2      /VERIFY REPEAT? (SR2 SET)
1289 8240 JMP LSRG              /NO
1290 8200 JMP LSRF              /YES

/AC NOT RESET BY TTSL
1291 4020 FRACF,      JMS Z SR0      /HALT ON ERROR? (SR0 SET)
1292 8211 JMP FNEXT1            /NO
1293 7402 FRAC3,      HLT
1294 8766 JMP I ALSRA          /REPEAT TEST LSRA

/TEST LSRF FAILED
1295 4020 ERLSRF,      JMS Z SR0      /HALT ON ERROR?
1296 8222 JMP FNEXT2            /NO
1297 7100 CLL
1298 1140 TAD Z STORAC
1299 7402 ERLSR6,      HLT
1300 8200 JMP LSRF              /AC AND LSR SHOULD EQUAL 177
/REPEAT TEST LSRF

1301 7601 M177A,      -177

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```

/TEST LSRG - TRY TO CLEAR LSR
1240 7340 LSRG,          CLL CLA CMA          /7777 TO AC
1241 6412 TTSL          /AC5-11 TO LSR
1242 7440 SZA          /WAS AC CLEARED TO ZERO?
1243 5260 JMP FRACG          /NO
1244 6411 GNEXT1,      TTCL          /RESET LSR TO ZFRO
1245 6414 TTPL          /READ CONTENTS OF LSR
1246 3140 DCA ≠ STORAC /STORE READ RESULTS
1247 4042 JMS ≠ SR1          /SCOPE REPEAT? (SR1 SET)
1250 5252 JMP .+2          /NO
1251 5240 JMP LSRG          /YES
1252 1140 TAD ≠ STORAC
1253 7440 SZA          /DOES AC EQUAL ZERO?
1254 5264 JMP ERLSRG          /NO
1255 4051 GNEXT2,      JMS ≠ SR2          /VERIFY REPEAT? (SR2 SET)
1256 5271 JMP LSRH          /NO
1257 5240 JMP LSRG          /YES

/AC NOT RESET BY TTSL
1260 4020 FRACG,      JMS ≠ SR0          /HALT ON ERROR? (SR0 SET)
1261 5244 JMP GNEXT1          /NO
1262 7402 FRAC4,      HLT
1263 5766 JMP I ALSRA          /REPEAT TEST LSRA

/TEST LSRG FAILED
1264 4020 ERLSRG,      JMS ≠ SR0          /HALT ON ERROR? (SR0 SET)
1265 5255 JMP GNEXT2          /NO
1266 1140 TAD ≠ STORAC
1267 7402 ERLSR7,      HLT          /IOT 6411 DID NOT CLEAR LSR
1270 5240 JMP LSRG          /REPEAT TEST LSRG

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/TEST LSRH - SET LSR 0, 2, 4 AND 6 TO ONE

| | | | | |
|------|------|-----------------------|-----------|------------------------------|
| 1271 | 6411 | LSRH, | TTCL | /RESET LINE SELECTION REG |
| 1272 | 7300 | CLA CLL | | |
| 1273 | 1325 | TAD C125 | | |
| 1274 | 6412 | TTSL | | /AC5-11 TO LSP |
| 1275 | 7440 | SZA | | /DID TTSL RESET AC? |
| 1276 | 6313 | JMP ERACH | | /NO |
| 1277 | 6414 | HNEXT1, | TTRL | /READ LSR TO AC |
| 1300 | 3140 | DCA Z | STORAC | /STORE READ RESULTS |
| 1301 | 4042 | JMS Z | SR1 | /SCOPE REPEAT? (SR1 SET) |
| 1302 | 6304 | JMP .+2 | | /NO |
| 1303 | 6271 | JMP LSRH | | /YES |
| 1304 | 1140 | TAD Z | STORAC | |
| 1305 | 1326 | TAD M125 | | /DOFS AC EQUAL 0125? |
| 1306 | 7440 | SZA | | /SKIP IF EQUAL |
| 1307 | 6317 | JMP ERLSRH | | /NO |
| 1310 | 4051 | HNEXT2, | JMS Z SR2 | /VERIFY REPEAT? (SR2 SET) |
| 1311 | 6327 | JMP LSR1 | | /NO |
| 1312 | 6271 | JMP LSRH | | /YES |
| | | /AC NOT RESET BY TTSL | | |
| 1313 | 4020 | ERACH, | JMS Z SR0 | /HALT ON ERROR? (SR0 SET) |
| 1314 | 6277 | JMP HNEXT1 | | /NO |
| 1315 | 7402 | ERAC5, | HLT | /YES |
| 1316 | 6766 | JMP I | ALSRA | /REPEAT TEST LSRA |
| | | /TEST LSRH FAILED | | |
| 1317 | 4020 | ERLSRH, | JMS Z SR0 | /HALT ON ERROR? (SR0 SET) |
| 1320 | 6310 | JMP HNEXT2 | | /NO |
| 1321 | 7100 | CLL | | |
| 1322 | 1140 | TAD Z | STORAC | |
| 1323 | 7402 | ERLSR8, | HLT | /AC AND LSR SHOULD EQUAL 125 |
| 1324 | 6271 | JMP LSRH | | /REPEAT TEST LSRH |
| 1325 | 0125 | C125, | 0125 | |
| 1326 | 7653 | M125, | -0125 | |

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/TFST LSRI - SFT LSRI, 3 AND 5 TO ONE

```

1327 6411 LSRI,      TTCL                      /RESET LSR
1330 7300   CLA CLL
1331 1363   TAD 0052
1332 6412   TTSL                      /AC5-11 TO LSR
1333 7440   SZA                      /DID TTSL RESET AC?
1334 5351   JMP ERACI                      /NO
1335 6414   INFXT1,   TTCL                /READ LSR TO AC
1336 3140   DCA Z STORAC                 /STORE TEST RESULT
1337 4042   JMS Z SR1                    /SCOPE REPEAT? (SR1 SET)
1340 5342   JMP .+2                      /NO
1341 5327   JMP LSRI                      /YES
1342 1140   TAD Z STORAC
1343 1364   TAD M052                      /DOES AC EQUAL 052?
1344 7440   SZA
1345 5355   JMP ERLSRI                    /NO
1346 4051   INFXT2,   JMS Z SR2          /VERIFY REPEAT? (SR2 SET)
1347 5765   JMP I ALSRJ                  /NO, ENTER NEXT TEST
1350 5327   JMP LSRI                      /YES, REPEAT TEST LSRI

1351 4020   /AC NOT RESET BY TTSL
ERACI,      JMS Z SR0                      /HALT ON ERROR? (SR0 SET)
1352 5335   JMP INFXT1                    /NO
1353 7402   ERAC6,   HLT
1354 5766   JMP I ALSRA                  /REPEAT TEST LSRA

1355 4020   /TFST LSRI FAILED
ERLSRI,    JMS Z SR0                      /HALT ON ERROR? (SR0 SET)
1356 5346   JMP INFXT2                    /NO
1357 7100   CLL
1360 1140   TAD Z STORAC
1361 7402   ERLSR9,   HLT                      /AC AND LSR SHOULD EQUAL 052
1362 5327   JMP LSRI                      /REPEAT TEST LSRI

1363 4052   0052,      0052
1364 7726   M052,     -0052
1365 1400   ALSRJ,    LSRJ

1366 1000   ALSRA,    LSRTST

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*1400

/TEST LSRJ - CLEAR, LOAD AND READ LSR (IOT 6417)

```

1400 7300 LSRJ,      CLL CLA
1401 3237   DCA LINCNT           /RESET LINE COUNT
1402 1237   TAD LINCNT
1403 6417   6417                 /CLEAR, LOAD AND READ LSR
1404 3140   DCA Z STORAC         /STORE READ RESULT
1405 4042   JMS Z SR1           /SCOPE REPEAT? (SR1 SET)
1406 5210   JMP .+2              /NO
1407 5202   JMP LSRJ+2          /REPEAT WITH SAME LINE NUMBER
1410 1237   TAD LINCNT
1411 7041   CIA                 /AC EQUALS MINUS LINCNT
1412 1140   TAD Z STORAC        /WAS CORRECT LINE COUNT READ?
1413 7440   SZA
1414 5225   JMP FRLSRJ          /NO
1415 2237   JNEXT1, ISZ LINCNT   /YES, INCREMENT LINE COUNT
1416 1237   TAD LINCNT
1417 1240   TAD M200            /HAS LINE COUNT OF 177 BEEN TESTED?
1420 7640   SZA CLA
1421 5202   JMP LSRJ+2          /NO
1422 4051   JMS Z SR2           /YES; VERIFY REPEAT?
1423 5241   JMP LSRK            /NO, ENTER NEXT TEST
1424 5200   JMP LSRJ

      /TEST LSRJ FAILED
1425 4020   FRLSRJ, JMS Z SR0    /HALT ON ERROR? (SR0 SET)
1426 5215   JMP JNEXT1          /NO
1427 7100   CLL
1430 1237   TAD LINCNT
1431 7402   FLSR10, HLT         /HALT WITH CORRECT LINE COUNT IN AC
1432 7200   CLA
1433 1140   TAD Z STORAC
1434 7402   HLT                 /HALT WITH INCORRECT TEST RESULT IN AC
1435 7200   CLA
1436 5202   JMP LSRJ+2

1437 0000   LINCNT, 0
1440 7600   M200, -0200

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/TEST LSRK - INCREMENT LSR FROM 000 TO 177

| | | | | |
|------|------|--------|---------|-------------------------------|
| 1441 | 7300 | LSR-K, | CLL CLA | |
| 1442 | 3237 | DCA | LINCNT | /CLEAR LINE COUNT |
| 1443 | 6411 | TTCL | | /CLEAR LSR TO ZERO |
| 1444 | 6401 | ADD1, | TTINCR | /INCREMENT LSR BY ONE |
| 1445 | 4042 | JMS | SR1 | /SCOPE REPEAT? (SR1 SET) |
| 1446 | 5250 | JMP | .+2 | /NO |
| 1447 | 5271 | JMP | AGAIN | /YES |
| 1450 | 2237 | ISZ | LINCNT | |
| 1451 | 1237 | TAD | LINCNT | |
| 1452 | 0313 | AND | C177K | |
| 1453 | 3237 | DCA | LINCNT | |
| 1454 | 6414 | TTRL | | /READ LSR TO AC |
| 1455 | 3140 | DCA | STORAC | /STORE AC |
| 1456 | 1237 | TAD | LINCNT | |
| 1457 | 7041 | CIA | | /AC CONTAINS - LINE COUNT |
| 1460 | 1140 | TAD | STORAC | |
| 1461 | 7440 | SZA | | /DID LSR INCREMENT CORRECTLY? |
| 1462 | 5274 | JMP | ERLSRK | /NO |

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| | | | | |
|------|------|--------------|--------------|-------------------------------------|
| 1463 | 1237 | KNEXT, | TAD LINCNT | /YES |
| 1464 | 7440 | SZA | | /DOFS LINE COUNT EQUAL 000 |
| 1465 | 5244 | JMP ADD1 | | /NO |
| 1466 | 4051 | JMS Z SR2 | | /YES; VERIFY REPEAT? (SR2 SFT) |
| 1467 | 5312 | JMP FXLSK | | /NO |
| 1470 | 5241 | JMP LSRK | | /YES, REPEAT LSRK |
| | | | | /SET UP SCOPE REPEAT |
| 1471 | 1237 | AGAIN, | TAD LINCNT | |
| 1472 | 6413 | 6413 | | /CLEAR LSR AND LOAD WITH CURRENT |
| 1473 | 5244 | JMP ADD1 | | /LINE COUNT |
| | | | | /LSR DID NOT INCREMENT CORRECTLY |
| 1474 | 4020 | FLSRK, | JMS Z SR0 | /HALT ON ERROR? (SR0 SFT) |
| 1475 | 5263 | JMP KNEXT | | /NO |
| 1476 | 7100 | CLL | | |
| 1477 | 1237 | TAD LINCNT | | |
| 1500 | 7402 | FLSR11, | HLT | /HALT WITH CORRECT LINE COUNT IN AC |
| 1501 | 7200 | CLA | | |
| 1502 | 1140 | TAD X STORAC | | |
| 1503 | 7402 | HLT | | /HALT WITH INCORRECT LINE COUNT |
| 1504 | 7200 | CLA | | /IN AC |
| 1505 | 1237 | TAD LINCNT | | |
| 1506 | 1314 | TAD M1 | | /SUBTRACT 1 FROM LINE COUNT |
| 1507 | 0313 | AND 0177K | | |
| 1510 | 7237 | DCA LINCNT | | /RETEST SAME LINE COUNT |
| 1511 | 5271 | JMP AGAIN | | |
| 1512 | 5715 | FXLSR, | JMP I ATS681 | /ENTER 681 INSTRUCTION TESTS |
| 1513 | 0177 | 0177K, | 0177 | |
| 1514 | 7777 | M1, | -0001 | |
| 1515 | 1600 | ATS681, | TS681A | |

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PAUSE

/680 DCS EXPANDED STATIC TEST - TAPE 3
/681 INSTRUCTION TEST

*1600
/TS681A - 681 NO ACTIVITY TEST (IOT 6400)

```

1600 7200 TS681A,      CLA
1601 1237   TAD OKJMP1
1602 3207   DCA NOAC+1
1603 1240   TAD FRJMP1
1604 3210   DCA NOAC+2           /PRESET JMP INSTRUCTIONS
1605 7120   CLL CML              /1 TO LINK
1606 6400   NOAC,      6400           /ADDRESS 681 BUT DEFINE NO ACTION
1607 5212   JMP NOSTAT           /THIS INSTRUCTION SHOULD BE EXECUTED
1610 5223   JMP SKIPER          /DON'T EXECUTE
1611 5227   JMP TTIER           /DON'T EXECUTE

1612 4042   NOSTAT,      JMS Z SR1           /SCOPE REPEAT? (SR1 SFT)
1613 5215   JMP .+2           /NO
1614 5200   JMP TS681A        /YES
1615 7430   SZL              /WAS THE LINK RESET?
1616 5220   JMP .+2           /NO
1617 5233   JMP TTOER          /YES
1620 4051   JMS Z SR2           /VERIFY REPEAT? (SR2 SET)
1621 5241   JMP TS681B        /NO, ENTER NEXT TEST
1622 5200   JMP TS681A        /YES, REPEAT TS681A

/INSTRUCTION FOLLOWING 6400 WAS NOT EXECUTED
1623 4020   SKIPER,      JMS Z SR0           /HALT ON ERROR? (SR0 SET)
1624 5212   JMP NOSTAT        /NO
1625 7402   FRIT01,      HLT              /HALT 1 - INCORRECT 681 SKIP ENABLE
1626 5200   JMP TS681A        /REPEAT TEST

/TWO INSTRUCTIONS FOLLOWING 6400 WERE NOT EXECUTED
1627 4020   TTIER,      JMS Z SR0           /HALT ON ERROR? (SR0 SET)
1630 5212   JMP NOSTAT        /NO
1631 7402   FRIT02,      HLT              /HALT 2 - IOT 6400 INTERPRETED AS IOT 6402
1632 5200   JMP TS681A        /REPEAT TEST

/LINK BIT WAS RESET
1633 4020   TTOER,      JMS Z SR0           /HALT ON ERROR? (SR0 SET)
1634 5220   JMP SKIPER-3      /NO
1635 7402   ERTT03,      HLT              /HALT 3 - IOT 6400 INTERPRETED AS IOT 6404
1636 5200   JMP TS681A        /REPEAT TEST

1637 5212   OKJMP1,      JMP NOSTAT
1640 5223   FRJMP1,      JMP SKIPER

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/TS681B - TTO TEST, (6404), PART 1 - CHECK ZERO THE LINK
1641 7320 TS681B,   CLA CLL CML           /0 TO AC, 1 TO LINK
1642 6404   TTO                               /CONTENTS OF LINE SELECTION REGISTER
                                           /SHOULD NOT AFFECT THIS TEST
1643 3140   DCA Z STORAC                     /STORE AC
1644 4042   JMS Z SR1                         /SCOPE REPEAT? (SR1 SET)
1645 5247   JMP .+2                            /NO
1646 5241   JMP TS681B                       /YES
1647 7430   SZL                               /WAS LINK RESET TO ZERO?
1648 5260   JMP LN0TZ                          /NO
1649 1140   TAD Z STORAC                     /YES; NOW EXAMINE AC0
1650 7500   SMA                               /SKIP IF AC0 (1)
1651 5255   JMP .+2
1652 5265   JMP AC0SET                       /LINK BIT WAS SHIFTED

1655 4051   PT1NXT,   JMS Z SR2                /TEST OK; VERIFY REPEAT? (SR1 SET)
1656 5272   JMP TS681C                       /NO, ENTER TEST PART 2
1657 5241   JMP TS681B                       /REPEAT PART 1

/LINK BIT WAS NOT RESET.
1660 4020   LN0TZ,   JMS Z SR0                /HALT ON ERROR? (SR0 SET)
1661 5255   JMP PT1NXT                       /NO
1662 1140   TAD Z STORAC                     /HALT AND DISPLAY CONTENTS OF
1663 7402   ERIT04,   HLT                     /AC FOLLOWING TTO EXECUTION
1664 5241   JMP TS681B                       /REPEAT TTO TEST, PART 1

/AC0 WAS SET TO ONE.
1665 4020   AC0SET,   JMS Z SR0                /HALT ON ERROR? (SR0 SET)
1666 5255   JMP PT1NXT                       /NO
1667 1140   TAD Z STORAC                     /HALT AND DISPLAY CONTENTS OF AC
1670 7402   ERIT05,   HLT                     /FOLLOWING TTO EXECUTION
1671 5241   JMP TS681B                       /REPEAT TTO TEST, PART 1

/TS681C - TTO TEST, PART 2 - CHECK LINK ROT. DISABLE AND RAR
1672 7320   TS681C,   CLA CLL CML           /1 TO LINK
1673 1325   TAD 04041                         /1 TO AC0 AND AC11
1674 6404   TTO                               /0 TO LINK AND RAR
1675 3140   DCA Z STORAC                     /STORE AC
1676 4042   JMS Z SR1                         /SCOPE REPEAT? (SR1 SET)
1677 5301   JMP .+2                            /NO
1700 5272   JMP TS681C                       /YES
1701 7430   SZL                               /IS LINK RESET?
1702 5312   JMP LR0TFR                       /NO
1703 1140   TAD Z STORAC                     /YES
1704 1326   TAD M2000                         /WAS AC EQUAL TO 2000 AFTER
1705 7440   SZA                               /EXECUTION OF TTO?
1706 5317   JMP SHFTR                          /NO
1707 4051   PT2NXT,   JMS Z SR2                /VERIFY REPEAT? (SR2 SET)
1710 5327   JMP TS681D                       /NO, ENTER TEST PART 3
1711 5272   JMP TS681C                       /YES, REPEAT PART 2

```

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```

/ LINK ROTATE NOT DISABLED
1712 4020 LROTFR,      JMS Z SR0           /HALT ON ERROR? (SR0 SET)
1713 5307      JMP PT2NXT           /NO
1714 1140      TAD Z STORAC
1715 7402 ERTT06,      HLT           /HALT AND DISPLAY AC TEST RESULTS
1716 5272      JMP TS681C           /REPEAT PART 2

/ RAR NOT EXECUTED CORRECTLY
1717 4020 SHFTFR,      JMS Z SR0           /HALT ON ERROR? (SR0 SET)
1720 5307      JMP PT2NXT           /NO
1721 7100      CLL
1722 1140      TAD Z STORAC
1723 7402 ERTT07,      HLT           /HALT AND DISPLAY AC TEST RESULTS
1724 5272      JMP TS681C           /REPEAT PART 2

1725 4001 C4001,      4001
1726 6000 M2000,      -2000

/ TS681 - TIO TEST, PART 3
1727 7300 TS681D,      CLA CLL
1730 1362      TAD C5252
1731 6404      TIO           /TEST RAR EXECUTION
1732 3140      DCA Z STORAC      /STORE AC
1733 4042      JMS Z SR1           /SCOPE REPEAT? (SR1 SET)
1734 5336      JMP .+2           /NO
1735 5327      JMP TS681D        /YES
1736 7430      SZL           /IS LINK STILL RESET?
1737 5347      JMP ERCML         /LINK WAS COMPLIMENTED
1740 1140      TAD Z STORAC      /LINK IS OK
1741 1363      TAD M2525         /WAS AC SHIFTED CORRECTLY
1742 7440      SZA
1743 5354      JMP ERSHFT        /NO
1744 4051 PT3NXT,      JMS Z SR2           /VERIFY REPEAT? (SR2 SET)
1745 5764      JMP I ATTITS      /NO, ENTER NEXT TEST
1746 5327      JMP TS681D        /YES, REPEAT PART 3

/ LINK BIT WAS SET TO ONE.
1747 4020 ERCML,      JMS Z SR0           /HALT ON ERROR? (SR0 SET)
1750 5344      JMP PT3NXT           /NO
1751 1140 ERTT08,      TAD Z STORAC      /CHECK FOR INCORRECT CM
1752 7402      HLT
1753 5327      JMP TS681D

/ RAR WAS NOT EXECUTED CORRECTLY.
1754 4020 ERSHFT,      JMS Z SR0           /HALT ON ERROR? (SR0 SET)
1755 5344      JMP PT3NXT           /NO
1756 7100      CLL
1757 1140      TAD Z STORAC
1760 7402 ERTT09,      HLT           /AC SHOULD EQUAL 2525
1761 5327      JMP TS681D

1762 5252 C5252,      5252
1763 5253 M2525,      -2525
1764 2000 ATTITS,      TS681E

```

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/681 INSTRUCTION TEST, (CONTINUED)

*2000

/TS681E - TTI TEST, PART 1 - CHECK IOT 6402 EXECUTION FORMAT

```

2000 7340 TS681E,      CLL CLA CMA
2001 6412     TTSL                      /PRESET LINE SELECTION REG. TO 177
2002 1232     TAD SWJMP1                 /AND CLEAR AC
2003 3207     DCA TTYIN+1
2004 1233     TAD CWJMP1
2005 5210     DCA TTYIN+2                 /PRESET ERROR JUMP INSTRUCTIONS
2006 6402     TTYIN,      TTI           /DON'T EXECUTE NEXT TWO WORDS
2007 5216     JMP FRJMP2                 /LINE STATUS WORD (LSW)
2010 5222     JMP FRJMP3                 /CHARACTER ASSEMBLY WORD (CAW)

2011 5213     JMP OKJMP2
2012 5226     JMP FRJMP4

```

/681 CORRECTLY SKIPPED LSW AND CAW

```

2013 4042     OKJMP2,      JMS Z SR1           /SCOPE REPEAT? (SR1 SET)
2014 5234     JMP TS681E
2015 5202     JMP TS681E+2                 /YES

```

/LSW WAS INTERPRETED AS AN INSTRUCTION

```

2016 4020     FRJMP2,      JMS Z SR0           /HALT ON ERROR? (SR0 SET)
2017 5213     JMP OKJMP2                 /NO
2020 7402     ERTTI1,     HLT               /HALT 1 - CHECK GENERATION OF S CYCLE
2021 5202     JMP TS681E+2

```

/CAW WAS INTERPRETED AS AN INSTRUCTION

```

2022 4020     FRJMP3,      JMS Z SR0           /HALT ON ERROR?
2023 5213     JMP OKJMP2                 /NO
2024 7402     ERTTI2,     HLT               /HALT 2 - CHECK S CYCLE 'SKIP BUS IN' ENABLE
2025 5202     JMP TS681E+2

```

/681 SKIPPED TWICE

```

2026 4020     FRJMP4,      JMS Z SR0           /HALT ON ERROR?
2027 5213     JMP OKJMP2                 /NO
2030 7402     ERTTI3,     HLT               /HALT 3 - DOUBLE SKIP OCCURRED
2031 5202     JMP TS681E+2

```

```

2032 5216     SWJMP1,      JMP FRJMP2
2033 5222     CWJMP1,      JMP FRJMP3

```

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```

/TS681F - TTI TEST, PART 2 - CHECK S CYCLE OPERATIONS
2034 7300 TS681F,    CLL CLA
2035 1331 TAD SW2000
2036 3242 DCA TTYIN2+1
2037 1331 TAD SW2000
2040 3243 DCA TTYIN2+2      /PRESET LSW AND CAW

2041 6402 TTYIN2,    TTI
2042 2000 2000          /LSW
2043 2000 2000          /CAW

2044 4042 JMS Z SR1      /SCOPE REPEAT? (SR1 SET)
2045 5247 JMP .+2          /NO
2046 5234 JMP TS681F      /YES
2047 1242 TAD TTYIN2+1
2050 1337 TAD M1000      /LSW SHOULD CONTAIN 1000
2051 7440 SZA
2052 5262 JMP LSWERR
2053 1243 TAD TTYIN2+2
2054 1336 TAD MN2000    /CAW SHOULD CONTAIN 2000
2055 7440 SZA
2056 5323 JMP CAWERR
2057 4051 NXXTY,      JMS Z SR2      /VERIFY REPEAT? (SR2 SET)
2060 5735 JMP I AT681G   /NO, ENTER NEXT TEST
2061 5234 JMP TS681F      /YES

/DETERMINE LSW ERROR TYPE
2062 4020 LSWERR,      JMS Z SR0      /HALT ON ERROR? (SR0 SET)
2063 5257 JMP NXXTY          /NO
2064 1242 TAD TTYIN2+1    /WAS MB SHIFTED?
2065 0331 AND SW2000
2066 7640 SZA CLA        /SKIP IF MB WAS SHIFTED
2067 5271 JMP .+2
2070 5275 JMP .+5

/ERROR HALT 1 - MB WAS NOT SHIFTED CORRECTLY
2071 1242 TAD TTYIN2+1    /DISPLAY LSW IN AC
2072 7100 CLL
2073 7402 ERTTI4,      HLT          /HALT 1- CHECK 'SHIFT MB'
2074 5234 JMP TS681F

/VERIFY CORRECT MB0 (0) SHIFT ENABLED
2075 1242 TAD TTYIN2+1    /WAS MB0 INCORRECTLY SET TO 1?
2076 0332 AND SW5000
2077 1333 TAD M5000
2100 7640 SZA CLA        /SKIP IF MB0 (1) AND THE MB REG.
2101 5306 JMP .+5        /SHIFT WAS EXECUTED

```

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```

/ERROR HALT 2
2112 1242 TAD TTYIN2+1 /DISPLAY LSW IN AC
2113 7100 CLL
2114 7402 ERITI5, HLT /HALT 2 - MB0 INCORRECTLY SFT TO 1
2115 5234 JMP TS681F

/VERIFY THAT COUNT MB WAS NOT ENABLED
2116 1242 TAD TTYIN2+1 /WAS COUNT MB INCORRECTLY ENABLED?
2117 5334 AND SW0007
2118 7640 SZA CLA /DON'T SKIP IF COUNT WAS ENABLED
2111 5313 JMP .+2
2112 5317 JMP .+5 /LSW ERROR UNIDENTIFIED

/ERROR HALT 3
2113 1242 TAD TTYIN2+1 /DISPLAY LSW IN AC
2114 7100 CLL
2115 7402 ERITI6, HLT /HALT 3 - 'COUNT MB' INCORRECTLY ENABLED
2116 5234 JMP TS681F

/ERROR HALT 4
2117 1242 TAD TTYIN2+1 /DISPLAY LSW IN AC
2118 7100 CLL
2119 7402 ERITI7, HLT /HALT 4 - COMBINATION OF ERRORS 4,5 & 6
2120 5234 JMP TS681F

/ERROR HALT 5 - CAW WAS MODIFIED
2123 4020 CAWERR, JMS Z SR0 /HALT ON ERROR? (SR0 SET)
2124 5257 JMP NXTTY /NO
2125 1243 TAD TTYIN2+2 /DISPLAY CAW IN AC
2126 7100 CLL
2127 7402 ERITI8, HLT /HALT 5 - CHECK FOR INCORRECT C CYC
2128 5234 JMP TS681F

2131 2000 SW2000, 2000
2132 5000 SW5000, 5000
2133 3000 M5000, -5000
2134 0007 SW0007, 0007
2135 2200 AT681G, TS681G
2136 6000 MN2000, -2000
2137 7000 M1000, -1000

```


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*2200
 /TS681G - TTI TEST, PART 3 - CHECK IOT 6402 WITH LSW = 4003

```

2210 7300 TS681G,    CLL CLA
2211 1254 TAD LS4003    /PREFSET LINE STATUS WORD
2212 3210 DCA TTYIN3+1
2213 1256 TAD CW4000    /PREFSET CHARACTER ASSEMBLY WORD
2214 3211 DCA TTYIN3+2
2215 1260 TAD ANOP
2216 3212 DCA TTYIN3+3    /PREFSET NOP INSTRUCTION

2217 6402 TTYIN3,    TTI
2218 4003 4003    /LSW
2219 4000 4000    /CAW
2220 7000 NOP
2221 4042 JMS Z SR1    /SCOPE REPEAT? (SR 1 SET)
2222 5216 JMP .+2    /NO
2223 5200 JMP TS681G    /YES
2224 1210 TAD TTYIN3+1
2225 1255 TAD M4004    /WAS LSW UPDATED CORRECTLY?
2226 7440 SZA
2227 5231 JMP FRRLSW    /LSW IS INCORRECT
2228 1211 TAD TTYIN3+2
2229 1257 TAD M6000    /WAS CAW UPDATED CORRECTLY?
2230 7440 SZA
2231 5236 JMP FRRCW    /CAW IS INCORRECT

2232 4051 TTYNXT,    JMS Z SR2    /VERIFY REPEAT? (SR2 SET)
2233 5262 JMP TS681H    /NO
2234 5200 JMP TS681G    /YES

/ERROR HALT 1 - LSW WAS NOT UPDATED CORRECTLY
2235 4020 FRRLSW,    JMS Z SR0    /HALT ON ERROR? (SR0 SET)
2236 5226 JMP TTYNXT    /NO
2237 1210 TAD TTYIN3+1    /DISPLAY LSW IN AC
2238 7402 ERRTI9,    HLT    /HALT 1 - AC SHOULD EQUAL 4004
2239 5200 JMP TS681G
  
```

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```

/ERROR HALT 2 - CAW WAS NOT UPDATED CORRECTLY
2236 4020 FRRCAW,      JMS Z SR0                /HALT ON ERROR? (SR0 SET)
2237 5226     JMP TTYNXT                        /NO
2240 1212     TAD TTYIN3+3                    /WAS NOP MODIFIED?
2241 1261     TAD MNOP
2242 7640     SZA CLA
2243 5250     JMP .+5                          /NOP WAS MODIFIED
2244 7100     CLL
2245 1211     TAD TTYIN3+2
2246 7402     ETTI10,      HLT                /HALT 2A - CAW & AC SHOULD = 6000
2247 5200     JMP TS681G
2250 7100     CLL
2251 1211     TAD TTYIN3+2
2252 7402     ETTI11,      HLT                /HALT 2B - CHECK FOR INCORRECT S CYCLE
/ SKIP ENABLE
2253 5200     JMP TS681G

2254 4003     LS4003,      4003
2255 3774     M4004,      -4004
2256 4000     CW4000,      4000
2257 2000     M6000,      -6000
2258 7000     ANOP,       NOP
2261 1000     MNOP,       -7000

```

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/TS681H - TTI TEST, PART 4 - CHECK 'COUNT MB' EXECUTION

```

2202 7300 TS681H,      CLL CLA
2203 1366      TAD MSEVEN      /PRESET TTICNT TO -7
2204 3365      DCA TTICNT
2205 1131      TAD Z FOUR      /PRESET LSWCNT TO 4
2206 3364      DCA LSWCNT
2207 1256      PASTRT,      TAD CW4000
2270 1364      TAD LSWCNT
2271 3301      DCA TTYIN4+1    /PRESET LSW
2272 2364      ISZ LSWCNT      /ADD ONE TO LSWCNT
2273 1364      TAD LSWCNT
2274 0367      AND MSKCNT      /MSKCNT EQUALS 0007
2275 3364      DCA LSWCNT
2276 1256      TAD CW4000      /PRESET CAW
2277 3302      DCA TTYIN4+2

2300 4002      TTYIN4,      TTI
2301 4004      4004          /LSW - COUNT IS INCREMENTED ON EACH PASS
2302 4000      4000          /CAW - SHOULD NEVER BE MODIFIED

2303 4042      JMS Z SR1          /SCOPE REPEAT? (SR1 SET)
2304 5312      JMP .+6          /NO
2305 1364      RETEST,      TAD LSWCNT      /YES
2306 1371      TAD CNTM1      /SUBTRACT 1 FROM LSWCNT
2307 0367      AND MSKCNT
2310 3364      DCA LSWCNT
2311 5267      JMP PASTRT      /EXECUTE REPEAT
/WAS LSW UPDATED CORRECTLY?
2312 1301      TAD TTYIN4+1
2313 7500      SMA          /DOES LSW0 CONTAIN 1?
2314 5334      JMP FRLSW0      /NO; ERROR 1
2315 0367      AND MSKCNT      /YES; CONTINUE TEST
2316 7041      CIA
2317 1364      TAD LSWCNT      /WAS LSW COUNT INCREMENTED CORRECTLY?
2320 7440      SZA
2321 5343      JMP ERRCNT      /NO; ERROR 2
2322 1302      TAD TTYIN4+2    /YES; TEST CAW
2323 7041      CIA
2324 1256      TAD CW4000      /DOES CAW EQUAL 4000?
2325 7440      SZA
2326 5355      JMP MODCAW      /NO
/WAS TEST FOR SEVENTH PASS
2327 2365      CHKPAS,      ISZ TTICNT
2330 5267      JMP PASTRT      /NOT SEVENTH PASS

2331 4051      JMS Z SR2          /VERIFY REPEAT? (SR2 SET)
2332 5770      JMP I AT681I
2333 5262      JMP TS681H      /YES, REPEAT TEST

```

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```

/ERROR 1 - LSWM WAS CLEARED TO ZERO
2343 4020 FRI SW0,      JMS Z SR0                /HALT ON ERROR? (SR0 SET)
2344 5327     JMP CHKPAS                      /NO
2345 7100     CLL
2346 1301     TAD TTYIN4+1                    /DISPLAY LSW IN AC
2347 7402     FTI I12,      HLT                /HALT 1 - CHECK FOR INCORRECT S CYCLE MR SHIFT
2348 7200     CLA
2349 5305     JMP RETEST

/ERROR 2 - LSW COUNT IS INCORRECT
2350 4020 ERRCNT,    JMS Z SR0                /HALT ON ERROR?
2351 5327     JMP CHKPAS                      /NO
2352 7100     CLL
2353 1364     TAD LSWCNT                      /DISPLAY EXPECTED LSW COUNT
2354 7402     FTI I13,      HLT                /HALT 2A - CHECK S CYCLE 'COUNT MR FNABLE.'
2355 7200     CLA
2356 1301     TAD TTYIN4+1                    /DISPLAY ACTUAL LSW COUNT
2357 7402     HLT                            /HALT 2B
2358 7200     CLA
2359 5305     JMP RETEST

/ERROR 3 - CAW IS INCORRECT
2360 4020 MODCAW,    JMS Z SR0                /HALT ON ERROR?
2361 5327     JMP CHKPAS                      /NO
2362 7100     CLL
2363 1302     TAD TTYIN4+2                    /DISPLAY CAW IN AC
2364 7402     FTI I14,      HLT                /HALT 3 - CHECK FOR INCORRECT C CYCLE GENERATIO
2365 7200     CLA
2366 5305     JMP RETEST

2367 0000 LSWCNT,      0
2368 0000 TTICNT,     0
2369 7771 MSFEVEN,    -0007
2370 0007 MSKCNT,     0007
2371 0400 AT681I,    TS681I
2372 7777 CNTM1,     -0001

```

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*2400

/TS681I - MB REGISTER SHIFT TEST, PART 1

```

2400 7300 TS681I,      CLA CLL                      /FILL MB WITH ONES
2401 1255     TAD M14
2402 3252     DCA SHFCNT                          /PRESET SHIFT COUNTER
2403 3253     DCA CHKCAW                          /RESET TEST WORD
2404 3211     SHIFTI,      DCA TTYIN5+2          /PRESET CAW
2405 1254     TAD FRLSW1
2406 3210     DCA TTYIN5+1                      /PRESET LINE STATUS WORD

2407 6402     TTYIN5,      TTI
2410 4003     4003                                /LSW
2411 0000     %                                  /CAW

2412 4042     JMS Z SR1                            /SCOPE REPEAT?
2413 5216     JMP .+3                               /NO
2414 1253     TAD CHKCAW                          /YES, RETAIN SAME CAW & REPEAT
2415 5204     JMP SHIFTI

                /CHECK RESULTS OF MB SHIFT
2416 7120     CLL CML                              /1 TO LINC
2417 1253     TAD CHKCAW
2420 7010     RAR                                  /SIMULATE MR SHIFT
2421 3253     DCA CHKCAW                          /STORE SHIFT RESULTS

2422 1253     TAD CHKCAW
2423 7041     CIA
2424 1211     TAD TTYIN5+2                      /COMPARE FOR CORRECT SHIFT RESULTS
2425 7640     SZA CLA                              /SKIP IF RESULTS ARE CORRECT
2426 5234     JMP FRMBSI

                /MR SHIFT CORRECT
2427 2252     SHFINI,      ISZ SHFCNT            /SKIP IF MR IS FULLY, (ONES)
2430 5205     JMP SHIFTI+1

2431 4051     JMS Z SR2                            /VERIFY REPEAT?
2432 5256     JMP TS681J                          /NO, ENTER PART 2
2433 5200     JMP TS681I                          /YES, REPEAT PART 1

```

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```

2434 4020 /MB SHIFT ERROR DETECTED, (PART 1)
      FRBRSI,   JMS Z SR0           /HALT ON ERROR?
2435 5227   JMP SHEINI             /NO
2436 7100   CLL
      /HALT 1 - MB SHIFT ERROR, PART 1
2437 1253   TAD CHKCAW
2440 7402   FRMBS1,   HLT           /HALT & DISPLAY CORRECT SHIFT RESULTS
2441 7200   CLA
2442 1211   TAD TTYIN5+2
2443 7402   HLT                   /HALT & DISPLAY ACTUAL SHIFT RESULTS

      /RETEST FAILING SHIFT
2444 7300   CLA CLL
2445 1253   TAD CHKCAW
2446 7004   HAL                   /RESTORE PREVIOUS CAW CONTENTS
2447 3253   DCA CHKCAW           /AND RETEST
2450 1253   TAD CHKCAW
2451 5204   JMP SHFTI

2452 6000   SHECNT,   0
2453 6000   CHKCAW,  0
2454 4003   PRLSW1,  4003
2455 7764   M14,     -0014

```

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/TS681J - MB REGISTER SHIFT TEST, PART 2

```

2456 7201 TS681J,    CLA IAC                /FILL MB WITH ZEROS
2457 1255   TAD M14
2460 3252   DCA SHFCNT                    /PRESET SHIFT COUNTER
2461 1331   TAD MS3777
2462 3253   DCA CHKCAW                    /PRESET TEST WORD
2463 1254   SHIFTJ,    TAD PRLSW1
2464 3270   DCA TTYIN6+1                  /PRESET LINE STATUS WORD
2465 1253   TAD CHKCAW
2466 3271   DCA TTYIN6+2                  /PRESET CAW

2467 6402   TTYIN6,    TTI
2470 4003   4003                          /LSW
2471 3777   3777                          /CAW

2472 4042   JMS Z SR1                      /SCOPE REPEAT?
2473 5275   JMP .+2                          /NO
2474 5263   JMP SHIFTJ                      /YES, RETAIN SAME CAW & REPEAT

/CHECK RESULTS OF MB SHIFT
2475 1253   TAD CHKCAW
2476 7110   CLL RAR                          /SIMULATE MB SHIFT
2477 3253   DCA CHKCAW
2500 1271   TAD TTYIN6+2                    /GET ACTUAL MB SHIFT RESULT
2501 0331   AND MS3777
2502 7041   CIA
2503 1253   TAD CHKCAW                      /COMPARE WITH CORRECT MB SHIFT RESULT
2504 7640   SZA CLA                          /SKIP IF RESULTS ARE CORRECT
2505 5313   JMP FRMBSJ

/MB SHIFT CORRECT
2506 2252   SHFINJ,    ISZ SHFCNT          /SKIP IF MB IS FULL, (ZEROS)
2507 5263   JMP SHIFTJ

2510 4051   JMS Z SR2                      /VERIFY REPEAT?
2511 5732   JMP I AT681K                    /NO, ENTER PART 3
2512 5256   JMP TS681J                      /YES, REPEAT PART 2

```

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```

2513 4020 /MB SHIFT ERROR DETECTED, (PART 2)
      FRMSJ,      JMS Z SR0           /HALT ON ERROR?
2514 5306      JMP SHFINJ
      /HALT 2 - MB SHIFT ERROR, PART 2
2515 7100      CLL
2516 1253      TAD CHKCAW
2517 7402 FRMS2,      HLT           /HALT & DISPLAY CORRECT SHIFT RESULTS
2520 7200      CLA
2521 1271      TAD TTYIN6+2
2522 0331      AND MS3777
2523 7402      HLT           /HALT & DISPLAY ACTUAL SHIFT RESULTS
2524 7200      CLA
2525 1253      TAD CHKCAW
2526 7124      CLL CML RAL       /RESTORE PREVIOUS CAW CONTENTS
2527 8253      DCA CHKCAW       /AND RETET
2530 5263      JMP SHIF TJ

2531 3777 MS3777,      3777
2532 2600 AT681K,      TS681K

```


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*2600

/TS681K - MB REGISTER SHIFT TEST, PART 3

```

2610 7300 TS681K,   CLA CLL           /FILL MR WITH ALTERNATE ONES & ZEROS
2611 3302   DCA PSFLEC           /RESET PASS SELECTOR
2612 1301   TAD MIN14
2613 3277   DCA CNTSHF           /PRESET SHIFT COUNTER
2614 1303   TAD PRCAW
2615 3276   DCA CAWCHK           /PRESET TEST WORD
2616 1300   SHIFTK,   TAD PRLSW3
2617 3213   DCA TTYIN7+1         /PRESET LSW
2618 1276   TAD CAWCHK
2619 3214   DCA TTYIN7+2         /PRESET CAW TO 4000

2612 6402   TTYIN7,   TTI
2613 4003   4003                 /LSW
2614 4000   4000                 /CAW

2615 4042   JMS Z SR1           /SCOPE REPEAT?
2616 5220   JMP .+2             /NO
2617 5206   JMP SHIFTK         /YES, RETAIN SAME CAW & RETEST

/CHECK RESULTS OF MB SHIFT
2620 1276   TAD CAWCHK
2621 7130   CLL CML RAR         /SIMULATE MB SHIFT
2622 3276   DCA CAWCHK
2623 7010   RAR
2624 3304   DCA RITBUK         /SAVE PREVIOUS CONTENTS OF MR11
2625 1214   TAD TTYIN7+2
2626 7041   CIA
2627 1276   TAD CAWCHK         /COMPARE MB SHIFT RESULTS
2630 7640   SZA CLA           /SKIP IF RESULTS ARE CORRECT
2631 5250   JMP ERMBSK

/MB SHIFT CORRECT
2632 2277   SHFINK,   ISZ CNTSHF /SKIP IF MR FULL, (ONES & ZEROS)
2633 5235   JMP .+2
2634 5267   JMP EX681T

2635 1302   TAD PSFLEC         /EXAMINE PASS SELECTOR
2636 7640   SZA CLA
2637 5246   JMP .+7
2640 1276   TAD CAWCHK         /PASS SELECTOR = 0
2641 5305   AND RSTMR0        /NOW SHIFT MR0 (0) TO MB1
2642 3276   DCA CAWCHK
2643 7001   IAC
2644 3302   DCA PSFLEC         /1 TO PASS SELECTOR
2645 5206   JMP SHIFTK

```

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```

/PASS SELECTOR = 1
2636 3302 DCA PSELEC /NO TO PASS SELECTOR
2637 5206 JMP SHIFTK /NOW SHIFT MEM (1) TO MB1

/MB SHIFT ERROR DETECTED, (PART 3)
2638 4024 ERMSK, JMS Z SR0 /HALT ON ERROR?
2639 5232 JMP SHFINK /NO

/HAULT 3 - MB SHIFT ERROR, PART 3
2640 7100 CLL
2641 1276 TAD CAWCHK
2642 7402 ERMSK3, HLT /HALT & DISPLAY CORRECT SHIFT RESULTS
2643 7200 CLA
2644 1214 TAD TTYIN7+2
2645 7402 HLT /HALT & DISPLAY ACTUAL SHIFT RESULTS
2646 7300 CLA CLL
2647 1304 TAD RITBUK /GET PREVIOUS CONTENTS OF MB11
2648 7004 HAL
2649 1276 TAD CAWCHK
2650 7004 HAL /RESTORE PREVIOUS CAW CONTENTS
2651 3276 DCA CAWCHK
2652 5206 JMP SHIFTK /RETEST FAILING MB SHIFT

2653 4051 EX681T, JMS Z SR2 /VERIFY REPEAT?
2654 5272 JMP .+2 /NO
2655 5200 JMP TS681K

/END OF STATIC TEST
2656 4060 JMS Z SR3 /HALT AT COMPLETION OF STATIC TEST?
2657 5706 JMP I ARING /NO, REPEAT STATIC TEST
2658 7402 ENDTST, HLT /END OF STATIC TEST
2659 5706 JMP I ARING /DEPRESS CONTINUE TO REPEAT STATIC TEST

2660 0000 CAWCHK, 0
2661 0000 CNTSHF, 0
2662 4003 PRLSW3, 4003
2663 7764 MIN14, -0014
2664 0000 PSELEC, 0
2665 4000 PRCAW, 4000
2666 0000 RITBUK, 0
2667 3777 RSTMB0, 3777
2668 0756 ARING, RING

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| | | | | | |
|---------|------|--------|------|---------|------|
| ACLFLC | 0076 | 0052 | 1363 | ERLSR I | 1355 |
| ACMSFT | 1665 | 0125 | 1325 | ERLSR J | 1425 |
| ADHAK | 0633 | 0177 | 0754 | ERLSR K | 1474 |
| ADHAKA | 0624 | 0177D | 1123 | ERLSR1 | 1017 |
| ADD | 0243 | 0177K | 1513 | ERLSR2 | 1044 |
| ADD1 | 1444 | 0400 | 0751 | ERLSR3 | 1067 |
| ADFC | 0563 | 04001 | 1725 | ERLSR4 | 1121 |
| AEXIT | 0344 | 05252 | 1762 | ERLSR5 | 1164 |
| AGAIN | 1471 | 0600 | 0752 | ERLSR6 | 1235 |
| AINTON | 0100 | 07777 | 1021 | ERLSR7 | 1267 |
| ALFTR | 0552 | 00NTNU | 1075 | ERLSR8 | 1323 |
| ALLCLK | 0352 | DEC | 0600 | ERLSR9 | 1361 |
| ALSRA | 1366 | DISARL | 0460 | ERLSW1 | 2334 |
| ALSRF | 1166 | ENEXT | 1106 | ERMSI | 2434 |
| ALSRJ | 1365 | JSIB | 0724 | ERMSJ | 2513 |
| ALSRTS | 0755 | ECT | 0512 | ERMSK | 2650 |
| ANOP | 2260 | ECT1 | 0206 | ERMS1 | 2444 |
| ANSR | 0623 | ECT2 | 0072 | ERMS2 | 2517 |
| ARING | 2706 | ECT3 | 0134 | ERMS3 | 2654 |
| ARSTR | 0077 | ECT4 | 0257 | ERRCAW | 2236 |
| | | ECT5 | 0466 | ERRCNT | 2343 |
| ASCI | 0562 | ELSR10 | 1431 | ERRLSW | 2231 |
| ASCIT | 0630 | ELSR11 | 1500 | ERSHFT | 1754 |
| ASURTR | 0626 | ENOTST | 2674 | ERTT1 | 2020 |
| ATARI E | 0441 | ENEXT1 | 1140 | ERTT2 | 2024 |
| ATS681 | 1515 | ENEXT2 | 1151 | ERTT3 | 2030 |
| ATTITS | 1764 | | | ERTT4 | 2073 |
| ATYPF | 0632 | ERACD | 1111 | ERTT5 | 2104 |
| AT681G | 2135 | ERACF | 1154 | ERTT6 | 2115 |
| AT681I | 2370 | ERACF | 1225 | ERTT7 | 2121 |
| AT681K | 2532 | ERACG | 1260 | ERTT8 | 2127 |
| AUXAC | 0141 | ERACH | 1313 | ERTT9 | 2234 |
| AWAY | 0627 | ERACT | 1351 | | |
| BADINT | 0160 | ERAC1 | 1113 | ERTT01 | 1625 |
| BELCHA | 0773 | ERAC2 | 1156 | ERTT02 | 1631 |
| BELL | 0014 | ERAC3 | 1227 | ERTT03 | 1635 |
| BITRUK | 2704 | ERAC4 | 1262 | ERTT04 | 1663 |
| CACHK | 2676 | ERAC5 | 1315 | ERTT05 | 1670 |
| CANERR | 2123 | ERAC6 | 1353 | ERTT06 | 1715 |
| CHKCAW | 2453 | ERCL1 | 0067 | ERTT07 | 1723 |
| CHKINT | 0153 | ERCL2 | 0101 | ERTT08 | 1751 |
| CHKPAS | 2327 | ERCL3 | 0110 | ERTT09 | 1760 |
| CHPTR | 0142 | ERCL4 | 0117 | ETTI10 | 2246 |
| CLOCK | 0137 | ERCM | 1747 | ETTI11 | 2252 |
| CLOCK1 | 0261 | EROSTA | 0716 | ETTI12 | 2340 |
| CLOCK2 | 0275 | EROSTB | 0743 | ETTI13 | 2347 |
| CLOCK3 | 0311 | EROST1 | 0722 | ETTI14 | 2361 |
| CLOCK4 | 0325 | EROST2 | 0746 | EXOST | 0750 |
| CLOCKK | 0341 | ERJMP1 | 1640 | EXIT | 0470 |
| CLRFIG | 0232 | ERJMP2 | 2016 | EXLSR | 1512 |
| CLSURR | 0005 | ERJMP3 | 2022 | EX681T | 2667 |
| CNTM1 | 2371 | ERJMP4 | 2026 | FINISH | 0550 |
| CNTSHE | 2677 | ERLSRA | 1014 | ENEXT1 | 1211 |
| COMCLK | 0400 | ERLSRB | 1040 | ENEXT2 | 1222 |
| CONVRT | 0641 | ERLSRC | 1063 | FOUR | 0131 |
| COUNT | 0006 | ERLSRD | 1115 | FSTPAS | 0007 |
| CR | 0522 | ERLSRE | 1160 | GETLTR | 0553 |
| CRIF | 0514 | ERLSRF | 1231 | GETNXT | 0502 |
| CWJMP1 | 2033 | ERLSRG | 1264 | GNEXT1 | 1244 |
| CW4000 | 2256 | ERLSRH | 1317 | GNEXT2 | 1255 |

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|--------|------|--------|------|---------|------|
| HEADER | 0532 | 12000 | 1726 | SW2000 | 2131 |
| INFXT1 | 1277 | 12525 | 1763 | SW5000 | 2132 |
| INFXT2 | 1310 | 14000 | 0753 | THREF | 0130 |
| INFXT1 | 1335 | 14104 | 2255 | TIME | 0355 |
| INFXT2 | 1346 | 1412 | 0354 | TIMEF | 0240 |
| INFCNT | 0437 | 15 | 0343 | TIMEOUT | 0136 |
| INTERR | 0464 | 15000 | 2133 | TIMEPL | 0442 |
| INTON | 0234 | 16 | 0551 | TS681A | 1600 |
| INTRPT | 0001 | 16000 | 2257 | TS681B | 1641 |
| INISTA | 0012 | 17777 | 1022 | TS681C | 1672 |
| JMPADD | 0345 | NOAC | 1606 | TS681D | 1727 |
| JMPCI1 | 0346 | NOFLAG | 0132 | TS681E | 2000 |
| JNFXT1 | 1415 | NORMAL | 0417 | TS681F | 2034 |
| KEFPAC | 0010 | NOSTAT | 1612 | TS681G | 2200 |
| KNEXT | 1463 | NOTYPE | 0510 | TS681H | 2262 |
| LETR | 0554 | NTTY | 2057 | TS681I | 2400 |
| LF | 0523 | OKJMP1 | 1637 | TS681J | 2456 |
| LINCNT | 1437 | OKJMP2 | 2013 | TS681K | 2600 |
| LNDF | 1660 | ONE | 0126 | ITCL | 6411 |
| LRDTR | 1712 | PASS | 0353 | ITI | 6402 |
| LSRR | 1023 | PASTRT | 2267 | ITICNT | 2365 |
| LSKC | 1046 | PCAW | 2703 | ITIER | 1627 |
| LSKD | 1071 | PRLSW1 | 2454 | ITINCR | 6401 |
| LSKE | 1125 | PRLSW3 | 2700 | ITJ | 6404 |
| LSKF | 1200 | PSELEC | 2702 | ITPER | 1633 |
| LSKG | 1240 | PT1NXT | 1655 | ITRL | 6414 |
| LSKH | 1271 | PT2NXT | 1707 | ITSL | 6412 |
| LSKI | 1327 | PT3NXT | 1744 | ITXOFF | 0463 |
| LSKJ | 1400 | PUTBAK | 0625 | ITYIN | 2006 |
| LSRK | 1441 | P142 | 0435 | ITYIN2 | 2041 |
| LSRTST | 1000 | P161 | 0436 | ITYIN3 | 2207 |
| LSTPAS | 0452 | RESTRT | 0213 | ITYIN4 | 2300 |
| LSXCNT | 2364 | RETEST | 2305 | ITYIN5 | 2407 |
| LSXERR | 2062 | RING | 0756 | ITYIN6 | 2467 |
| LS4003 | 2254 | RNGCNT | 0775 | ITYIN7 | 2612 |
| TASK1 | 0342 | RNPS | 0145 | ITYNXT | 2226 |
| MIN14 | 2701 | RSTMR0 | 2705 | IT1OFF | 6422 |
| INOP | 2261 | SELECT | 0200 | IT1ON | 6424 |
| | | SHFCNT | 2452 | IT1SKP | 6421 |
| IN2000 | 2136 | SHFINI | 2427 | IT2OFF | 6432 |
| NOCAW | 2355 | SHFINJ | 2506 | IT2ON | 6434 |
| SEVFN | 2366 | SHFINK | 2632 | IT2SKP | 6431 |
| SKXCNT | 2367 | SHFTFR | 1717 | IT3OFF | 6442 |
| SKSR0 | 0015 | SHIFTI | 2404 | IT3ON | 6444 |
| SKSR1 | 0050 | | | IT3SKP | 6441 |
| SKSR2 | 0057 | SHIFTJ | 2463 | IT4OFF | 6452 |
| SKSR3 | 0066 | SHIFTK | 2606 | IT4ON | 6454 |
| SKSR4 | 0013 | SKIPFR | 1623 | IT4SKP | 6451 |
| SKSR5 | 0774 | SPACF | 0631 | IWD | 0127 |
| SK3777 | 2531 | SR0 | 0020 | TYPE | 0524 |
| 0052 | 1364 | SR1 | 0042 | | |
| 01 | 1514 | SR2 | 0051 | WORK | 0622 |
| 014 | 0434 | SR3 | 0060 | J | |
| 01000 | 2137 | STORAC | 0140 | | |
| 0125 | 1326 | STORF | 0440 | | |
| 01253 | 0776 | STORI | 0011 | | |
| 014 | 2455 | ST685 | 0674 | | |
| 0177 | 1124 | SURTR | 0636 | | |
| 0177A | 1237 | SWJMP1 | 2032 | | |
| 0200 | 1440 | SW0007 | 2134 | | |