CHAPTER 4

Troubleshooting the Installation

Your router went through extensive testing and burn-in before leaving the factory. However, if you encounter problems starting up, use the information in this chapter to help isolate the cause. Problems with the initial startup will most likely be caused by the source power or an interface processor that has become dislodged from the backplane. Although an overtemperature condition is unlikely at initial startup, the environmental monitoring functions are included because they also monitor internal voltages.

Note The procedures in this chapter assume that you are troubleshooting the initial system startup, and that the router is in the original factory configuration. If you have removed or replaced components or changed any default settings, the recommendations in this section might not apply.

At the initial system boot, you should verify the following:

- The external power cable is connected and proper source power is being delivered to the system.
- The system blower is operating.
- The system software boots successfully.
- The RSP2 and all interface processors are properly installed in their slots, and each initializes (is enabled by the system software) without problems.

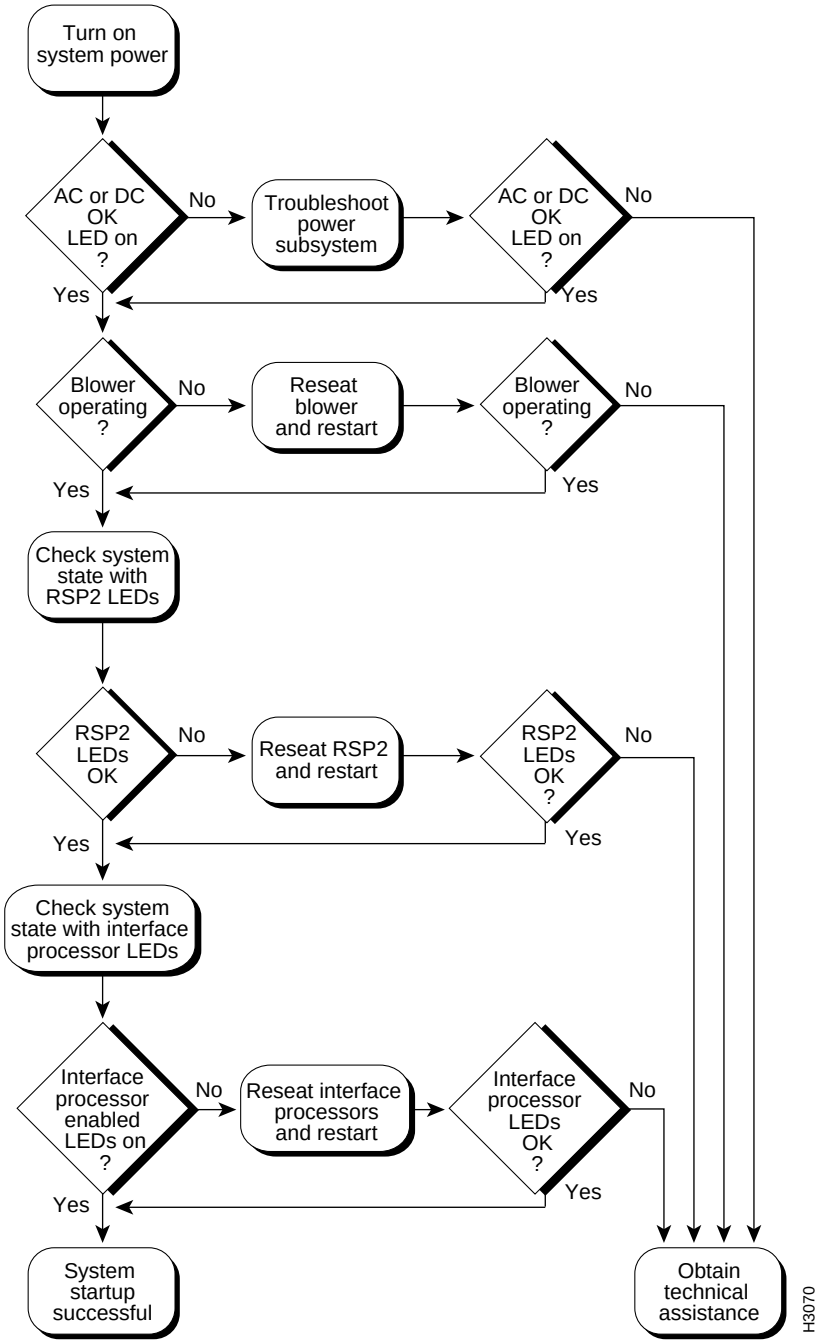
When each of these conditions is met, the hardware installation is complete, and you should proceed to the appropriate software documentation to configure the system and the individual interfaces. If the startup sequence fails before these conditions are met, use the procedures in this chapter to isolate and, if possible, resolve the problem.

If you are unable to easily solve the problem, contact a customer service representative for assistance and further instructions. Before you call, have the following information ready to help your service provider assist you as quickly as possible:

- Date you received the router
- Chassis serial number (located on a label on the right rear deck of the chassis)
- Type of software and release number
- Brief description of the problem you are having
- Brief explanation of the steps you have already taken to isolate and resolve the problem
- Maintenance agreement or warranty information

Figure 4-1 shows the general troubleshooting strategy described in this chapter. Refer to this chart as necessary to follow the steps to isolate problems to a specific subsystem, and resolve the problem if possible.

Figure 4-1 Troubleshooting Strategy for Startup Problems



Troubleshooting Overview

This section describes the troubleshooting methods used in this chapter and defines how the router is divided into subsystems for more efficient problem solving.

Problem Solving with Subsystems

The key to problem solving the system is to try to isolate the problem to a specific subsystem. The first step in solving startup problems is to compare what the system *is doing* to what it *should be doing*. Since a startup problem is usually attributable to a single component, it is more efficient to first isolate the problem to a subsystem rather than troubleshoot each component in the system. For these troubleshooting procedures, consider the following subsystems:

- Power subsystem—This subsystem comprises the power supplies, the external power cable, and the backplane.
- Cooling subsystem—This subsystem comprises the blower module, which includes the blower, the blower speed control board, the front-panel LEDs, and the module itself. The blower should be operating whenever the system power is on. The variable speed feature allows the blower to operate at a slower speed and provide quieter operation when the internal chassis temperature is within the normal operating range. If the internal temperature exceeds a specified temperature, the blower speed increases to move more cooling air through the chassis. As a result, it may be difficult to determine whether or not the blower is operating in noisy, air-conditioned rooms. If you determine that the blower is not operating, contact a service representative immediately. There are no installation adjustments that you should make if it does not function properly at initial startup.
- Processor subsystem—This subsystem includes the RSP2 and all interface processors. The RSP2 contains the system operating software (in an onboard Flash memory SIMM or on a Flash memory card), and the enabled LED on each interface processor indicates whether or not the RSP2 was able to initialize it. Remember that an interface processor that is partially installed in the backplane might cause the system to hang and crash.

The following sections will help you isolate a problem to one of these subsystems and direct you to the appropriate troubleshooting section.

Identifying Startup Problems

When you start up the router for the first time, you should observe the startup sequence described in the section “Starting the Router” in the chapter “Installing the Router.” This section contains a more detailed description of the normal startup sequence and describes the steps to take if the system does *not* perform that sequence as expected.

By checking the state of the LEDs on the power supplies and processor modules (the RSP2 and interface processors), you can determine when and where the system failed in the startup sequence. Use the following descriptions to isolate the problem to a subsystem, then proceed to the appropriate sections (indicated in each description) to try to resolve the problem.

When you start up the system by turning on the main system power switch on the interface processor end of the power supplies, the following should occur:

- The AC (or DC) OK LED should go on immediately, and it should remain on as long as the system is receiving source power and the power switch is in the on (|) position. If this LED does not go on, or if it goes off while the power switch is still on, there could be a problem with either the source power, the internal DC power that the power supplies distribute to the internal components, or the cooling subsystem.

  The green AC (or DC) OK LED indicates the status of the power supplies and internal DC voltages. The AC (or DC) OK LED stays on when all of the following conditions are met:

  — Power supplies are on and receiving 100 to 240 VAC, 50 to 60 Hz (or –48VDC to –60VDC) source power.

  — Power supplies are providing the +5, +12, –12, and +24 VDC to internal components.

  — All internal DC voltages are within tolerance.

  If the AC (or DC) source power or any of the internal DC voltages exceed allowable tolerances, the AC (or DC) OK LED will not go on, or will go off shortly after you turn on the power. Because both the RSP2 (which uses +5, +12, –12 VDC), and the blower module (which uses +24 VDC) are required for operation, a problem with any of the internal DC lines can prevent the system from starting up or continuing operation.

  For example, if there is a problem with the +24 VDC line that supplies the blower module, the system will start up but also recognize that the blower is not operating. The system will initiate a blower failure shutdown sequence, display the appropriate warning messages, then shut down after two minutes. If there is a problem with any of the other DC lines, the RSP2 will not be able to initialize the system software, so the system might attempt to start up and fail during the boot sequence.

  Depending upon when the DC OK LED goes off, proceed as follows:

  — If the AC (or DC) OK LED stays off (if it never goes on) when you turn on the power switch, there is a problem with either the AC (or DC) source power or the DC power that is distributed to the internal components. Proceed to the section “Troubleshooting the Power Subsystem” in this chapter.

  — If the AC (or DC) OK LED goes on temporarily, then goes off within 30 seconds, the system is most likely shutting itself down because it detected an out-of-tolerance power or temperature condition within the power supplies. Proceed to the section “Troubleshooting the Power Subsystem” in this chapter.

  — If the AC (or DC) OK LED goes on, and the system starts up as expected but then displays the following message and shuts down after two minutes, there is a problem with the blower. Proceed to the section “Troubleshooting the Cooling Subsystem” in this chapter.

    ```
    %ENVM-2-FAN: Fan has failed, shutdown in 2 minutes
    ```

  — If the AC (or DC) OK LED stays off yet the system starts up correctly, displays the preceding message, and shuts down after about two minutes, there is a problem with the +24VDC line to the blower module. Proceed to the section “Troubleshooting the Power Subsystem” in this chapter.

- As soon as you turn on the power switch, you should immediately hear the blower operating. If you are in an unusually noisy environment, such as an air-conditioned wiring closet with other equipment noise, place your hand near the middle of the plastic panel on front of the chassis (opposite the interface processor end of the chassis); you should feel the exhaust air that is being forced out of the chassis.

Note Do not mistake the power supply exhaust air coming from the bottom front panel.

  - If the AC (or DC) OK LED is on, but the blower is not operating, there is a problem with the blower. (The system will shut itself down if it detects that the blower is not functioning properly.) Proceed to the section "Troubleshooting the Cooling Subsystem" in this chapter.
  - If the AC (or DC) OK LED is on at startup and the blower is operating, but the system shuts down after two minutes, there might be a problem with the blower control board. Proceed to the section "Troubleshooting the Cooling Subsystem" in this chapter.

- When you turn on the system power, the LEDs on the RSP2 should go on and off as follows:
  - The RSP2 and front-panel normal LEDs go on after the system has completed a successful boot to indicate normal system operation. These LEDs should remain on during system operation.
  - The CPU halt LED should always remain off. This LED goes on only if the system detects a processor hardware failure.

  If the normal LEDs do not go on, or if CPU halt LED goes on and stays on, proceed to the section "Troubleshooting the Cooling Subsystem" in this chapter.

- The enabled LED on each interface processor goes on when the RSP2 has completed initialization of the interface processor for operation. This LED indicates that the interface processor is receiving power and has been recognized by the RSP2; it does not indicate the state of the individual interfaces. It does, however, indicate that an interface processor contains a valid microcode version. If an enabled LED fails to go on, proceed to the section "Troubleshooting the Interface Processors" in this chapter.

Note While the system is starting up and initializing the individual interface processors, the status LEDs on the interface processors will flash on and off or light intermittently; this is normal behavior. The LEDs do not indicate the true status of the interfaces until the system has initialized the interface processors and you have enabled the individual interfaces.

When the LEDs indicate that the system has initialized successfully, the system banner (similar to the following example) should be displayed on the console screen. If it is not displayed, refer to the section "Connecting the Console Terminal" in the chapter "Installing the Router" to verify that the terminal is set correctly and that it is properly connected to the RSP2 console port.

```
System Bootstrap, Version 4.6(5), SOFTWARE
Copyright (c) 1986-1995 by cisco Systems
RSP2 processor with 16384 Kbytes of memory
### (text omitted) ###
F3: 2012356+47852+194864 at 0x1000

              Restricted Rights Legend
```

```
Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

             cisco Systems, Inc.
             170 Tasman Drive
             San Jose, CA 95134

GS Software (RSP-K), Version 10.3(571) [fc3], RELEASE SOFTWARE
Copyright (c) 1986-1995 by cisco Systems, Inc.

(text omitted)

Press RETURN to get started!
```

Troubleshooting the Power Subsystem

Check the following to help isolate the problem:

- On the interface processor end of the power supplies, are the AC (or DC) OK LEDs on?
  - If yes, the AC (or DC) source is good, and the power supplies are functional.
  - If no, but the blower is operating *and* LEDs on the processor modules are on, suspect a faulty power supply LED. The RSP2 uses +5 VDC, and the blower uses +24 VDC; therefore, if both the RSP2 and blower are operating, all internal DC lines are within tolerance.
  - If no and there is not other obvious activity, first suspect that the power switch is not fully in the on (|) position. Rotate the power switch clockwise and ensure that it is set completely in the on (|) position. Refer to the section “Starting the Router” in the chapter “Installing the Router.”
  - If the system power switch is set correctly and the AC (or DC) OK LED remains off, suspect the AC (or DC) source or the power cable. Turn the power switch off, connect the power cable to another power source if one is available, and turn the switch back on. If the LED then goes on, the problem is the first power source.
  - If the LED fails to go on after you connect the power supply to a new power source, swap the power cable with a replacement if one is available and turn the switch back on. If the AC (or DC) OK LED then goes on, return the first power cable for replacement.
  - Ensure that the blower module is seated properly. Refer to the section “Removing and Replacing the Blower Module” in the chapter “Maintaining the Router” to remove and reseat the blower module. Ensure that the blower control board edge connector is inserted fully in the backplane socket. After you replace the chassis cover panel, try starting the system again.
  - If the LED still fails to go on when connected to a different power source with a new power cable, the power supply is probably faulty. If a spare power supply is available, replace the existing power supply with the spare and restart the system. Refer to the section “Removing and Replacing a Power Supply” in the chapter “Maintaining the Router.” If the AC (or DC) OK LED then goes on, return the faulty power supply for replacement.

If you are unable to resolve the problem or if you determine that either the power supply or power cable is faulty, contact a service representative for instructions.

Troubleshooting the Cooling Subsystem

Check the following to help isolate the problem:

- When you start up the system, does the blower go on?

  To determine whether the blower is operating, listen for the blower motor. In noisy environments, near the middle of the plastic panel on front of the chassis (opposite the interface processor end of the chassis) to feel for air being forced out the exhaust vent.

  — If yes, the +24 VDC line to the blower is good, but there might be a problem with the software.

  — If no, there is a problem with the blower or the +24 VDC power. If the output fail LED is on, there could be a problem with the +24VDC supply to the blower either at the power supply or the blower control board.

  — If no and the output fail LED is off, ensure that the blower module is seated properly. Refer to the section “Removing and Replacing the Blower Module” in the chapter “Maintaining the Router” to remove and reseat the blower module. Ensure that the blower control board edge connector is inserted fully in the backplane socket. After you replace the chassis cover panel, try starting the system again.

- Do the system and blower start up, but shut down after about two minutes?

  — If you have changed the software configuration register boot field settings or altered the configuration file boot instructions, the system could be booting a software image that does not recognize the signals from the blower control board, and therefore assumes that the cooling subsystem is not operating.

  — The following message, if displayed, indicates that the blower has failed or is operating out of tolerance.

  ```
  %ENVM-2-FAN: Fan has failed, shutdown in 2 minutes
  ```

  If the blower or the blower control board fails, you must replace the blower module.

  — The following message, if displayed, indicates that the system has detected an overtemperature condition or out-of-tolerance power inside the chassis.

  ```
  Queued messages:
  %ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown
  ```

  If an environmental shutdown results from an out-of-tolerance power condition, the output fail LED will go on before the system shuts down. Refer to the section “Troubleshooting the Power Subsystem” in this chapter.

  Although an overtemperature condition is unlikely at initial startup, ensure that heated exhaust air from other equipment is not entering the inlet vents, and that there is sufficient clearance around the front and rear of the chassis to allow cooling air to flow. Refer to the guidelines in the chapter “Preparing for Installation” for preventive site configurations.

  This message could also indicate a faulty component or temperature sensor. Before the system shuts down, use the **show environment** or **show environment table** commands to display the internal chassis environment. Refer to the chapter “Product Overview” for detailed descriptions.

If you are still unable to resolve the problem, contact a service representative for further instructions.

Troubleshooting the Processor Subsystem

The processor subsystem comprises the RSP2 and interface processors. The RSP2 is a required system component. The system cannot operate unless the RSP2 is installed properly; however, because the CyBus interface processors support OIR, the system can operate without any interface processors installed as long as none are in *partial* contact with the backplane pins; an interface processor that is partially connected to the backplane will send incomplete signals to the processor, which will fault the bus and cause the system to hang. Therefore, first ensure that the RSP2 is installed properly and the system software has initialized successfully. Then, if necessary, you can troubleshoot individual interface processors.

Troubleshooting the RSP2

These procedures assume that the RSP2 and router are in the original factory configuration, and that you have not changed any configuration register settings or made changes to your configuration file.

If you have made such changes, refer to the section "Configuring the RSP2" in the chapter "Maintaining the Router," to reselect default values.

If the RSP2 LEDs do not go on as expected, check the following items to help isolate the problem.

- Do all of the RSP2 LEDs remain off when system power switch is turned on?
  - If all RSP2 LEDs stay off, first refer to the sections "Troubleshooting the Power Subsystem" and "Troubleshooting the Cooling Subsystem" in this chapter to ensure that both the blower and power supplies are functioning properly.
  - If the power supplies and blower appear operational but none of the RSP2 LEDs are on, suspect that an improperly connected RSP2 or interface processor has hung the bus. Turn the system power switch off and, on each processor module, loosen the captive installation screws and use the ejector levers to eject and reseat each board. (For a description and illustration of the ejector levers, refer to the section "Installing and Configuring Processor Modules" in the chapter "Maintaining the Router.") Tighten all captive installation screws, then restart the system.
  - With the power supplies turned off, reseat the RSP2 in its slot and restart the router.
- Is the RSP2 normal LED on?

  If yes, the system software has initialized successfully, and the system is operational.
- Is the RSP2 CPU halt LED on?

  If yes, the system has detected a processor hardware failure. (This LED should be off in normal operation.) Contact a service representative for instructions.

Troubleshooting the Interface Processors

Check the following to help isolate the problem:

- Are *all* interface processor enabled LEDs on?

  If yes, the system is operational. Proceed to the instructions for configuring the interfaces in the appropriate software documentation.

- Are *any* interface processor enabled LEDs off?

  — If any of the enabled LEDs are off, first check the RSP2 normal LED, which will be on if the system booted successfully.

  — If the enabled LED on an individual interface processor is off, suspect that the interface processor has pulled away from the backplane. You do not have to turn off the system power to remove and replace an interface processor. Use the ejector levers to eject and then reseat the interface processor, then tighten both of the captive installation screws. (For a description and illustration of the ejector levers, refer to the section “Online Insertion and Removal” in the chapter “Product Overview.”) After the system reinitializes the interfaces, the enabled LED on the interface processor should go on.

If you experience trouble with the startup that is not resolved with these procedures, contact a service representative for assistance and further instructions.