

**2608A
LINE PRINTER
DIAGNOSTIC**



Publication History

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SECTION I. INTRODUCTION

1-1. GENERAL

This diagnostic verifies the operation of the 2608A Line Printer with either the 26099A PCA or the 59310B HP-IB PCA and its respective cable. The basic I/O portion of the 26099A interface card, which includes the Flag and Control circuits, will be tested. Various tests will select the 2608A via skip-on-flag, interrupt and direct memory access (DMA). Dual Channel Port Controller (DCPC) and DMA are synonymous throughout this manual. All of the standard features of the 2608A will be checked by either one or more tests. Since several features of the 2608A, such as the selection of character sets and a programmable Vertical Forms Control (VFC), could allow almost endless testing of combinations of outputs, it has been decided to limit the testing of some feature in any individual pass through the diagnostic.

1-2. REQUIRED HARDWARE

- a. HP 2100, HP1000, M-Series, E-Series, or F-Series CPU with minimum 8K of memory.
- b. Either one of the following interfaces.
 1. HP 26099-60001 PCA with cable 26099-60002.
 2. 59310B PCA with cable # 59310-60002.
- c. Any one of the diagnostic input devices as listed in the HP Diagnostic Configurator Manual (24296-90157), paragraph 1-2.d is required for loading the diagnostic.
- d. 2608A line printer with 2608A I/O adapter corresponding to the PCA interface used:
 1. 6099A requires parallel I/O PCA 02608-60019 with I/O adapter 02608-60034
 - 59310B requires HP-IB I/O PCA 02608-60026 with I/O adapter 02608-60043
 (The 59310B must be strapped for IFC enable)
- e. Sufficient quantity of 132 column line printer paper. (15-weight or heavier)

1-3. OPTIONAL HARDWARE

- a. DMA (DCPC) installed in computer.
- b. Console printer device for message reporting.
- c. Alternate character set option -001 and/or substitution character set option -002 as defined in Table 5-1 may be installed.
- d. 6-part 132-column line printer paper.

1-4. SOFTWARE REQUIREMENTS

- a. Diagnostic Configurator, Part No. HP24296A used for equipment configuration and as a console device driver. Included are:

Binary object tape	24296-60001
Manual	02100-90157
- b. HP 2608A diagnostic program.

Binary object tape	22608-16001
Manual (This manual)	02608-90901

The diagnostic serial number (DSN), 105105 (Octal), is contained in memory location 126 (Octal) of the program. The firmware ID number stored in location 137 (Octal) identifies which version of firmware is installed in the 2608A under test. The current test number and subtest number are stored in locations 407 and 410 (Octal) respectively.

1-5. RELATED DOCUMENTS

- a. *2608A Technical Reference Manual* 02608-90903
- b. *26099A Printer Interface Kit* 26099-90901
- c. *59310B HP-IB Interface Manual* 59310-90061

1-6. DESCRIPTION OF 2608A CHARACTER SETS

The standard 2608A has a 128 character ASCII set installed. Also available are language ROMS which extend the resident character set capabilities up to a maximum of 16 languages. Both the existence of, and the ability to select and print these optional languages will be exercised by this diagnostic. Table 5-1 identifies the codes and options associated with the languages.

The diagnostic will determine the availability of languages by executing a programmable status readback (120200B, with bits 0-3 = binary code of the language to be tested). If the requested language is available, the first byte of status returned will be the binary code for that language. The code for ASCII (00) will be returned if the requested language is not available.

The diagnostic program will arbitrarily assign both the primary language and the secondary language with the code "00". Section V of this manual provides details on how the primary language may be modified by the user while running the diagnostic. When reading the descriptions of the various tests in Section IV, note that some of the tests will arbitrarily reassign the values for the primary and/or secondary languages. Within such tests the operator does NOT have control over the language selection. A means is available by which the user may reassign the definition of the primary language.

The reader is reminded that just because alternate languages may be available in the 2608A, does not imply that all of the tests in the diagnostic should be executable in the language of the operator's choice. In some cases the function of a specific test requires that certain patterns be printed, such as in the Power Supply test. In other cases the test may actually attempt to print a readable text on the 2608A. Such a printout in any language except ASCII would be meaningless. In other tests, such as the character set test, it does indeed make sense to print in the operator's choice and such will be the case.

SECTION II. PROGRAM ORGANIZATION

2-1. ORGANIZATION

This diagnostic program consists of an initialization section, a control section, and 19 tests (see Table 3-1.). The initialization section accepts the select code, sets up all I/O instructions and processes the operator's choice of options. The control section allows for sequential or selective stepping through the various tests by monitoring the status of selected bits in the S-register. The tests themselves are specifically designed to verify operation of the 2608A.

This diagnostic is used in conjunction with the Diagnostic Configurator.

2-2. TEST CONTROL AND EXECUTION

The program outputs a title message to the console device for operator information and then executes the tests according to the options selected on the Switch Register by the operator. The control section checks Switch Register bits 15, 13, and 12. Bit 12, if set, is used to loop on the diagnostic; bit 13 is used to loop on a given test that is running at the time; and bit 15, if set, will halt the computer at the completion of a test.

The program also keeps count of the number of passes that have been completed and will output the pass count at the completion of each pass (if Switch Register bit 10 is clear). The count will be reset only if the program is restarted.

2-3. SELECTION OF TEST BY OPERATOR

The operator has the option of selecting any test or combination of tests to be run. Switch register bit 9 is set to indicate the start of a selection sequence. The computer will clear bit 9 and come to a halt 102075 to indicate it is ready for the selection. In most cases the test currently in execution will complete prior to the halt. The operator loads the A and B registers with the test(s) desired. A-register bit 0 represents Test 00, bit 1 represents Test 01, and so on for all available tests. (See Table 3-1.). The operator's selection will then be run. If the operator clears all bits, the standard sequence which consists of all tests except test 18 will be run.

2-4. MESSAGE REPORTING

There are two types of messages: error and information. Error messages are used to inform the operator when the device fails to respond to a given control or command sequence. Information messages are used to inform the operator of the progress of the diagnostic or to instruct the operator to perform some operation related to the function of the unit. In this case, an associated halt will occur to allow the operator time to perform the function. The operator must then press RUN. If a console device is used, the printed message will be preceded by the letter E (error) or the letter H (information) and a number (in octal). The number is also related to the halt code when a console device is not available. The table of Information and Error halts (Table 4-3) is used to interpret these halts when the console device is not available. Examples of error and information messages are as follows:

Example — Error with halt Message:

E030 FLAG FAILED TO SET Halt Code: 102030 (octal)

Example — Information with halt Message:

H024 PRESS PRESET(EXT & INT). RUN Halt Code: 102024 (octal)

Example — Information only Message:

H025 BI-O COMP Halt Code: None

Information messages are suppressed by setting Switch Register bit 10. Tests which require operator intervention are suppressed by setting Switch Register bit 8 (i.e., Preset Test in BI-O, Manual Control Test). When Switch Register bit 12 is set, selected tests will be repeated. All operator intervention will be suppressed.

Error messages can be suppressed by setting Switch Register bit 11 and error halts can be suppressed by setting Switch Register bit 14. This is useful when looping on a single section that has several errors.

2-5. DESCRIPTION OF STATUS TYPES

I/O Status

I/O status is obtained from an "LIA CH" instruction on the 26099A interface, and by programmable status read with data byte code 1B (120001B) on both the 59310B and 26099A interfaces. If an error is detected, E054 I-O STATUS ERROR is reported, followed by a list of bits with incorrect status. "SUBTEST XXB" is appended to E054 if applicable (i.e. TEST 01, MANUAL CONTROL). For example:

```
E054 I-O STATUS ERROR
  BIT 0 POWER FAIL; SHOULD BE 0
  BIT 4 VFC CH12; SHOULD BE 1
  BIT 7 ON LINE, OFF LINE; SHOULD BE 1
```

Programmable Status

Programmable status is available through execution of a status read command (120000B) with the lower 7 bits set to the number of status bytes to be read. See Table 4-5 for Status Input Word Format. "Programmable status with data byte code XXB", will be abbreviated as "PS-XXB" in test descriptions in Section 4. Error messages resulting from incorrect programmable status with data byte code 1 thru 13B, and 20B will pertain to the specific type of status requested. For example, if PS-06B is incorrect, the following error is reported:

```
E112 6 LPI DOT ROW COUNT
```

All status information is returned in bits 0-7 on the 59310B interface. The 26099A interface returns status in bits 8-15; however, for interpretation purposes, the status will be stored in bits 0-7 (See Table 4-5). In the event that an error is detected in programmable or I/O status, the A and B registers contain the following information:

```
A register bits 0- 7 = actual status
                    8-15 = subtest number, if applicable
B register bits 0- 7 = expected status
                    8-15 = 1 for I/O status or PS-1B;
                        or else, data byte code of status requested
```

2-6. DIAGNOSTIC LIMITATIONS

The capability of the interface to receive, pass and deny priority is not completely checked by this diagnostic. If the interface does not receive priority (i.e., PRH (Priority High) from next lower select code), an error E014 NO INT will occur. To check this on the 26099A PCA, remove a board of a lower select code and run the Basic I/O Test and the above mentioned error should occur. Since the HP-IB does not have a Basic I/O test, this does not apply to the 59310B PCA. Checking the ability of the board to pass or deny priority is beyond the scope of this diagnostic.

2-7. SELF TEST DIAGNOSTIC

The 2608A SELF TEST is a series of tests to verify its operational status. These tests will cause printed output for operator verification but do not test the I/O card or cable. For execution of local SELF TEST, the operator should install paper, close the platen, and assure the status of the machine to be: POWER ON, OFF LINE, no print mechanism error, and no test fail. Then the operator presses the SELF TEST button on the front panel of the printer. Verification of correct operation of the print mechanism, (e.g., print quality) is necessary. For more detailed definition of the SELF TEST features, see Appendix B.

2-8. INTERNAL 2608A STRAPS

No internally strapped options exist for the parallel I/O PCA 02608-60019.

For the HP-IB I/O PCA 02608-60026, the following options are available:

- a. Parity (WT1 and WT2) Strap in: parity on command byte disabled
Strap out: parity on command byte enabled
(See 02608-90003 sec. C3.4.4.)
- b. Control Characters (WT3 and WT4) Strap in: CR, LF, and FF are enabled as control characters.
(See 02608-90003 sec. C3-6.)
Strap out: CR, LF, and FF interpreted as ASCII data, with no control functions. This is the default condition.

SECTION III.

OPERATING PROCEDURES

3-1. OPERATING PROCEDURES

Any attempt to execute this diagnostic without first testing the 2608A with the local self test feature via the front panel is highly discouraged! If the 2608A is unable to verify operation under self test then any attempt to execute the software diagnostic will produce meaningless data.

A flowchart of the operating procedures is provided on the following page (Figure 3-1).

If an unconfigured Diagnostic Configurator is used, start at entry point A.

If a configured Diagnostic Configurator is used, start at entry point B.

If a combined configured Diagnostic Configurator and an unconfigured Diagnostic is used, start at entry point C.

If a combined configured Diagnostic Configurator and a configured Diagnostic is used, start at point D.

3-2. RUNNING THE DIAGNOSTIC

Before running the diagnostic the operator must first satisfy the following conditions (see figure 4-2, 2608A Control Panel):

- a. Ribbon cartridge installed
- b. Platen closed
- c. Paper installed
- d. POWER ON
- e. ON LINE
- f. POWER ON CONDITION switches clear
- g. No TEST FAIL, PRINT MECHANISM, PAPER OUT, or PLATEN/RIBBON errors

Diagnostic execution begins according to:

- a. Operator's selection of Diagnostic Configurator configured or unconfigured. (See Figure 3-1)
- b. Operator's selection of diagnostic program configured or unconfigured. (See Figure 3-1)
- c. Starting address of diagnostic:
 1. P Register = 100 (octal)
 2. S Register
 - (a) Bits 0 thru 5 (required): Subchannel (SC) of the 2608A under test.
 - (b) Bit 6: Clear to select 6 LPI operation (default). Set to select 8 LPI operation.
 - (c) Bit 7: Clear selects 26099A interface (go to step 6); Set to select 59310B interface.

If bit 7 is set, then supply in bits 11-15 the HP-IB address that is contained on the HP-IB I/O adapter on the rear panel of the 2608A.

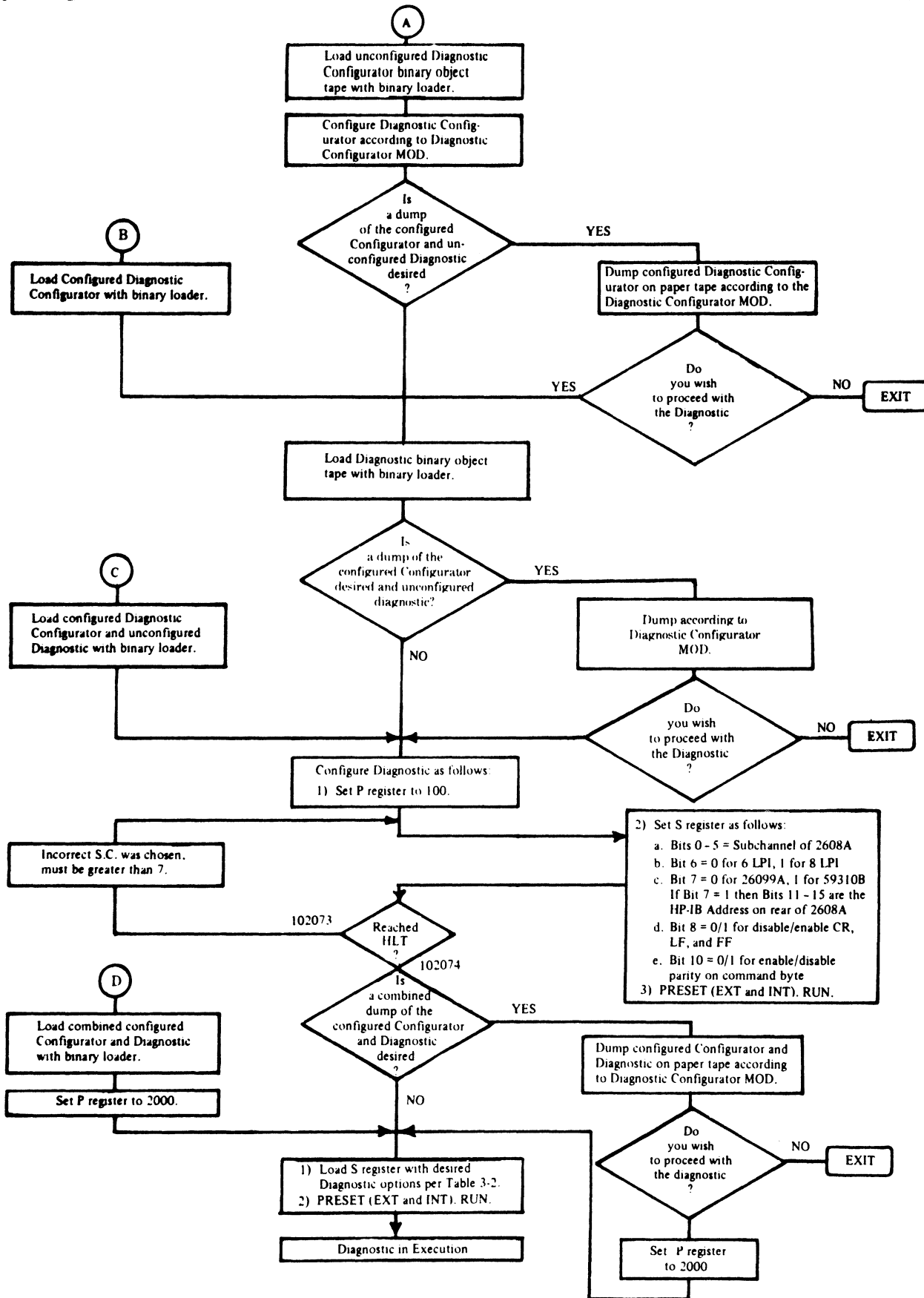


Figure 3-1. Operating Procedures Flowchart

- (d) Bit 8 (59310B interface only) Clear if strapped to disable CR, LF, and FF; set if strapped to enable CR, LF, FF (see section 3-6).
- (e) Bit 10 (59310B interface only) Clear if strapped to enable parity on command byte; set if strapped to disable parity (see section 2-8).
- (f) Press RUN:
If halt 102073 octal is displayed, subchannel less than 10 octal has been entered in S-register. Enter correct subchannel in S-register and press RUN.
- (g) After halt 102074 octal is displayed then options described in Table 3-2 can be selected.
- (h) HALT 106000 octal will always occur when starting at P = 100 (Octal) to allow operator to realign TOF on the line printer and then press RUN.

3. P Register = 2000 (octal)

Program retains all information provided in earlier steps. To select any new options as per Table 3-2, set bit 9 of the S register before pressing RUN. Otherwise the diagnostic will retain all previous options and immediately begin execution.

Regardless of either starting address, the introductory message below is printed on the console device.

"2608A LINE PRINTER DIAGNOSTIC DSN = 105105B,
FIRMWARE ID NUMBER = YYYYYDEC"

TABLE 3-1. TEST SELECTION AND IDENTIFICATION

A or B REGISTER SET TO SELECT CLEAR TO BYPASS	TEST NUMBER	DESCRIPTION
0	TEST 00A	BASIC I/O (26099A only)
	TEST 00B	HP-IB FUNCTIONS(59310B only)
1	TEST 01	MANUAL CONTROL
2	TEST 02	PING-PONG
3	TEST 03	PARITY (59310B only)
4	TEST 04	TRIANGULAR PRINT
5	TEST 05	VERTICAL FORMAT CONTROL
6	TEST 06	CHARACTER SET
7	TEST 07	DMA/DCPC
8	TEST 08	ROM READBACK (Uses DMA)
9	TEST 09	PRIMARY/SECONDARY SELECT
10	TEST 10	PRIMARY/SECONDARY/INTERMIX
11	TEST 11	2X SIZE CHARACTER
12	TEST 12	CONTROL CHARACTERS
13	TEST 13	GRAPHICS ALIGNMENT TEST
14	TEST 14	GRAPHICS COLUMN WIDTH TEST
15	TEST 15	GRAPHICS DIAGONAL TEST

TABLE 3-1. TEST SELECTION AND IDENTIFICATION (continued)

B Register		
0	TEST 16	GRAPHICS PATTERN TEST
1	TEST 17	POWER SUPPLY TEST
2	TEST 18	PRINT QUALITY TEST (Selectable only by operator action)
2-15	RESERVED	

Note

If the A and B registers are clear then the standard sequence of all listed tests are sequentially executed.

TABLE 3-2. SWITCH REGISTER OPTIONS

BITS	FUNCTION IF SET
0	Select new primary language between passes. See Section 3-4.
1-6	Reserved.
7	Override current VFC definition with programmatic definition that is identical to standard 2608A 6 LPI VFC.
8	Suppress tests requiring operator intervention.
9	Abort current run and HALT with MDR=102075; user sets bits of A or B register with test selection where bit 0 set selects TEST 00, bit 1 set selects TEST 01, etc. To restart, press RUN.
10	Suppress printing of operator information messages (H-type; see Table 4-3).
11	Suppress printing of error messages (E-type; see Table 4-3).
12	Repeat all selected tests after diagnostic run is complete without halting. Message "PASS XXXXXX" will be printed on console device before repeating tests unless Bit 10 is set or console is not present. All tests requiring operator intervention will be suppressed.
13	Repeat the currently executing test (loop).
14	Suppress error halts (see Table 4-3).
15	Halt at the end of each test with MDR=102076. The A-register holds the octal equivalent of the test number of the test just executed.

Upon completion of each pass of the diagnostic, the pass count is printed on the console device to inform the operator. The computer halts with 102077 octal displayed in the T-register; the pass count displayed in the A-register. At this point, the operator need only press RUN to execute another pass of the diagnostic.

3-3. RESTARTING

The program may be restarted by setting the P-register to 2000 octal, selecting Switch Register options as defined in Table 3-2. and pressing RUN. The introductory message will always be repeated.

If a trap cell halt (106077 octal) occurs, the user must determine the cause of the interrupt or of the transfer of control to the location in the M register. The program may need to be reloaded to continue.

3-4. MODIFICATION OF PRIMARY LANGUAGE

At the end of each pass through of the diagnostic, a check will be made to see if the operator wishes to modify the default primary language, which is always assumed to be ASCII, to any other available language (see Section V for details). A decision by the operator to modify the primary language will necessarily modify the appearances of all output directed to the printer in those tests which do not require a specific pattern to be printed. In all descriptions of the tests which cause printing, ASCII will be assumed to be the primary language. It is left to the operator's imagination to visualize the output in other languages. Note that the code charts for all defined languages are contained in Appendix A.

3-5. ERROR/HALT MESSAGES ON CONSOLE DEVICE

In all cases the error and/or halt messages which are printed on the console device will be in ASCII. Modification of the primary language for line printer output will NOT affect these messages. Numbers output on the console will be decimal unless marked as octal (followed by a "B").

3-6. RESERVED CONTROL CHARACTERS

Three character codes have special meaning to the 2608A line printer. The 2608A actually inspects all of the characters it receives and in three cases will perform a special action.

Shift In (SI) 017 octal

This code, when received in the data stream, instructs the printer to return to the currently selected primary language set (see section V). The SI code itself is then deleted from the data stream.

Shift Out (SO) 016 octal

This code, when received in the data stream, instructs the printer to select its print data from the currently selected secondary set, until the receipt of a SI code. It is not reset by a paper motion command. For example, the following sequence of characters: A,B,SO,C,D,SI,E, Print Command; (Octal codes 101,102,16,103,104,17,105, from the primary language and CD are selected from the secondary language. Note that the SO and SI do not occur in the printout.

Backspace (BS) 010 octal

The backspace control code enables the 2608A to overstrike any character. The procedure is that the character preceding the BS code will be overstruck (that is to say their dot matrix patterns will be merged) with the character immediately following the BS code.

If the 59310B is the interface being used, it is possible to enable execution of CR, LF, and FF by installing a strap between WT3 and WT4 on PCA 02608-60026 (see installation section of 2608A Operator's Manual). When starting the diagnostic at P=100, S-Register bit 8 should reflect the position of this strap (see section 3-2).

Carriage Return (CR) 015 octal

Receipt of 15 octal results in a print and zero line slew.

Line Feed (LF) 012 octal

If a LF (12 octal) is encountered in the data stream, the printer executes a print and single line slew.

Form Feed (FF) 014 octal

When the printer receives a FF (14 octal), it executes a VFC Channel 1 command (print and move to TOF).

Control characters SI, SO, BS (and CR, LF, FF if strapped) will not be printable characters, but will function as described above. However, the unique actions these control characters cause in the 2608A may be programmatically disabled by setting the device's print mode to transparent standard mode (130020B), or transparent double size mode (130021B). In test descriptions of Section IV, these characters will be specifically named when they are disabled by assigning a transparent print mode. In the event that control characters are disabled, SI, SO, BS (and CR, LF, FF if strapped) will not function as such but instead be interpreted and printed as ASCII data. In test descriptions in Section 4, "reserved control characters" will refer to SI, SO, BS, CR, LF, and FF.

3-7. 8TH BIT DATA

Receipt of data with the eighth bit set indicates to the 2608A that the data is to be printed from the secondary character set, unless the printer is in graphics mode, in which case all bits are interpreted as graphics data.

3-8. DIAGNOSTIC EXECUTION TIME

In measuring the execution time of a complete pass of the diagnostic, the following is assumed:

- a. All tests requiring manual intervention are suppressed.
- b. Both alternate character set and substitution character set ROMs installed.

Under these conditions, a complete pass through the diagnostic (excluding all tests requiring manual control) takes approximately 4.5 minutes.

SECTION IV.

DIAGNOSTIC PERFORMANCE

4-1. TEST DESCRIPTION

Each of the tests associated with the 2608A is designed to verify operation of a portion of the device. Some of the tests will produce messages and/or halts that uniquely identify which test is in operation and what function is being tested. In other cases the messages/halts may result from any one of several tests. Table 4-3 is available to the operator to provide more definitive information both on the nature of the error and the test in which it occurred. Each printing test will be identified as to test number in decimal and its function.

This diagnostic separates printed output by slewing paper at the end of each test, so that the following test begins on the next half page or the top of the next form, whichever comes first.

Each individual test description contains the following information:

- a. What function is under test.
- b. Messages that occur in its execution.
- c. Unique halts that occur if a failure is detected.
- d. If the test requires manual intervention.
- e. When the operator must examine the printout to determine the test results.
- f. When the line printer output is in the current primary language.

Table 4-4 illustrates the 2608A command output word format, and Table 4-5 illustrates the status input word format.

4-2. BASIC I/O TEST

Test 00A (26099A interface only)

This test verifies the basic I/O functions of the computer and the 26099A interface card. Subtests 1 thru 7 are the standard diagnostic tests for the CPU interface and are not described in this manual. Note that Subtest 8 requires manual intervention. This test does not generate any printout on the 2608A.

SUBTEST 1

Checks the ability to clear, set and test the interrupt system. The following instruction combinations are tested:

CLF 0 - SFC 0
CLF 0 - SFS 0
STF 0 - SFC 0
STF 0 - SFS 0

Errors in the above sequences produce error messages E000-E004 as shown in Table 4-3.

SUBTEST 2

Checks the ability to clear, set and test the interface flag. The following instruction combinations are tested:

CLF CH - SFC CH
CLF CH - SFS CH
STF CH - SFC CH
STF CH - SFS CH

Errors in the above sequences produce error messages E005-E010 as shown in Table 4-3.

SUBTEST 3

Checks that the test select code does not cause an interrupt with the Flag and Control set on the interface and the interrupt system off. The sequence of instructions is shown below:

STF CH
STC CH
STF 0
CLF 0

The CLF 0 instruction should inhibit an interrupt from occurring. Error message E004 occurs if CLF 0 fails.

SUBTEST 4

Checks that the Flag of the interface under test is not set when all other select code Flags are set. Error message ED11 occurs if a Flag is set incorrectly.

SUBTEST 5

Checks the ability of the interface to interrupt. With the Flag and Control set and the interrupt system on, there should be an interrupt on channel CH; if not, error message E014 occurs. The program checks that the interrupt occurred where expected. The interrupt should not occur before a string of priority-affecting instructions are executed. The following instructions are used to check the hold off operation:

STC 1
STF 1
CLC 1
CLF 1
JMP *+1,I
DEF *+1
JSB *+1,I
DEF *+1
NOP

Error messages E012 and E015 will occur if the hold off fails. This test also checks that another interrupt doesn't occur when the interrupt system is turned back on. Error message E013 will occur if an interrupt does occur. Finally, this subtest checks that no instruction was missed during the interrupt (E026 INT EXECUTION ERROR).

SUBTEST 6

Checks that with the interrupt system on and the CH Control and Flag set, there is no interrupt following a CLC CH instruction. The following sequence of instructions are used:

```
STC CH
STF CH
STF 0
CLC CH
```

If the CLC CH fails to inhibit an interrupt, error message E016 will occur.

SUBTEST 7

Checks that the CLC 0 instruction inhibits interrupts when the CH Control and Flag are set. The following sequence of instructions is used:

```
CLF CH
STC CH
STF CH
STF 0
CLC 0
```

If the CLC 0 fails to inhibit an interrupt, error message E017 will occur.

SUBTEST 8

This subtest is bypassed if the operator chooses to suppress tests requiring operator intervention. If not suppressed, the message below is printed on the console device:

```
H024 PRESS PRESET (EXT & INT), RUN
```

When the operator responds, the following are checked:

- a. Did the interface Flag set (EXTERNAL)?
- b. Did Control clear (EXTERNAL)?
- c. Did interrupt system go "off" (INTERNAL)?
- d. Did I/O data lines clear (EXTERNAL)?

Error messages E017 or E019 or E020 or E021 result if an error is found.

SUBTEST 9

This subtest verifies execution of the Self Test command, assuming proper functioning of the 2608A local self test. The program sends the Self Test command with printing disabled (040001B). The operator should observe oscillations of the print mechanism, but no printed output should be produced. If the flag does not set within 3 seconds, E126 is reported and the test is exited. PS-05B is checked for an expected status of 0. If an error occurs, E127 is reported. To continue, press RUN.

At the conclusion of this test the following is printed on the console device:

```
H025 BI-O COMP
```

Execution of selected device tests begins immediately.

Test 00B (59310B interface only)

There is no Basic I/O Test for the 59310B PCA. Should an error be suspected the operator should verify the operation of the 59310B by executing it's diagnostic.

SUBTEST 1

This subtest verifies proper execution of a Device Specified Jump (DSJ) command. The program first sends an Off Line command (030000B). A DSJ should return a status of 1. PS-1B is executed to clear the DSJ status. The program sends another talk addressed DSJ and the status should now be 0. If either DSJ status is incorrect, E121 is reported.

SUBTEST 2

This subtest verifies the execution of the Device Clear command. Print mode is programmatically changed to double size, and a listen addressed Device Clear command (20B) is issued to the printer. PS-03B is executed to verify resetting of the print mode to standard by the Device Clear command. If the status is incorrect, E120 is reported.

SUBTEST 3

This subtest verifies the Device Identify Code of the 2608A. A universal untalk command (37B) is sent, followed by a secondary command of the device address. The two bytes of information returned are expected to be 40B and 1 respectively. If an error is detected, E130 is reported.

SUBTEST 4

The purpose of this subtest is to verify the operation of the 2608A Self Test via the HP-IB Self Test Command (37B with data byte code 1 for printing disabled). It is assumed at this time that the 2608A local Self Test functions properly. The program sends a listen addressed HP-IB Self Test command to the printer. The operator should observe oscillations of the print mechanism, but no printed output should be produced. A positive response to parallel poll is expected within 3 seconds. PS-05B is checked to verify Self Test results. In addition, this subtest will also verify execution of the talk addressed HP-IB Self Test command to function as PS-05B. If the status returned is not correct, E125 is reported. To continue, press RUN.

SUBTEST 5

This subtest verifies operation of the 2608A Self Test via the Self Test Command (040001B). Execution and expected results are identical to that for Subtest 4, except that the only status checked is PS-05B. If a status error occurs, E127 will be reported. To continue, press RUN.

SUBTEST 6

This subtest verifies operation of service request and serial poll. The program sends an OFF LINE command to the printer and verifies that the printer is not requesting service (SRQ). E133 is reported if the printer requests service. The printer's response to serial poll should be negative; if not, E134 occurs. The program issues an ON LINE command and then exits the test.

Errors reported in subtests 1, 4 and 5 are evidence of a serious problem that should be resolved before further testing of the printer with this diagnostic.

4-3. TEST 01 MANUAL CONTROL TEST

This test allows the operator to test the manual controls of the 2608A Line Printer. If an error in status is detected, "SUBTEST XXB" is appended to the error message. For example, if PS-06B is incorrect, the following message will be reported:

E112 6 LPI DOT ROW COUNT; SUBTEST XXB

or, if status from PS-1B or "LIA CH" is incorrect,

E054 I-O STATUS ERROR; SUBTEST XXB BIT 0 POWER FAIL; SHOULD
BE 0 BIT 2 6/8 LPI; SHOULD BE 1

When an error halt occurs, the A and B registers will contain the information defined in section 2-5.

Upon completion of a subtest, the program will proceed to the next subtest. This test is suppressed if the operator selects bits 8 or 12 in the switch register (See table 3-2).

This test is most easily executed when a console printer is available for display of the various messages. However, the operator may run this test by observing the halts displayed in the memory data register (T-register) that correspond to the various messages. This test does not generate any printout on the 2608A.

Power on conditions for primary and secondary languages and 6/8 LPI are defined by the Nine-Position Rocker Switch as indicated on the printer's Control Panel under the access cover (See figure 4-2). These nine switches correspond to the binary code for primary, secondary, and 6/8 LPI modes during POWER ON or RESET. When the lower side of the rocker is depressed, a zero (0) is represented. To execute this test, the operator should set all POWER ON CONDITION switches to 0. It is assumed that the following subtests will be executed in sequence, as it may effect the status being checked.

SUBTEST 1B - The console device types:

H040 POWER OFF LP (BACK, LOWER LEFT); PRESS RUN

Operator turns off line printer's power (switch located in lower left hand corner of the rear of the machine as viewed by the operator standing in front of the device). The operator presses RUN. I/O status is checked on bits 377B for an expected status of 377B (26099A interface only).

Note

The format "on bits XXXB" is to indicate the bits considered significant for the current I/O status checks. For example, in Subtest 1B, bits 37:B are checked as all bits are expected to have status "1" for Power Off Conditions, however, in Subtest 24B only bit 2 of I/O status is checked to verify correct 6/8 LPI status.

SUBTEST 2B - The console types:

H041 POWER ON, READY THE PRINTER, CLEAR POWER ON SWITCHES, ON
LINE; PRESS RUN

The operator is now requested to satisfy all the conditions required to print and then to press RUN. The program check I/O status on bits 375B for an expected status of 231B.

SUBTEST 3B

No console printout occurs for this subtest. The program executes a master clear command and checks I/O status on bits 375B for expected status 230B.

SUBTEST 4B

No console printout occurs for this subtest. The program executes PS-1 thru 12B for expected status as follows:

data byte code (octal)	expected status (octal)
1	230
2	200
3	0
4	0
5	0
6	0
7	0
10	Not tested
11	0
12	0

SUBTEST 5B - The console types:

H042 PRESS RESET, ON LINE; PRESS RUN

The operator depresses the RESET switch, then ON LINE, and presses RUN. The program checks I/O status on bits 375B for an expected status of 231B. The program then executes a master clear command to clear the power fail bit of I/O status (bit 0).

SUBTEST 6B - The console types:

H043 PRESS OFF LINE; PRESS RUN

The operator depresses the OFF LINE switch, then presses RUN. The program checks I/O status on bits 375B for an expected status of 30B.

SUBTEST 7B - The console types:

H044 PRESS ON LINE, OPEN PLATEN; PRESS RUN

The operator depresses the ON LINE switch, then opens the platen and presses RUN. The program checks PS-2B on bits 372B for an expected status of 2B.

SUBTEST 10B - The console types:

H045 CLOSE PLATEN, ON LINE; PRESS RUN

The operator closes the platen, then depresses the ON LINE switch and presses RUN. The program checks PS-2B on Bits 372B for an expected status of 200 B.

SUBTEST 11B - The console types:

H046 TEAR PAPER IMMEDIATELY BELOW PRINTER; PRESS RUN

The operator tears the paper at the perforation immediately below the printer and presses RUN. The program moves paper to cause a PAPER OUT condition. PS-2B is checked on bits 372B for an expected status of 20B.

SUBTEST 12B - The console types:

H047 REINSTALL PAPER, ALIGN TOF, PRESS ON LINE; PRESS RUN

The operator reinstalls paper, aligns top of form via the line feed and forms adjust switches (Do NOT press RESET), depresses the ON LINE switch, then pressed RUN. The program checks PS-2B on bits 375B for an expected status of 200B.

SUBTEST 13B

No console printout occurs for this subtest. The program executes a programatic OFF LINE command and checks I/O status on bits 375B for an expected status of 30B.

SUBTEST 14B - The console types:

H050 PRESS 8 LPI; PRESS RUN

The operator presses the 8 LPI switch and then RUN. The program checks I/O status on bits 375B for an expected status of 234B.

SUBTEST 15B

No console printout occurs for this subtest. The program executes a programmatic ON LINE command and checks I/O status on bits 375B for an expected status of 234B.

SUBTEST 16B

No console printout occurs for this subtest. The program attempts to cause the VFC initialized status bit to clear by programmatically installing another VFC in the printer. I/O status on bits 375B is checked for an expected status of 244B.

SUBTEST 17B

No console printout occurs for this subtest. The program returns to the 6 LPI and VFC initialized modes. Then I/O status on bits 375B is checked for an expected status of 230B.

SUBTEST 20B - The console types:

H051 PRESS OFF LINE, LINE FEED; PRESS RUN

The operator depresses the OFF LINE switch, the LINE FEED switch (only advance one line!), and presses RUN. PS-6B and PS-7B are checked to verify correct dot row count and line count of 0,1 respectively.

SUBTEST 21B - The console types

H052 PRESS FORM FEED, ON LINE; PRESS RUN

The operator depresses the FORM FEED switch and presses RUN. PS-6B, PS-7B are checked to verify correct dot row count and line count of 0,0. I/O status on bits 70B is checked for expected status of 30B.

SUBTEST 22B - The console types:

H053 SET POWER ON LANGUAGES = XXXXXXXXXX; PRESS RUN

The operator should enter the pattern displayed by H053 (if no console is available, the A-register bits 0-8 contains the pattern) into the POWER ON LANGUAGE switches on the front panel under the access cover. Press RUN. The program checks PS-20B to verify POWER ON languages. E131 is reported if an error is detected. This subtest is executed once for each of the 8 POWER ON LANGUAGE switches, and once to reset all switches to 0.

SUBTEST 23B - The console types:

H055 SET POWER ON 6-8 LPI = X, PRESS RESET; PRESS RUN

The operator sets the power on 6-8 LPI switch to the requested position, presses RESET and then RUN. The I/O status is checked on bit 4B for 0 then 1 respectively. If a console is not available the A-register will indicate 6B or 10B (8 decimal) for 6 or 8 LPI respectively.

The program then places the printer ON LINE.

SUBTEST 24B (59310B interface only) - The console types:

H066 SET HP-IB ADDRESS SWITCHES TO XXB; PRESS RUN

The operator sets the printer's address switches (located in the lower right hand corner of the printer as viewed by the operator standing in front of the device; see figure 4-1) to XXB and presses RUN. The program addresses the device to listen and then attempts to send a single data byte to the printer. If the transfer is unsuccessful, then E124 is reported to indicate either a hardware failure or an operator error. This subtest is executed once for each of the 5 address switches. If no console is available, the operator should set the HP-IB address as indicated in A-register bits 0-4 when H066 occurs.

SUBTEST 25B (59310B interface only) - The console types:

H067 SET YOUR HP-IB ADDRESS IN SWITCH AND A-REG; PRESS RUN

The operator is now being directed to select the HP-IB address to be used throughout the duration of the diagnostic. This information is supplied to the program via the A register. Insure that the value supplied in the A register is identical to that set in the HP-IB address switch prior to pressing RUN.

Throughout the execution of these subtests, the operator may visually inspect the status of the light indicators on the control panel to verify their function (see figure 4-2).

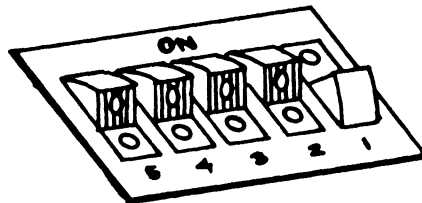


Figure 4-1. HP-IB Address Switch

4-4. TEST 02 PING-PONG TEST

SUBTEST 1

This subtest verifies communication between the 2608A and the CPU via the 2608A PING-PONG command. The program sends a PING command (060000B) followed by 256 bytes of data. A PONG command (060000B) is issued and the printer should return the same 256 bytes of data to the CPU. The returning data is checked for correct sequence and content. If an error is detected E122 is reported.

SUBTEST 2 (59310B interface only)

This subtest verifies communication between the 2608A and the 59310B via the HP-IB PING-PONG command (36B). Execution is identical to Subtest 1, except that E140 is reported if an error occurs.

4-5. TEST 03 PARITY TEST (59310B only)

This test is executed only if the interface is the 59310B and S-register bit 10 (Parity disable) was clear when the diagnostic was started at P = 100B.

This test assures that parity errors are not being erroneously detected by the 2608A. If this were the case, it would be highly improbable that this point could even be reached.

A command with erroneous parity (even) is sent to the 2608A. If the parity error is not detected by the printer, E141 occurs. The HP-IB is now cleared, and a DSJ command is executed. If the response fails to report the previous parity error, E142 results.

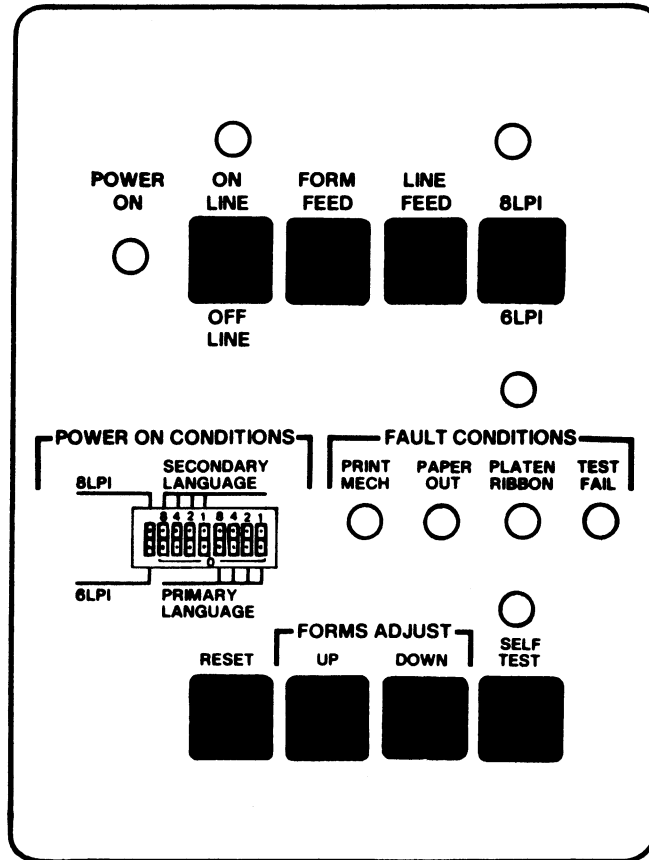


Figure 4-2. 2608A Control Panel

4-6. TEST 04 TRIANGULAR PRINT TEST

The Triangular Print Test prints a triangular pattern of 136 lines of the character "M" (115 octal). The purpose of this test is to check for correct wiring of the print mechanism. Each succeeding line of print contains one less character than the previous line. Since the 2608A is a 132 column printer and the first line of print is 136 characters, the actual pattern produced is 5 lines of 132 characters followed by the triangular pattern.

Visual inspection of the output is required to verify results.

The output from this test is in ASCII, independent of the currently selected language.

4-7. TEST 05 VERTICAL FORMAT CONTROL TEST

This test verifies the capability of controlling paper motion to selected locations on the paper. The test is divided into two subtests. The first requests paper motion via Vertical Format Control (VFC) commands. The second subtest requests motion via paper slew commands. Neither of these tests claim to be all inclusive in testing combinations of VFC and slewing commands. In the interest of conserving both paper and time, only selected samples of commands are used.

The printout for both subtests is indicated by the "FUNCTION" column in Table 4-1 and 4-2. The message will always occur beginning in column 1 and should be printed on the paper in the relative forms position indicated by the message. Visual inspection by the operator is required to verify proper position of the messages.

SUBTEST 1

This subtest verifies the ability of moving the paper to selected positions on the form via VFC commands. Table 4-1 indicates the sequence of testing, the functions which are tested, and the number of times they are repeated.

TABLE 4-1. VFC COMMANDS

FUNCTION (MESSAGE)	NO. OF TIMES PERFORMED	OCTAL CODE	OPERATION	VFC CHAN
TOF	1	100200	Top of form	1
BOF	1	100201	Bottom of form	2
SS	12(16)+	100202	Single space	3
DS	6(8)+	100203	Double space	4
TS	3(4)+	100204	Triple space	5
QP	2	100206	Quarter page	7
HP	2	100205	Half page	6
SP(EP)	3(4)+	100207	6th (8th) page	8
CH13	2	100214	Next 7th line	13
CH14	2	100215	Next 6th line	14
CH15	2	100216	Next 5th line	15
CH16	2	100217	Next 4th line	16
CH10	1	100211	BOF minus 1 line	10
CH9	1	100210	Bottom of form	9
CH11	1	100212	TOF minus 1 line	11
CH12	1	100213	Top of form	12

+8 LPI operation.

SUBTEST 2

This subtest verifies the ability of moving the paper to selected positions on the form via slew requests. The 2608A allows slew commands from 0 to 127 lines in any individual request. Table 4-2 indicates the sequence of testing, and the functions which are tested.

TABLE 4-2. SLEW COMMANDS

SLEW FUNCTION (MESSAGE)	OCTAL CODE	LINES SLEWED
Slew 000B	100000	0*
Slew 001B	100001	1
Slew 002B	100002	2
Slew 004B	100004	4
Slew 010	100010	8
Slew 020	100020	16
Slew 040	100040	32
Slew 100B	100100	64

*This command does not actually cause a physical print, but rather fills the printer's buffer. The next slew request for slew 1 line should produce the message "CH 12" beginning in column 1 followed by the message "SLEW 000B" beginning in column 10 of the same line.

Bit 7 of the switch register has an additional impact on this test. Should this bit be set by the operator prior to entry into the test then the program will automatically install a new VFC definition into the printer. This VFC is identical to the standard 16 channel 6LPI VFC for an 11 inch form. The observed output from selection of this option is identical to the output generated by the standard 6LPI as defined in Table 4-1.

Note

Setting bit 7 will arbitrarily override the VFC select information supplied by the operator in S register bit 7 when the diagnostic was initialized at P register = 100. The programmed form length will always be 11 inches regardless of the length of the standard VFC installed in the printer.

The output from this test is in ASCII, independent of the currently selected primary language.

The operator must examine the output to verify the performance of this test.

4-8. TEST 06 CHARACTER SET TEST

This test verifies that the selection of all octal codes from 0 to 177B yields the correct characters which in turn are properly printed. Reserved control characters will be disabled for this test.

For each octal code, a complete line of 132 columns of that code is printed, producing 128 lines of output.

Visual inspection of the output is required to verify results.

The output from this test is in the currently selected primary language.

4-9. TEST 07 DMA/DCPC TEST

The DMA Test verifies that the Line Printer will run under DMA control. A buffer of 132 characters of ripple print pattern is output to the printer under DMA. After each line is printed, a new line is stored into the buffer. Each line is rotated one print position to the left on each succeeding line. A total of 127 lines are printed. Reserved control characters will be disabled for this test.

The underline character (137B) is not included since it has a width of 7 dots compared to all other ASCII characters which have a width of 5 dots. Inclusion of underline would slow the ASCII version print speed to about 260 lines per minute.

This test will be executed only if the DMA option has been specified during the set-up procedure of the CONFIGURATOR. If DMA has not been configured, H033 is printed, and the program continues with the next operator selected test. It is assumed that the DMA hardware is working correctly and only the service request logic of the line printer interface and corresponding timing relation are to be tested.

Error message E034 will be printed if the flag fails to set after the DMA completion. Error message E035 will be printed if the interface flag fails to set after DMA completion. In either case, the test is aborted, and the program continues to the next operator-selected test.

Visual inspection of the output is required to verify results.

The output from this test is in the currently selected primary language.

4-10. TEST 08 ROM READBACK TEST

This test verifies the ability to request a readback from the 2608A of the dot patterns contained in ROM that comprise a 128 character set. DMA is used to input the dot data from the printer. Since 9 bytes are transmitted for each of the 128 characters, a total of 1153 bytes are expected, with byte 1 identifying the language code. Following receipt of the dot data, the test will reconstruct the data and by printing 9 lines of graphics dot data, will reproduce the 128 characters in the set. The test will be conducted once for each language code. Default for any language not available will be ASCII. Note that reserved control characters, though enabled, occur in the printout, since this is a graphics print.

This test will be executed only if the DMA option has been specified during the setup procedure of the CONFIGURATOR. If DMA has not been configured, H033 is printed, and the program continues with the next operator selected test. It is assumed that the DMA hardware is working correctly and only the service request logic of the line printer interface and corresponding timing relation are to be tested. Error message E034 is reported if the flag fails to set after the DMA completion.

The operator must examine the formation of the 128 characters to verify the results of this test for each language.

This test is independent of the operator's selection of a primary language.

4-11. TEST 09 PRIMARY/SECONDARY SELECT TEST

This test verifies the capability to programmatically select all the character sets installed in the 2608A, first as the primary and then the secondary language. For each language that is installed in the 2608A, 2 lines of print will occur. The first line will be with the character set selected as the primary set via SI, and the second line will be printed as the secondary set, via SO. The following message will precede each of the two lines of print to indicate the current language code: "LANGUAGE CODE = XXB" where XX will vary from 00 through whatever (if any) other languages are installed. All control characters will be deleted from the data for this test, except SI and SO.

The number of languages installed in the 2608A will determine the length of this test. See Table 5-1 for description of the character set codes.

The operator must examine the output to determine the success of this test.

This test is independent of the operator's selection of a primary language.

4-12. TEST 10 PRIMARY/SECONDARY/INTERMIX TEST

This test verifies the capability of alternating between the primary and secondary languages within the same line of print via the "8th bit" selection of the secondary language. The intent of this test is to cycle through all of the installed languages in the 2608A by selecting each of those languages as the primary language with ASCII always as the secondary. For each available language the following sequence is output:

XX, XX+8th bit set

where the sequence is repeated as XX varies from 00 to 177B. Reserved control characters will be disabled for this test. Two lines of 128 characters will be printed. Each cycle will be identified by the message "Language Code = XXB" where XX is defined in Table 5-1.

This test is independent of the operator's selection of a primary language.

The operator is required to examine the output to verify the results of the test.

4-13. TEST 11 2X SIZE CHARACTER TEST

This test verifies the ability to print all the characters that are available in a size that is twice the height and width of the normal 5x7 matrix character. The technique used in this test is identical to that described in Test 10 (Primary/Secondary/Intermix Test). The only modification necessary to that description is that the output for each available language will be four lines of 64 characters per line.

The operator is required to examine the output to verify the results of this test.

This test is independent of the operator's selection of a primary language.

4-14. TEST 12 CONTROL CHARACTERS TEST

This test consists of a series of subtests designed primarily to verify the operation of the 2608A when various combinations of characters occur. Some of the subtests will produce blank lines of print. Some will test illogical but possible combinations of characters. Each subtest defined below describes the condition under test, the output used, and the expected results.

The format for each subtest is to precede each of the subtests' output with the title "TEST 12, SUBTEST N" where N will range from 1 to the number of subtests available. Throughout this series of subtests the primary language is set to "00". The secondary language is a function of the language options available. If the Alternate Character Set ROM is installed, the secondary language is set to "02" (Cyrillic). If Cyrillic is not available, the secondary language will be set to 10B (French). In the event that neither language option is available, both primary and secondary language codes will be assigned to "00".

SUBTEST 1

Goal: Verify that the SI (17 octal) code is nonprinting, (when transparency is not invoked) regardless of position in the buffer.

Output: 200 bytes of the code 17 octal followed by print command.

SUBTEST 2

Same as Subtest 1 except the code output is SO (16 octal).

SUBTEST 3

Same as Subtest 1 except the code output is BS (10 octal).

SUBTEST 4

Goal: Verify that if the first character output is a BS (10 octal), that the character immediately following is lost.

Output: 10 octal, 101 octal, print command.

Result: One blank line.

SUBTEST 5

Goal: Verify that only the first character output after a BS (10 octal) in column 1 is lost.

Output: 10 octal, 101 octal, 102 octal, print command.

Result: The character 'B' is printed in column 1.

SUBTEST 6

Goal: Verify that a BS (10 octal) code that is the last code output before the print command does not affect the code output previous to the BS.

Output: 101 octal, 102 octal, 10 octal, print command.

Result: The characters "AB" are printed in columns 1 and 2.

SUBTEST 7

Goal: Verify that successive BS (10 octal) codes are functionally equivalent to a single BS code.

Output: 101 octal, 111 octal, 10 octal, 10 octal 130 octal, print command.
Result: The character "A" will occur in column 1 while column 2 contains the character "I" overlaid with the character "X".

SUBTEST 8

Executed only if one of the language options is available.

Goal: Verify that selection of the secondary language via the SO (16 octal) code will transfer to the next line of print.

Output: 16 octal, followed by 132 characters of the code 135 octal, then print command.

Result: A single line of 132 identical characters as selected by 135 octal in whatever is the secondary language.

Output: 132 characters of the code 135 octal followed by a print command.

Result: A single line of 132 identical characters as selected by 135 octal in whatever is the secondary language.

SUBTEST 9

Goal: Verify the ability to overprint (print and suppress space) a "line at a time" when using normal size characters.

Output: 132 characters of the code 117 octal (O) followed by an alpha print command with a zero line slew.

Result: Neither printing nor paper motion should occur.

Output: 132 characters of the code 111 (I) followed by an alpha print command that specifies a single line slew.

Result: 132 characters are printed on a single line consisting of 117 octal (O) overlaid by 111 octal (I).

SUBTEST 10

Goal: Verify the ability to overprint a "line at a time" when printing in the 2X character size.

Output: 66 characters of the code 117 octal (O) followed by a double size print command with a zero line slew.

Result: Neither printing nor paper motion should occur.

Output: 66 characters of the code 111 octal (I) followed by a double size print command with a single line slew.

Result: 66 characters are printed across the page consisting of 117 octal (O) overlaid by 111 octal (I) in a 2X size.

SUBTEST 11

- Goal:** Verify that print commands with suppress space are accumulative if succeeding lines of output have less characters than previous lines.
- Output:** 132 characters of the code 117 octal (O) followed by a print command with a zero line slew.
- Result:** Neither printing nor paper motion should occur.
- Output:** 99 characters of the code 057 octal (/) followed by a print command with a zero line slew.
- Result:** Neither printing nor paper motion should occur.
- Output:** 66 characters of the code 134 octal (\) followed by a print command with a zero line slew.
- Result:** Neither printing nor paper motion should occur.
- Output:** 33 characters of the code 111 octal (I) followed by a print command with a single line slew.
- Result:** Should produce a single line of print of 132 characters where the first 33 are O's overlaid with I's, the second 33 are O's overlaid with \s, the third 33 are O's overlaid with /s, and the last 33 characters should be O's without overstrikes.

SUBTEST 12

- Goal:** Verify operation of the "set left margin" command.
- Output:** Successive lines of print are output wherein each line, up to the 16th line, will be progressively shifted one print column to the right after which the next 15 lines will reseed a print column at a time back to column 1.
- Result:** 31 lines of print each containing 116 T's forming a "right arrow" pattern.
- Subtests 13-15 are executed only if interface is 59310B and if the operator set bit 8 at P 100 to indicate that CR, LF, and FF are enabled.

SUBTEST 13

- Goal:** Verify that CR (15 octal) is the functional equivalent of overstrike (Print with zero (0) line slew).
- Output:** Same as for Subtest 11, except CR (15 octal) replaces zero line slew commands.
- Result:** Same as for Subtest 11.

SUBTEST 14

- Goal:** Verify that LF (12 octal) is the functional equivalent of a print with single slew command.
- Output:** 101 octal, 102 octal, 12 octal, 103 octal 104 octal, 12 octal
- Result:** Two lines of output: line 1 with "A", "B" in columns 1 and 2 respectively; line 2 with characters "C", "D" in columns 1, 2 respectively.

SUBTEST 15

Goal: Verify that the functional equivalent of FF (14 octal) is a VFC CH1 command (print and move to next TOF).

Output: 101 octal, 102 octal, 14 octal

Result: Characters "A", "B" in columns 1,2

Output: 103 octal, 104 octal, 12 octal

Result: Characters "C", "D" in columns 1,2, at TOF.

4-15. TEST 13 GRAPHICS ALIGNMENT TEST

This test verifies that the 2608A print mechanism is in proper alignment. The test is divided into 4 sections. The first section tests alignment of the leftmost dot column; the second, alignment of the rightmost dot column; the third, alignment of the center dot column. For each of the first 3 subtests, 180 dot rows with 1 dot in each of the 132 columns are printed. The fourth subtest outputs a solid horizontal dot row followed by 2 blank dot rows. This pattern is repeated 60 times.

4-16. TEST 14 GRAPHICS COLUMN WIDTH TEST

This test prints 50 percent of the dot positions across the page by alternating between 64 dot columns off and 64 dot columns on. 700 dot rows (Approx. 1 page) of this pattern are output. By looping on this test, the operator can dynamically adjust the column width alignment of the 2608A.

4-17. TEST 15 GRAPHICS DIAGONAL TEST

This test verifies the ability to rotate a single dot through each of the dot positions available within any of the 132 columns. 700 dot rows of diagonal lines (Approx. 1 page) from the upper left to the lower right corner of the page are produced by this test.

A visual inspection of the output is required by the operator.

Obvious wavering in the diagonals is cause to expect maladjustment of the print mechanism.

4-18. TEST 16 GRAPHICS PATTERN TEST

This test produces a graphics pattern that may be visually inspected to determine an overall rating of the graphics print quality.

4-19. TEST 17 POWER SUPPLY TEST

This test is designed to verify the ability of the power supply to maintain power under specified conditions. The “too many dots” circuitry, which delays printing if the allowed number of dots per second is exceeded, is also under test. When the number of dots exceeds this value, the operator should observe the print mechanism returning to the “home” position for approximately 1/2 second. It is recommended that 6 part paper be used to best analyze performance.

SUBTEST 1

One full page of the character “#” (octal 43) at 8 LPI is output to the printer with no programmatic delays. The “too many dots” circuitry should not be activated (i.e., there should be no apparent delay in printing).

SUBTEST 2

Approximately one full page of maximum density graphics data is output to the printer with no programmatic delays. The operator should verify functioning of the “too many dots” circuitry by observing periodic delays in printing. If this circuitry is not functioning, the “circuit breaker” will trip and the test will not complete.

The operator is required to examine the output. The resulting printout should not show any sign of deterioration of print quality, nor any change in the horizontal or vertical alignment of the dots.

This test is independent of the operator's selection of a primary language.

4-20. PRINT QUALITY TEST

The print quality test is not designed to detect a specific printer failure, but rather as an overall verification of the print quality of the printer. It is not part of the standard run of tests and must be specifically requested by the operator. Selection of this test is via the standard procedure of setting bit 9 in the S-register. When the halt occurs, display the B-register and set bit 2. The test will remain selected until the operator specifically de-selects it.

This test will print a single page of text. The text contains double size headings. These headings are followed by upper case only text which is followed by mixed upper and lower case text.

The output for the Print Quality Test is in the currently selected primary language.

TABLE 4-3. ERROR INFORMATION MESSAGES AND HALT CODES

HALT	SECTION	MESSAGE	COMMENTS
102073	Configuration	None	I/O select code entered at configuration is invalid. Must be greater than 7 octal. Re-enter a valid select code; press RUN.
102074	Configuration	None	Select code entered during configuration is valid. Enter program option bits (Table 3-2) in Switch Register and press RUN.
102075	Test Control	None	Test selection request resulting from S-reg bit 9 being set. Enter in A/B-reg the desired group of tests to be executed, and press RUN. (See Table 3-1)
102076	Test Control	None	End-of-test halt resulting from Switch Register bit 15 being set (A-register has the test number). To continue, press RUN.
102077	Test Control	PASS XXXXXX	Diagnostic run complete. S-reg options may be changed (pass count in A reg). To continue, press RUN.
106077	Test Control	None	Halts in location 2-77B to trap interrupts which may occur unexpectedly due to hardware malfunctions. M-reg contains I/O slot which interrupted. Diagnostic may be partially destroyed if halt occurs. Program may have to be reloaded; problem should be corrected before proceeding.
None	Test Control	2608A LINE PRINTER DIAGNOSTIC DSN = 105105B FIRMWARE ID = YYYYYDEC	Introductory message. Printed on initial pass through the diagnostic and whenever the operator restarts the program at 2000 octal.
None	Test Control	TEST XXXXXX DEC	Information message before error message (XX = test number in decimal). Message occurs only once within a test but is suppressed for any subsequent messages within the same test.
102000	TEST 0A	E000 CLF 0- SFC 0 ERROR	CLF/SFC 0 failed. CLF did not clear Flag or SFC caused no skip with Flag clear.

TABLE 4-3. ERROR INFORMATION MESSAGES, HALT CODES (continued)

HALT	SECTION	MESSAGE	COMMENTS
102001	TEST 0A	E001 CLF 0-SFS 0 ERROR	CLF/SFS 0 failed. CLF did not clear Flag or SFS caused skip with Flag clear.
102002	TEST 0A	E002 STF 0-SFC 0 ERROR	STF/SFC 0 combination failed. STF did not set Flag or SFC caused skip with Flag set.
102003	TEST 0A	E003 STF 0-SFS 0 ERROR	STF/SFS 0 combination failed. STF did not set Flag or SFS caused no skip with Flag set.
102004	TEST 0A	E004 CLF 0 DID NOT INHIBIT INT	With card Flag and Control set, CLF 0 did not turn off interrupt system.
102005	TEST 0A	E005 CLF CH-SFC CH ERROR	CLF/SFC CH combination failed. CLF did not clear Flag or SFC caused no skip with Flag clear.
102006	TEST 0A	E006 CLF CH-SFS CH ERROR	CLF/SFS CH combination failed. CLF did not clear Flag or SFS caused skip with Flag clear.
102007	TEST 0A	E007 STF CH-SFC CH ERROR	STF/SFC CH combination failed. STF did not set Flag or SFC caused skip with Flag set.
102010	TEST 0A	E010 STF CH-SFS CH ERROR	STF/SFS CH combination failed. STF did not set flag or SFS caused no skip with Flag set.
102011	TEST 0A	E011 STF XX SET CARD FLAG	Select code screen test failed. A-register contains XX octal where XX = select code that caused that card flag to set.
102012	TEST 0A	E012 INT DURING HOLD	Interrupt occurred during an I/O instruction or a JMP/JSB OFF INSTR indirect instruction.
102013	TEST 0A	E013 SECOND INT OCCURRED	Card interrupted a second time after initial interrupt was processed.
102014	TEST 0A	E014 NO INT	No interrupt occurred with card Flag and Control set and the interrupt system on.
102015	TEST 0A	E015 INT RTN ADDR ERROR	Interrupt did not occur at the correct location in memory.
102016	TEST 0A	E016 CLC CH ERROR	CLC CH did not clear card Control with the interrupt system on.
102017	TEST 0A	E017 CLC 0 ERROR	CLC 0 did not clear Control with the interrupt system on.

TABLE 4-3. ERROR INFORMATION MESSAGES, HALT CODES (continued)

HALT	SECTION	MESSAGE	COMMENTS
102020	TEST 0A	E020 PRESET (EXT) DID NOT SET FLAG	PRESET (EXT) did not set the card Flag.
102021	TEST 0A	E021 PRESET (INT) DID NOT DISABLE INTS	PRESET (INT) did not disable the interrupt system.
102022	TEST 0A	E022 PRESET (EXT) DID NOT CLEAR CONTROL	PRESET (EXT) did not clear Control.
102023	TEST 0A	E023 PRESET (EXT) DID NOT CLEAR I-O LINES	PRESET (EXT) did not clear I/O data lines.
102024	TEST 0A	H024 PRESS PRESET (EXT & INT), RUN	Press PRESET (External, Internal) and RUN.
None	TEST 0A	H025 BI-O COMP	Basic I/O Tests completed.
102026	TEST 0A	E026 INT EXECUTION ERROR	Interrupt was not processed correctly.
102030	TEST 01-06, 09-17	E030 FLAG FAILED TO SET	With the interrupt system off, device flag failed to set.
102031	TEST 01-06, 09-17	E031 LP FAILED TO INT	With interrupt system on, line printer failed to interrupt.
102032	TEST 01-06 09-17	E032 LP NOT READY	Line printer status indicates that printer is not ready.
102033	TEST 07-08	H033 DMA NOT CONFIG	DMA option bit not set during configuration of the CONFIGURATOR.
102034	TEST 07-08	E034 DMA TIME OUT	DMA or card failed to set flag after a block transfer.
102035	TEST 07-08	E035 I-O FLAG NOT SET AFTER DMA COMP	DMA completed a block transfer but the interface card did not set its flag to indicate it was finished.
102036	TEST 01-06, 09-17	E036 LP OFF LINE	Status indicates printer is OFF LINE.

TABLE 4-3. ERROR INFORMATION MESSAGES, HALT CODES (continued)

HALT	SECTION	MESSAGE	COMMENTS
102040	TEST 01	H040 POWER OFF LP (BACK LOWER LEFT); PRESS RUN	Operator reaches to lower left rear of printer and drops power and then press RUN on front panel of computer.
102041	TEST 01	H041 POWER ON, READY THE PRINTER. CLEAR POWER ON SWITCHES, ON LINE; PRESS RUN	Operator follows this sequence: 1. Restore power 2. Install paper (If not already installed) 3. Closes platen (If not already closed) 4. Set all switches labeled "power on conditions" to the open position (under the access cover). 5. Press the ON LINE switch 6. press RUN on the computer
102042	TEST 01	H042 PRESS RESET. ON LINE; PRESS RUN	Operator presses the RESET switch, then ON LINE switch; press RUN.
102043	TEST 01	H043 PRESS OFF LINE; PRESS RUN	Operator presses the OFF LINE switch; then presses RUN
102044	TEST 01	H044 PRESS ON LINE. OPEN PLATEN; PRESS RUN	Operator corrects the OFF LINE condition and then moves platen to open position and then presses RUN.
102045	TEST 01	H045 CLOSE PLATEN. ON LINE; PRESS RUN	Operator closes platen presses ON LINE; and presses RUN.
102046	TEST 01	H046 TEAR PAPER IMMEDIATELY BELOW PRESS RUN	The operator tears the paper at the first perforation below the printer; presses RUN.
102047	TEST 01	H047 REINSTALL PAPER. ALIGN TOF. PRESS ON LINE; PRESS RUN	Operator reinstalls paper, aligns TOF, insures the platen is closed, presses ON LINE and then presses RUN.
102050	TEST 01	H050 PRESS 8 LPI; PRESS RUN	Operator presses the 8 LPI switch and then presses RUN.
102051	TEST 01	H051 PRESS OFF LINE.LINE FEED; PRESS RUN	The operator presses OFF LINE, LINE FEED, and RUN.

TABLE 4-3. ERROR INFORMATION MESSAGES, HALT CODES (continued)

HALT	SECTION	MESSAGE	COMMENTS
102052	TEST 01	H052 PRESS FORM FEED, ON LINE; PRESS RUN	The operator presses FORM FEED, ON LINE, and then RUN.
102053	TEST 01	H053 SET POWER ON LANGUAGES XXXXXXXXX; PRESS RUN	The operator sets the switches labeled "power on conditions" as indicated in message or by the A-reg. Press RUN.
102054	TEST 00, 01, 05	E054 I-O STATUS ERROR; SUBTEST XXB]	Incorrect I/O or PS-1B status; subtest number appended for Test 01.*
102055	TEST 01	H055 SET POWER ON 6-8 LPI = X, PRESS RESET; PRESS RUN	Set the 6-8 LPI power on condition switch to the state indicated in message or the A-reg.(6B or 10B for 6 or 8 LPI)
102063	MODIFY LANGUAGE SECTION	H063 PUT LANGUAGE CODE IN S-REG; PRESS RUN	The operator is requesting a change of the primary language. Modify S-register as per Table 5-1 to select primary language.
102065	TEST 01	E065 NO VFC CHANNEL 12 STATUS	Request for motion to TOF via VFC channel 12 failed to set BIT 12 in status word
102066	TEST 01	H066 SET HP-IB ADDRESS SWITCHES TO XXB; PRESS RUN	The operator sets address switches to the state req'd in message or A-reg. (59310B interface only)
102067	TEST 01	H067 SET YOUR HP-IB ADDRESS IN SWITCH AND A-REG;PRESS RUN	Operator should now select choice of HP-IB address and indicate the choice by supplying in A-register. Then press RUN.
106000	TEST 0-17, TEST CONTROL	H100 REALIGN TOF; PRESS ONLINE; PRESS RUN	Message occurs when starting at P = 100 or if Power Fail bit set unexpectedly. In either case, TOF will be redefined when the operator presses RUN.
106004	TEST 0-17	E104 TAKE DEVICE XXB OFF LINE; PRESS RUN	Parallel Poll from device not under test. Device polling must be taken OFF LINE for device under test to continue. Device address is in A-reg. (59310B interface only)

TABLE 4-3. ERROR INFORMATION MESSAGES, HALT CODES (continued)

HALT	SECTION	MESSAGE	COMMENTS
106006	TEST 0-17	E106 NO RESPONSE TO PARALLEL POLL	Device under test does not respond to parallel poll within 1000 ms(59310B interface only).
106012	TEST 01	E112 6 LPI DOT ROW COUNT; SUBTEST XXB	6 LPI dot row count (PS-06B) is not as expected.*
106013	TEST 01	E113 6 LPI FORM POSITION; SUBTEST XXB	6 LPI form position (PS-07B) is incorrect.*
106007	TEST 0-17	E107 HPIB TIMEOUT	Attempt to transfer either a command or data did not complete within 200 ms (59310B only)
106015	TEST 01	E115 8 LPI DOT ROW COUNT; SUBTEST XXB	8 LPI dot row count (PS-11B) is incorrect.*
106016	TEST 01	E116 8 LPI FORM POSITION; SUBTEST XXB	8 LPI form position (PS-12B) is incorrect.*
106020	TEST 0B, 01	E120 PRINT MODE; SUBTEST XXB	Print mode (PS-03B) not 0 as expected. In test 00B (59310B only) this error implies failure of Device Clear command.*
106021	TEST 0B	E121 DSJ	DSJ response not as expected. A reg. = Actual response; B reg. = Expected response. (59310B interface only)
106022	TEST 02	E122 PING-PONG	Data returned from PING-PONG test is incorrect in content and/or sequence.
106023	TEST 01	E123 DISPLAY STATUS; SUBTEST XXB	Error in Display Status (PS-02B).*
106024	TEST 01	SWITCH FAILED	Attempt to access device XXB failed due to either a switch failure or operator error during TEST 01 subtest 24B (59310B interface only)
106025	TEST 0B	E125 HP-IB SELF TEST STATUS	Status returned by talk addressed HP-IB Self Test (37B) not 0 as expected (59310B interface only).
106026	TEST 0A	E126 SELF TEST TIMEOUT	Execution of Self Test via the Self Test command (040001B) not complete within 3 seconds.

TABLE 4-3. ERROR INFORMATION MESSAGES, HALT CODES (continued)

HALT	SECTION	MESSAGE	COMMENTS
106027	TEST 0A,B	E127 SELF TEST STATUS; SUBTEST XXB	Self Test Status returned by PS-05B not 0 as expected for pass of self test.*
106030	TEST 0B	E130 DEVICE IDENTIFY	Data returned does not match that expected to correctly identify 2608A. A-reg bits 8-15 = actual byte 1, bits 0-7 = actual byte 2; B-reg = expected bytes 1,2. (59310B only)
106031	TEST 01	E131 PRI-SEC POWER ON CONDITION SWITCH; SUBTEST XXB	Status from PS-20B indicates unexpected "power on condition" setting for primary/secondary language.*
106032	TEST 01	E132 PRI-SEC LANGUAGE; SUBTEST XXB	PS-4B indicates primary/secondary languages are not as expected.*
106033	TEST 0B	E133 ILLEGAL SERVICE REQUEST	2608A should not be requesting service when OFF LINE. (59310B interface only)
106034	TEST 0B	E134 ILLEGAL RESPONSE TO SERIAL POLL	Response to Serial Poll is positive; expected to be negative since 2608A is OFF LINE. (59310B interface only)
106035	TEST 0B	E135 NO SERVICE REQUEST	2608A did not request service as expected (59310B only)
106036	TEST 0B	E136 NO RESPONSE TO SERIAL POLL	2608A did not respond positively to serial poll as expected (59310B interface only).
106037	TEST 01	E137 IFC FLAG FAILED TO CLEAR	IFC flag failed to clear. A device is asserting the IFC line. (59310B only)
106040	TEST 02	E140 HP-IB PING-PONG	Data returned in HP-IB PING-PONG is incorrect in content and/or sequence. (59310B interface only).
106041	TEST 03	E141 PARITY ERROR NOT DETECTED	Failed to hold off handshake on a command with incorrect (even) parity. (59310B interface only)
106042	TEST 03	E142 PARITY ERROR NOT REPORTED	Failed to report (thru it's DSJ response) that a command parity error occurred. (59310B only)

Note

In all cases where the comment field is marked with an asterisk (*) the reader is directed to Section 2-5 for interpretation of the status contained in the A and B registers if a console device is not available for message reporting.

TABLE 4-4. 2608A COMMAND OUTPUT WORD FORMAT

COMMAND	BYTE *	ASSOCIATED DATA BYTE
bits		7 6 5 4 3 2 1 0
26099A	15 14 13 12	
59310B (bit 4=0)	3 2 1 0	
Data	0 0 0 0	P/S Character Code
Character Set Change	0 0 0 1	Sec. Code Prim. Code
VFC Set/Reset	0 0 1 0	6/8 Number of Lines
(n - odd)	0 0 0 0	Channels 16 - 9
(n - even)	0 0 0 0	Channels 8 - 1
OFF/ON Line	0 0 1 1	X X X X X X X F/O
Self Test	0 1 0 0	X X X X X X X E/D
Master Clear	0 1 0 1	X X X X X X X X
Ping-Pong Ping	0 1 1 0	X X X X X X X 0
Pong	0 1 1 0	X X X X X X X 1
Set Left Margin	0 1 1 1	X X X X # of bl col
Print	1 0 0 0	S/C Paper Instruction
Print/Slew	1 0 0 0	0 # Slew Lines
Print/Select	1 0 0 0	1 X X X Channel No
Readback Status	1 0 1 0	0 # of Status Bytes
Chars	1 0 1 0	1 X X XLang code
Print Mode	1 0 1 1	X X X Tran Mode #
HP-IB CHANNEL COMMANDS		
LISTEN COMMAND	BYTE	ASSOCIATED DATA BYTE
bits	4 3 2 1 0	7 0
Device Clear	1 0 0 0 0	X X X X X X X X
Ping	1 1 1 1 0	X X X X X X X X
HP-IB Self Test	1 1 1 1 1	X X X X X X X E/D
TALK COMMAND	BYTE	
Device Specified Jump	1 0 0 0 0	
Pong	1 1 1 1 0	
Self Test Status	1 1 1 1 1	

* For 26099A the command byte is in bits 15 thru 12, with associated data byte in bits 7 thru 0. For 59310B operations the command byte is in bits 4 thru 0 of the command word followed by a second transfer of the associated data byte.

- 0/1 = P/S, Primary/Secondary;
- 6/8, Six/Eight LPI; F/O, Off/On Line; S/C, Slew/VFC;
- E/D, Enable/Disable;
- X , Reserved;

Above abbreviations apply to both Tables 4-4 and 4-5.

TABLE 4-5. 2608A STATUS WORD FORMAT

DATA BYTE CODE	STATUS TYPE	RETURNED DATA FORMATS							
		7	6	5	4	3	2	1	0
1B	I/O *	F/O	Nt Rdy	Ch9	Ch12	VFC In	6/8	Rsvd	P Fail
2B	DISPLAY	F/O	P M Er	S Tst	Paper	Rsvd	6/8	Pl/Rbn	Rsvd
3B	PRNT MODE	Reserved		Tran	0=std,	1=dbl,	2=grph		
4B	PRI-SEC	Secondary Language				Primary Language			
5B	Self Test	P/F	Number of selftest subtest which failed						
6B	6LPI DRC	6 Lines Per Inch Dot Row Count							
7B	6LPI LNCT	6 Lines Per Inch Line Count							
10B	6LPI PGSZ	6 Lines Per Inch Page Size							
11B	8LPI DRC	8 Lines Per Inch Dot Row Count							
12B	8LPI LNCT	8 Lines Per Inch Line Count							
13B	8LPI PGSZ	8 Lines Per Inch Page Size							
14B	Frmwr #	Firmware Identification Number							
15B	1st P Col	First print column Range is 0 thru 17B							
20B	POW ON LN	Secondary Language				Primary Language			

Note

Data Bytes 16, 17, and 21 thru 377B are not considered significant to the diagnostic.

* This is the I/O status normally available with an "LIA CH" instruction on the 26099A interface or with PS-1B on either the 59310B or 26099A interface.

The 26099A interface returns status in bits 8-15, the 59310B interface in bits 0-7. For purposes of the diagnostic, all status will be compared and stored in bits 0-7.

SECTION V. MODIFICATION OF PRIMARY LANGUAGE

5-1. GENERAL

At any time while running the diagnostic the operator may initiate a request to modify the current primary language. This feature is not considered to be part of the standard tests used by this diagnostic to verify operation of the line printer. The diagnostic program is distributed with ASCII defined as the primary language and if this section is never selected, then all passes through the diagnostic will result in ASCII being the predominant visible output. Should the operator decide to assign a language other than ASCII as the primary language, then the following should be noted:

- a. Only at the end of a pass will the diagnostic check to see if a change has been requested. To make the request, Bit 0 of the S-register must be set.
- b. Bit 0 will be cleared after each change of primary diagnostic language. The operator must specifically select this option for each change of language.
- c. This procedure does not modify the definition of the secondary language. The default for the secondary language remains at "00".

5-2. SELECTION PROCEDURE

The following appears on the console device and the computer halts:

```
H063 PUT LANGUAGE CODE IN S-REGISTER; PRESS RUN
```

The operator will then supply the appropriate code in the S-register according to Table 5-1. The existing code displayed in the S-register will be the current selection. Following test selection, the operator presses RUN and a new pass through the diagnostic will begin with the operator selected primary language. The usual contents of the S-register as defined in Table 3-2 are saved prior to this step and restored as soon as the operator presses RUN.

TABLE 5-1. CHARACTER SET SELECT CODES

LANGUAGE	OCTAL CODE	BINARY CODE
ASCII	00	0000
"Language" Option (-001)		
ARABIC	01	0001
CYRILLIC	02	0010
KATAKANA	03	0011
DRAW	04	0100
RESERVED (ASCII is default)	05-06	
Substitution Option (-002)		
APL	07	0111
FRENCH	10	1000
GERMAN	11	1001
SWEDISH/FINNISH	12	1010
DANISH/NORWEGIAN	13	1011
SPANISH	14	1100
BRITISH	15	1101
JAPANESE ASCII	16	1110
ROMAN EXTENSION	17	1111

For more detailed information pertaining to character sets see A-2608-90003 section 4.5.3.

HEWLETT-PACKARD CHARACTER SET FOR COMPUTER SYSTEMS

This table shows HP's implementation of ANS X3.4-1968 (USASCII) and ANS X3.32-1973. Some devices may substitute alternate characters from those shown in this chart (for example, Line Drawing Set or Scandinavian font). Consult the manual for your device.

The left and right byte columns show the octal patterns in a 16 bit word when the character occupies bits 8 to 14 (left byte) or 0 to 6 (right byte) and the rest of the bits are zero. To find the pattern of two characters in the same word, add the two values. For example, "AB" produces the octal pattern 04502. (The parity bits are zero in this chart.)

The octal values 0 through 37 and 177 are control codes. The octal values 40 through 176 are character codes.

Decimal Value	Octal Values		Mnemonic	Graphic ¹	Meaning	Decimal Value	Octal Values		Character	Meaning
	Left Byte	Right Byte					Left Byte	Right Byte		
0	000000	000000	NUL	␣	Null	32	020000	000040		Space, Blank
1	000400	000001	SOH	␣	Start of Heading	33	020400	000041	!	Exclamation Point
2	001000	000002	STX	␣	Start of Text	34	021000	000042	"	Quotation Mark
3	001400	000003	ETX	␣	End of Text	35	021400	000043	#	Number Sign, Pound Sign
4	002000	000004	EOT	␣	End of Transmission	36	022000	000044	\$	Dollar Sign
5	002400	000005	ENQ	␣	Enquiry	37	022400	000045	%	Percent
6	003000	000006	ACK	␣	Acknowledge	38	023000	000046	&	Ampersand, And Sign
7	003400	000007	BEL	␣	Bell, Attention Signal	39	023400	000047	'	Apostrophe, Acute Accent
8	004000	000010	BS	␣	Backspace	40	024000	000050	(Left (opening) Parenthesis
9	004400	000011	HT	␣	Horizontal Tabulation	41	024400	000051)	Right (closing) Parenthesis
10	005000	000012	LF	␣	Line Feed	42	025000	000052	*	Asterisk, Star
11	005400	000013	VT	␣	Vertical Tabulation	43	025400	000053	+	Plus
12	006000	000014	FF	␣	Form Feed	44	026000	000054	,	Comma, Cedilla
13	006400	000015	CR	␣	Carriage Return	45	026400	000055	-	Hypphen, Minus, Dash
14	007000	000016	SO	␣	Shift Out	46	027000	000056	.	Period, Decimal Point
15	007400	000017	SI	␣	Shift In	47	027400	000057	/	Slash, Slant
16	010000	000020	DLE	␣	Data Link Escape	48	030000	000060	0	} Digits, Numbers
17	010400	000021	DC1	␣	Device Control 1 (X-ON)	49	030400	000061	1	
18	011000	000022	DC2	␣	Device Control 2 (TAPE)	50	031000	000062	2	
19	011400	000023	DC3	␣	Device Control 3 (X-OFF)	51	031400	000063	3	
20	012000	000024	DC4	␣	Device Control 4 (TAPE)	52	032000	000064	4	
21	012400	000025	NAK	␣	Negative Acknowledge	53	032400	000065	5	
22	013000	000026	SYN	␣	Synchronous Idle	54	033000	000066	6	
23	013400	000027	ETB	␣	End of Transmission Block	55	033400	000067	7	
24	014000	000030	CAN	␣	Cancel	56	034000	000070	8	
25	014400	000031	EM	␣	End of Medium	57	034400	000071	9	
26	015000	000032	SUB	␣	Substitute	58	035000	000072	:	Colon
27	015400	000033	ESC	␣	Escape?	59	035400	000073	;	Semicolon
28	016000	000034	FS	␣	File Separator	60	036000	000074	<	Less Than
29	016400	000035	GS	␣	Group Separator	61	036400	000075	=	Equals
30	017000	000036	RS	␣	Record Separator	62	037000	000076	>	Greater Than
31	017400	000037	US	␣	Unit Separator	63	037400	000077	?	Question Mark
127	077400	000177	DEL	␣	Delete, Rubout					

CHARACTER CODE CHARTS

APPENDIX A

HEWLETT-PACKARD CHARACTER SET FOR COMPUTER SYSTEMS (CONTINUED)

9206-1C

Decimal Value	Octal Values		Character	Meaning
	Left Byte	Right Byte		
64	040000	000100	@	Commercial At
65	040400	000101	A	Upper Case Alphabet, Capital Letters
66	041000	000102	B	
67	041400	000103	C	
68	042000	000104	D	
69	042400	000105	E	
70	043000	000106	F	
71	043400	000107	G	
72	044000	000110	H	
73	044400	000111	I	
74	045000	000112	J	
75	045400	000113	K	
76	046000	000114	L	
77	046400	000115	M	
78	047000	000116	N	
79	047400	000117	O	
80	050000	000120	P	
81	050400	000121	Q	
82	051000	000122	R	
83	051400	000123	S	
84	052000	000124	T	
85	052400	000125	U	
86	053000	000126	V	
87	053400	000127	W	
88	054000	000130	X	
89	054400	000131	Y	
90	055000	000132	Z	
91	055400	000133	[Left (opening) Bracket
92	056000	000134	\	Backslash, Reverse Slant
93	056400	000135]	Right (closing) Bracket
94	057000	000136	^ ↑	Caret, Circumflex; Up Arrow ⁴
95	057400	000137	_ ←	Underline; Back Arrow ⁴

Decimal Value	Octal Values		Character	Meaning
	Left Byte	Right Byte		
96	060000	000140	`	Grave Accent ⁵
97	060400	000141	a	Lower Case Letters ⁵
98	061000	000142	b	
99	061400	000143	c	
100	062000	000144	d	
101	062400	000145	e	
102	063000	000146	f	
103	063400	000147	g	
104	064000	000150	h	
105	064400	000151	i	
106	065000	000152	j	
107	065400	000153	k	
108	066000	000154	l	
109	066400	000155	m	
110	067000	000156	n	
111	067400	000157	o	
112	070000	000160	p	
113	070400	000161	q	
114	071000	000162	r	
115	071400	000163	s	
116	072000	000164	t	
117	072400	000165	u	
118	073000	000166	v	
119	073400	000167	w	
120	074000	000170	x	
121	074400	000171	y	
122	075000	000172	z	
123	075400	000173	{	Left (opening) Brace ⁵
124	076000	000174		Vertical Line ⁵
125	076400	000175	}	Right (closing) Brace ⁵
126	077000	000176	~	Tilde, Overline ⁵

NOTES: ¹This is the standard display representation. The software and hardware in your system determine if the control code is displayed, executed, or ignored. Some devices display all character control codes as "|", "@", or space.

²Escape is the first character of a special control sequence. For example, ESC followed by "J" clears the display on a 2640 terminal

³Delete may be displayed as "--", "@", or space.

⁴Normally, the caret and underline are displayed. Some devices substitute the up arrow and back arrow.

⁵Some devices upshift lower case letters and symbols (\ through ~) to the corresponding upper case character (@ through ^). For example, the left brace would be converted to a left bracket.

APPENDIX B

SELF TEST DIAGNOSTIC

B-1. GENERAL ORGANIZATION

Self test is implemented in the 2608A for four purposes:

- a. Operator verification of operational status of the machine (i.e., the printer prints and all major functional blocks [except the I/O adapter] function correctly).
- b. Remote test by CPUs to determine functional status of the printer (including the I/O adapter but requiring an operator to verify correct operation of the print mechanism; e.g., print quality). Subtests performed are listed in Table B-1.
- c. Exercisor loop to aid in detailed troubleshooting as per above. Continuous loop is selected as discussed in B-2.
- d. Remote execution of Self Test is initiated by sending a Self Test command with printing enabled (040000B), or printing disabled (040001B).

TABLE B-1. FUNCTIONS FOR 2608A SELF TEST

Test Number	Test Performed
01B	Processor Direct Control, Interrupt
02B	Bus, Input
03B	Bus, Output
04B	RAM
05B	Character Generation
06B	Servo Loop
07B	Not Defined
10B	Language Options
11B	Graphics Print
12B	Double Size Print
13B	Standard Print
14B	Not Defined
15B	Not Defined
16B	Not Defined
17B	Exercise Remaining Logic

B-2. OPERATING PROCEDURES

Printer Status For Self Test

To enter the SELF TEST mode, the status of the machine must be:

POWER ON, OFF LINE, no PRINT MECHANISM error, no TEST FAIL error; paper should be installed and the platen closed.

Self Test Loop

The printer will loop on self test if the "Diagnostic Loop" pin is grounded. Also, the self test will not halt on detected errors if the "Ignore Diagnostic Error" pin is grounded. Both pins are on the Motor Driver Board. It is not possible to loop on individual tests within the self test routine.

Output

Printed output is produced only for subtests 10B thru 13B, providing the "paper installed and platen closed" conditions are met before self test is run. The operator should inspect the 2397 printed output for print quality, etc.

Errors occurring in subtests 00B-07B result in setting the LED labeled TEST FAIL on the control panel. If the Self Test Button is held depressed after a Test Fail, the binary number of the failing subtest is displayed by the "print mechanism", "paper out" and "ribbon/platen" LEDs. No error is detected for subtest numbers greater than 07B.

For more details pertaining to implementation of SELF TEST, see A-2608-90003 sections 4.9 and 5.1.8.

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IMPORTANT: These symbols designate general product line capability. They do not insure sales or support availability for all products within a line, at all locations. Contact your local sales office for information regarding locations where HP support is available for specific products.

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