8

Troubleshooting

Power On

The plotters automatically perform a series of internal self tests and mechanical initialization sequences whenever the user switches the plotter on. These are completed after about 30 seconds. If a failure occurs, an error is indicated on the front-panel LEDs. You can perform a failure analysis by interpreting the LED error code. (Details ➧ later in this chapter.)

Power-On Self Test

The power-on self test does the following:

1 Initializes the servo processor.

2 Initializes the main processor .

3 Tests communication between the main processor and the servo processor.

4 Tests the ROM checksum.

5 Causes the main processor to initialize certain firmware modules and communicate with the carriage processor.

6 Tests the EEROM checksum.

7 Tests the servo-processor transfer buffer and interrupt-tracking abilities.

8 Tests the communication between the processors again.

9 Tests the carriage ASIC.

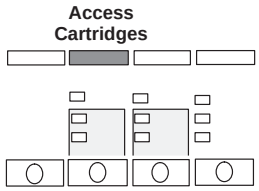
10 Begins mechanical initialization of the plotter.

Extended Power-On Self Test

Perform the extended power-on test whenever the plotter passes the normal power-on test, but does not function properly.

To begin the extended power-on test, perform the following procedure:

1. Switch the plotter off.
2. While holding the **Access Cartridges** key down, switch the plotter on.
3. Once the **Busy** LED lights up, release the **Access Cartridges** key.



As well as carrying out the normal power-on tests, the extended power-on test does the following:

1. Tests the processor-support-ASIC motion control circuitry. (These circuits control the media and carriage motors.)
2. Tests the swath RAM.
3. Tests the communication link between the cartridge-interface ASIC and the carriage ASIC.
4. Tests the available DRAM not being used by the system. (The length of this test is dependent on how much DRAM is installed.)
5. Begins mechanical initialization of the plotter.

Mechanical Initialization

The automatic mechanical initialization of the plotter begins at the end of the power-on test. The initialization procedure does the following:

1. Checks the window sensor.
2. Locates the initial position of the stepper motor.
3. Initializes the carriage axis (Y-axis).
4. Ejects any loaded sheet of media.
5. Checks the pinch-arm sensor.
6. Checks the media sensor.
7. Sets the plotter to accept media.
8. Tests the remainder of the DRAM.

What You Should See and Hear

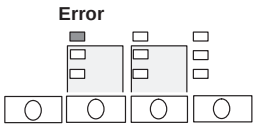
When you turn on the plotter, the following happens:

1. All six LEDs light up for a brief moment; then the **Busy** LED remains on.

   *If you have activated the extended power-on self tests, all six LEDs remain off for a few seconds before the **Busy** LED lights up.*

2. The stepper motor makes a buzzing noise.
3. The cartridge carriage knocks against the left-hand side.
4. The carriage moves across the plotter and knocks three times against the right-hand side.
5. The carriage returns to the left-hand side.
6. Any loaded sheet of media is ejected.
7. If either cartridge is not correctly positioned, the carriage moves to a position where you can access it; the **Cartridges** LED lights up indicating that you have to load, reseat or replace the cartridges. (Instructions ➧ User's Guide.)
8. The cartridges are cleaned in the service station on the left-hand side of the plotter. During the cleaning process, the carriage moves slightly a number of times for the wiper to wipe the nozzles.
9. The carriage then parks in the service station on the left-hand side of the plotter.
10. If you have loaded or reseated the cartridges, the **Cartridges** and **Load Media** LEDs flash, indicating that the first sheet of media that you load will be used to run the cartridge-alignment procedure (Details ➧ chapter 7.)
11. If the cartridges are already aligned, the **Load Media** LED lights up to indicate that the plotter is ready for you to load media.

Errors Indicated by LEDs



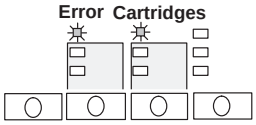
The **Error** LED on the front panel works in combination with the other LEDs to specify the type of error that has occurred. The three possible states of any LED are represented like this:

Off **On** **Flashing**

User Errors

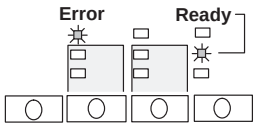
User errors are associated with user settings or user actions and may be solved by the user without calling a Customer Engineer. They are indicated by the **Error** LED flashing. (Further Information ➧ User's Guide, chapter 4, *Troubleshooting*.)

Error and **Cartridges** flashing



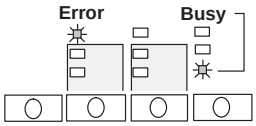
Possible Causes	Corrective Action
An error was detected during the cartridge-alignment routine.	1. Remove the cartridges. 2. Ensure that the protective tape has been removed and that the contacts are clean. 3. Replace the cartridges. 4. If the LEDs do not stop flashing when you lower the window, replace both cartridges with new ones. See also ➧ later in chapter, § *Frequent Cartridge Failure*.
An error was detected while scanning a setup sheet.	1. Check the quality of the media and print of the setup sheet. 2. If the quality appears acceptable, try loading the sheet again face down. If not, use a newly printed setup sheet. 3. If the error persists, perform the setup-sheet calibration.

Error and **Ready** flashing



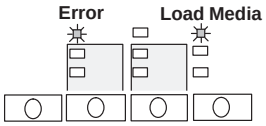
Possible Causes	Corrective Action
The current plot is too large for the plotter's memory	To be able to perform this plot, you have to install more memory. (If the plot is a raster plot, it might work if you send it with a **no negative motion** RTL command.)

Error and **Busy** flashing



Possible Causes	Corrective Action
The serial-interface settings are different on the plotter and on the software.	1. Print a setup sheet and check the plotter's current settings for **Baud Rate** and **Parity**. 2. Compare these with the current settings of the same two items for your application software. They must be the same. 3. If necessary, change the plotter's settings.
The serial-interface cable is not correctly connected.	Connect the cable correctly.
The computer is ignoring the plotter's handshake signals.	If the computer is using hardware handshake, ensure that the serial-interface cable has a handshake wire.

Error and **Load Media** flashing



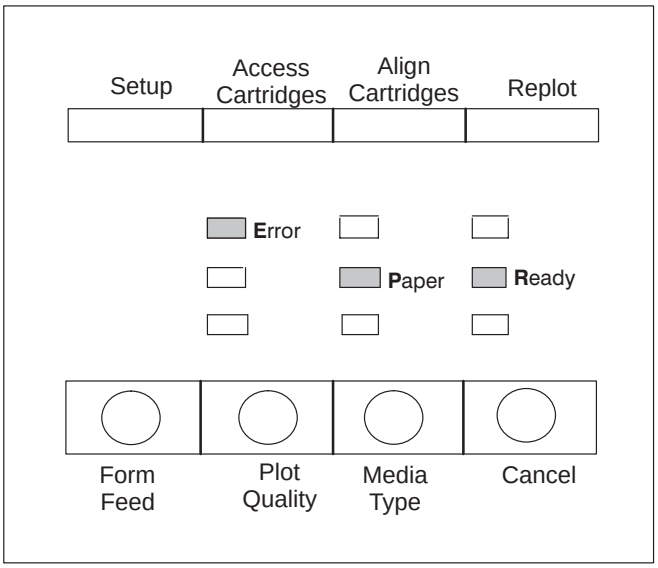
Possible Causes	Corrective Action
The media does not advance around the roller when loaded.	Remove the media and reload it.
You loaded the media too far from the right side.	Remove the media and reload it, aligning the right edge between the two dashed lines on the loading area.
The leading edge of the media is not parallel to the roller.	Reload the media, aligning it correctly.
The media is too small for the plotter.	Use an A-size or A4-size sheet or larger. Load in portrait orientation for setup and align-cartridge routines.

See also ➧ later in this chapter, § *Problems in Loading Media*.

System Errors

System errors are associated with plotter hardware failure that needs to be repaired by a Service or Customer Engineer. System errors are indicated by the **Error** LED lit and steady.

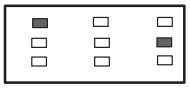
In the tables on the following pages, the symbol  represents the front-panel LEDs, where, in this case, the **Error**, **Paper** and **Ready** LEDs are lit and steady, and the other LEDs are off.



Error and **Busy** LEDs lit and steady: Input/output errors.

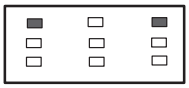
LEDs lit and steady	Error Number and Description	Corrective Options
	336. RS-232-C data overflow. Data byte was not read before another was entered into the UART.	At the time of printing of this manual, this error should be solved by replacing the main PCA. If the problem remains, consult recent service notes for a possible solution. If no service note deals with this error, report the problem to the HP Response Center.
	276. Failure of RS-232-C loopback test.	Ensure the loopback connector is the appropriate one. / Replace main PCA.
	340. Failure of centronics READ.	Replace main PCA.

Error and **Ready** LEDs lit and steady: Memory errors.



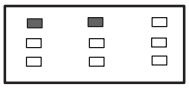
LEDs lit and steady	Error Number and Description	Corrective Options
	81. Failure of ROM test	Replace EPROMs. If problem remains, replace main PCA.
	21. Failure of DRAM quick test	Replace main PCA.
	85. Failure of DRAM full test	Replace main PCA
	49. Failure of Swath RAM test	Replace main PCA
	113. Failure of EEROM test	Replace main PCA.
	53. DRAM SIMM failure	Replace DRAM SIMM. If problem remains, replace main PCA.
	117. Sensor structure – firmware failure	At the time of printing of this manual, this error should not occur. If it does occur, consult recent service notes for a possible solution. If no service note deals with this error, report the problem to the HP Response Center.
	145. Out of memory	Install a larger DRAM SIMM.

Error and **Load Media** LEDs lit and steady:
Media-path/servo errors.



LEDs lit and steady	Error Number and Description	Corrective Options
	82. Shutdown of media axis (X-axis)	See ➧ later in this chapter, § *Servo-Control System Failures*.
	22. Shutdown of carriage axis (Y-axis)	See ➧ later in this chapter, § *Servo-Control System Failures*.
	86. Carriage-axis failure	Check encoder strip, carriage assembly, trailing cable, main PCA.
	50. Cartridge-cap failure	See ➧ later in this chapter, § *Frequent Cartridge Failure*. / Check the service station, encoder strip and media motor.
	114. Error detected in media-axis servo feedback loop.	Check media motor, media-motor encoder cable, main PCA.
	54. Error detected in carriage-axis servo feedback loop.	Check encoder strip, carriage assembly, trailing cable, main PCA.
	118. Bail sensor indicates the bail is up when it should be down or vice versa, or the bail drops suddenly (missing the notch on the auto cam).	See ➧ later in this chapter, § *Bail-Lift-Mechanism Failure.* / Use the bail-sensor test to help troubleshoot. / Check for mechanical problems. / Perform the bail calibration.
	146. Accuracy-calibration error	Did you load the media in the correct orientation? / Ensure that the marks are visible on the plot. If not, check cartridges. / Ensure that the sheet is cut correctly. / Perform a cartridge alignment: if alignment is correct, the problem may be in the main PCA, media motor or media motor gear; if alignment is incorrect, the problem may be in the carriage.
	210. Media-sensor-calibration error. One of the flags on the media sensor may be positioned too far forward or too far back.	Replace the media sensor. If the error persists, there may be a problem with the LED on the cartridge carriage: Perform a cartridge alignment / Replace LED.

Error and **Cartridge** LEDs lit and steady: Miscellaneous errors.



LEDs lit and steady	Error Number and Description	Corrective Options
	88. Processor fault	At the time of printing of this manual, this error should not occur. If it does occur, consult recent service notes for a possible solution. If no service note deals with this error, report the problem to the HP Response Center.
	28.Communication failure between the main and servo processors. Communication occurs through the processor-support ASIC.	Replace main PCA.
	92. Servo interrupts not occurring or not reaching the main processor support ASIC.	Replace main PCA.
	56. Error in servo-drive calculations.	Replace main PCA.
	120. Servo-processor communication error.	Replace main PCA.
	60. Failed communications between the carriage and main processors.	Check trailing cable connections and continuity. If needed, replace trailing cable, main PCA or carriage assembly.
	124. The optical sensor on the carriage has failed to locate lines drawn during the cartridge calibration routine.	Reduce ambient light. / If media is not clean and reflective, change media. / If lines are faint, replace cartridges. / Clean lens. / Replace LED.
	152. Failure of cartridge-interface–ASIC test.	Replace main PCA.
	216. Firmware failure.	At the time of printing of this manual, this error should not occur. If it does occur, consult recent service notes for a possible solution. If no service note deals with this error, report the problem to the HP Response Center. Note conditions before error occurred. Include setup sheet and service configuration plot in report.

Firmware-Code Revision Level

To check the firmware-code revision level that the plotter is using, print a setup sheet or a service configuration plot.

Troubleshooting Tips

Repair + Calibrate
After you have made a repair, consider if any calibrations have been affected.

Print Quality
You can use the user demonstration plot to look at overall print quality including smoothness and straightness of lines, arcs, circles, and characters. The procedure for plotting the demonstration plot is given in the User's Guide.

Diagnosing Problems
You can use the service configuration plot to help diagnose problems. The procedure for plotting the configuration plot is given on page 8-23.

Other Tips
On the following pages are tips about solving the following problems:

- Servo control-system failures
- Frequent cartridge failure
- Bail-lift-mechanism failure
- Cartridge carriage rubbing against encoder strip
- Premature wearing of drive belts
- Sensor does not find media edge
- Last swath is clipped when replotting
- Ink smearing
- Plots joined or not plotted
- Incorrect line widths
- Plotter won't read setup sheet; Plots solid black area fill
- Problems in loading media

Servo Control-System Failures

Media-Axis (X-Axis) Shutdown

In the case of a media-axis shutdown, try one or more of the following corrective actions:

- Clear any binding in the media-axis mechanics due to a media jam. (Do not pull the media along the carriage axis. Doing so could break the media-sensor flags.)
- Remove the two screws that attach the drive-roller gear to the drive roller. This should enable you to manually spin the drive roller. If it does not, the roller is probably jammed.
- Perform the servo/encoder service test to check for problems with the media-axis motor encoder and main PCA.

Carriage-Axis (Y-Axis) Shutdown

In the case of a carriage-axis shutdown, try one or more of the following corrective actions:

- Clear any binding in the carriage-axis mechanics due to a media jam.
- Turn the plotter off. This should enable you to manually move the carriage along the carriage-axis. Check for any areas where the carriage may be binding.
- Ensure that the double pulley, small drive belt, small belt tensioner, main belt, main idler, and carriage bushings are in correct working order.
- Perform the servo/encoder service test to check for problems with the servo-feedback and motor drive systems.

Frequent Cartridge Failure

Remove Tape and Align Cartridges

One frequent cause of cartridge problems is that the user has forgotten to remove the tape from new cartridges. Remove the tape and perform a cartridge alignment.

Damaged Encoder Strip

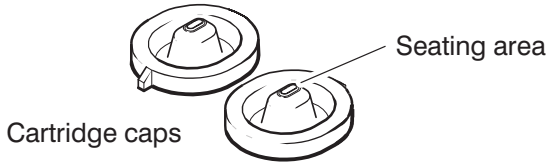
Another cause of apparent frequent cartridge failure may be a damaged encoder strip. If the small slots on the strip are damaged, the plotter cannot position the carriage correctly during cartridge checking. Try replacing the encoder strip.

Incompatibility between Carriage and Firmware

In combination, cartridge carriage C2847-60071 (carriage PCA C2847-60125) and plotter firmware A.01.00 destroy the cartridges. Update the plotter firmware and replace the cartridges. (Details ➧ chapter 9 § *Problems Corrected by Firmware Release A.01.01*.)

Misaligned Cartridge Caps

If a customer is complaining about shortened cartridge life or frequent cartridge failure, you should check the cartridge-cap alignment (procedure below). This is especially true if the problem is always happening to the same cartridge. A sure sign of a misaligned cap is excess ink around the cap and inside the ink reservoir. You should clean the caps and reservoir using only water. You should also clean the wiper.



Function of the Cartridge Caps

The cartridge caps (also called service-station caps) are located in the service station. Looking closely at a cartridge's print-head reveals two parallel rows of nozzles. The cap should form a seal that surrounds the rows. If the caps are mispositioned, the seal may be touching one or more of the nozzles. The result is premature cartridge failure and a messy service station.

What can Cause Cap Misalignment?

The most common cause is that the cap is not seated properly on the service-station sled. Any of the service-station parts could cause misalignment if defective or installed incorrectly.

Checking Cartridge-Cap Alignment

The following tools are recommended for this procedure:

- Soft lint-free wipes
- Non-permanent ink marker (dry erase type works best)
- 10X magnifier
- Print cartridges

To check the alignment of the caps with respect to the print-head nozzles

1 Remove the window, center cover and left endcover.

2 Manually move the carriage out of the service station.

3 Load very clean cartridges into the carriage.

Use lint-free wipes dampened with water to clean the cartridges.

4 Apply ink to the seating area of the cartridge caps with the ink marker.

5 Manually move the carriage **slowly** into the service station, then out again.

6 Remove the cartridges and observe where the ink mark is positioned with respect to the nozzles. A 10X magnifier is very useful for this step. If one is not available, you should look at how centered the mark is within the gold pad area.

7 If the ink mark is touching any nozzle, you need to check and reseat the cartridge caps and repeat the test.

Bail-Lift-Mechanism Failure

Normal Bail-Lift Sequence

The following is what should happen during a normal bail-lift sequence:

1. The cartridge carriage positions over the engagement lever. This connects the auto-lift mechanism to the drive-roller gear. The media motor becomes the driving force for the auto-lift.
2. The media motor drives the drive roller, which in turn drives the bail auto-lift. The bail begins raising up until the "UP" position is reached.
3. The carriage moves away from the engagement lever so that the media may be driven by the drive roller without affecting the position of the bail. (The bail is kept in the up position by the left bail arm resting in the notch on the gear cam.)
4. After the media is moved forward, the carriage again positions over the engagement lever. The media motor then drives the bail auto-lift and the bail lowers to the down position.

When the bail is down, it presses on the bail sensor switch. This is how the plotter knows the position of the bail.

Problems

- The cam gear and engaging gear detach from the drive-roller gear even though the carriage is still actuating the engaging lever. This can happen due to excessive part tolerances or wear.
- The engaging lever spring is installed on the lower rung of the Y-drive bracket, creating too much spring tension. Excessive spring tension accentuates any looseness in the bail lift parts. Install the spring on the upper rung.
- The carriage does not properly locate the engagement lever, preventing the gears from engaging. Any problems with the carriage-motor control system (for example, the encoder strip) or associated mechanics could cause this problem. Also, if the carriage cannot find the true left stop during initialization (caused by interference), the engaging lever cannot be located. Possible causes of interference are the service-station sled and the main tensioner bracket.
- The bail falls from the up position. This can result if the cam is over or under-rotated. The notch on the cam, used to catch the left bail bracket, is not properly located for the "bail up" condition, and the bail falls abruptly. A bail calibration may correct this problem.

Teflon Washers versus Cam-Gear Support

Problems can arise if the lift mechanism is too loose or too tight. The solution in the DesignJet 200 involved the use of teflon washers. A new solution comes with the introduction of the DesignJet 220 and involves a new part called the cam-gear support. (Details ➧ chapter 9, § *New Bail-Lift-Mechanism Support*.)

Cartridge Carriage Rubbing against Encoder Strip

When properly installed, the encoder strip should pass through the cartridge-carriage assembly without touching it. Sometimes excessive rubbing may be experienced, causing the encoder strip to buckle or vibrate, and thus causing errors in the carriage-axis servo feedback system and poor carriage-axis position tracking.

You can adjust the encoder-strip position by adjusting the position of the encoder spring bracket. To do this, perform the following procedure:

1. Remove the power cord from the plotter.
2. Remove the window, center cover and right endcover.
3. Manually position the carriage assembly in the center of the plotter.
4. Loosen the top and bottom screws of the adjustable encoder-spring bracket.
5. Manually move the bottom of the bracket about the bracket's top screw until the encoder strip is centered in the carriage; then tighten the screws.

Premature Wearing of Drive Belts

The main belt or the small Y-drive belt may wear prematurely if the plotter is placed near a diazo copier that uses ammonia to produce blue-line copies. The material used in the belts is very reactive to ammonia vapor. The vapor is very corrosive and can damage other parts as well. It is recommended to move the plotters away from such copiers.

Sensor does not Correctly Find Media Edge

Excessive ink deposits on the drive-roller surface can fool the sensor by reflecting the light. (Cleaning roller ➧ chapter 4.)

Last Swath is Clipped when Replotting

This bug on DesignJet 200 plotters will be solved in firmware revision A.01.02. (Details ➧ chapter 9.)

Ink Smearing

Add Starwheel Mount

Ink may smear in DesignJet 200 plotters and early DesignJet 220 plotters due to cockle in the media caused by the geometry of the media path. The problem is more evident when loading A/A4-size media. (Solution ➧ chapter 9, § *Change in Bail and Overdrive Parts*.)

Change Carriage Rear Bushing

Another reason for ink smearing in DesignJet 200 plotters is an insufficient distance between the cartridges and the media. This problem is solved in the DesignJet 220 plotters, using a new rear bushing on the cartridge carriage. You can order this bushing for a DesignJet 200. (Part number ➧ chapter 10.)

Plots Joined or Not Plotted

HP-GL Timeout

If the user is using an **HP 7586B** (HP-GL) driver, it may not end files properly with the result that several plots may be joined, or not plotted at all. In this case you need to choose an **HP-GL Timeout** period. (Instructions ➧ User's Guide.) The timeout tells the plotter how long to wait before assuming a plot is complete.

Short timeout period: A timeout setting that is too short results in incomplete plots.

Long timeout period: If the plotter has finished receiving the plot data (**Busy** LED stops flashing and remains on) and is waiting for the timeout period to finish before plotting, you can command it to plot immediately by pressing **Form Feed**.

Incompatibility between Trailing Cable and Main PCA

The shielded trailing cable C3180-60033 (blue and white) is NOT compatible with old main PCAs (C3180-60101, C3180-68101, C3180-69101). Nothing is printed if you use them in combination. Update the main PCA.

Incorrect Line Widths

DesignJet 200 plotters with firmware version A.01.00 may plot line widths that are inconsistent with the selected values if an **IN** command is absent in the plot files. Update the firmware. (Details ➧ chapter 9, § *Problems Corrected by Firmware Release A.01.01*.)

Plotter won't Read Setup Sheet; Plots Solid Black Area Fill

This problem can occur on DesignJet 200 plotters with the old-style cartridge carriage. Install a new carriage. (Details ➧ chapter 9, § *Change in Carriage*.)

Problems in Loading Media

User's Guide

The Troubleshooting section of the User's Guide lists mistakes you may be making if the plotter continually rejects your media.

Long Media doesn't Load

DesignJet 200 plotters with firmware version A.01.00 cannot load 1.6-m media. Update the firmware. (Details ➧ chapter 9, § *Problems Corrected by Firmware Release A.01.01*.)

Translucent Media doesn't Load

Some DesignJet 200 carriage PCAs have problems sensing translucent media. The solution is to install a new cartridge carriage. (Further Information ➧ chapter 9, § *Change in Carriage*.)

Binding, or Missing Sensor Flags

Media-load failures can also occur due to binding in the media-axis mechanics or missing media-sensor flags. Clear any binding in the media-axis mechanics due to a media jam. (Do not pull the media along the carriage axis. Doing so could break the media-sensor flags.)

Media Skews Badly

Ensure that the media diverters (part number ➧ page 10-26) are correctly installed. If one is missing or broken, replace it. To access this part, you need to remove the drive roller !

Service Tests

Test	Description
Bail Cycle Test	This tests the following: • Bail • Bail sensor switch • Drive Mechanics • Main PCA
Bail-Sensor Test	This tests the following: • Bail sensor switch • Main PCA • Mechanical interference
Electrical Test	The electrical test performs all of the following: • Carriage communications test • Carriage ASIC test: Values stored in the carriage ASIC registers are temporarily stored. All registers are tested by writing, then reading, the numbers AA(hex) and 55(hex). When the test is complete, previously stored values are restored. • Cartridge interface ASIC test: Verifies the functionality of the cartridge interface ASIC. • Cartridge ASIC / carriage ASIC link test • EEROM checksum • On-board SIMM RAM test • ROM CRC test: Performs a ROM checksum and compares it to a checksum value previously stored. • Swath RAM test: Tests the RAM used by the cartridge interface ASIC to store the swath.
Input/Output Test	The input/output test performs the following: • Parallel input/output test: Reads the data and status registers of the Bi-Tronics PAL. (Tests only a small portion of the Bi-Tronics input/output functionality.) • Serial input/output test: Verifies the ability of the RS-232 interface to send and receive data. This test uses a special loopback connector (part number 07440-60302) to connect the output to the input.