Cisco 7000 Air Filter and Chassis Blower Replacement Instructions

Cisco Part Numbers MAS-7KFAN, ACS-7KFILTER

This document contains instructions for replacing air filter and the chassis blower in the Cisco 7000. The air filter, which is integrated with the top front chassis panel, should be kept clean by periodic vacuuming, and should be replaced if it becomes torn, worn, or dirty. You can access the filter while the system is operating by removing the bottom front chassis panel. The blower, which is located in the front interior of the chassis, need only be replaced if the existing blower fails. You must turn all system power off and remove the top and bottom chassis panels to access the blower.

The sections in this document include the following:

- "Obtaining Technical Assistance," page 2
  For installation problems that you cannot resolve, this section provides instructions for obtaining technical assistance and lists the information you need on hand before you call
- "Product Overview," page 2
  Brief descriptions of the blower and air filter, and the functions of each
- "Prerequisites," page 4
  Safety guidelines to prevent injury to yourself or damage to the equipment, and the tools and parts you will need for these installations
- "Removing and Replacing the Front Chassis Panels," page 6
  Procedures for removing and replacing the front chassis panels to access the air filter or the front interior of the chassis to replace the blower
- "Cleaning and Replacing the Air Filter," page 9
  Procedures for periodically cleaning and washing the air filter and for replacing it when necessary to maintain proper air flow through the system and keep the internal air temperature within normal ranges
- "Replacing the Chassis Blower," page 10
  Procedures for replacing the blower and for restarting the system and verifying that the system and the new blower both operate properly after the installation

Obtaining Technical Assistance

This document contains instructions for replacing the Cisco 7000 chassis blower (MAS-7KFAN) and air filter (ACS-7KFILTER). It also provides the procedures for replacing and periodically cleaning the air filter in the bottom front chassis panel. If you encounter problems that you are unable to resolve, contact a service representative or the Technical Assistance Center (TAC) for assistance. You can phone the TAC at 800 553-2447, or send e-mail to `tac@cisco.com`.

Before you contact a service representative, have the following information ready:

- Date you received the Cisco 7000
- Chassis serial number (located on a label on the right rear deck of the chassis)
- Type of installation or upgrade you are performing (replacing the chassis blower or cleaning the air filter, for example)
- Title and Doc. No. of this document (from the front page)
- Brief description of the problem you are having
- Brief explanation of the steps you have taken to isolate and resolve the problem
- Maintenance agreement or warranty information

Refer to the *Cisco 7000 Hardware Installation and Maintenance* publication for complete system installation and startup procedures, and for physical descriptions of chassis components.

Product Overview

This section provides brief physical and functional descriptions of the chassis blower and air filter. Figure 1 shows the front of the chassis with the top and bottom front panels removed to show the internal components.

The system blower provides cooling air for the Cisco 7000 internal components. The blower is located on the bottom left of the chassis interior when viewed in the orientation shown in the Figure 1. The blower draws air in through the air filter (which is not shown in Figure 1) and directs it up through the floor of the internal slot compartment and over the RP, SP, and IPs. The exhaust air is forced out the rear of the chassis above and to each side of the internal slot compartment. The airflow path is shown in Figure 2. The air dam shown in the Figure 2 keeps the chassis blower air separate from the air drawn in by the power supply fans.

Two air ducts on the rear of the blower, shown shaded in the Figure 2, fit snugly into the two cutouts in the backplane. The blower is secured to the backplane with three large captive Phillips or Allen-head screws (the earliest chassis manufactured use Phillips screws; the rest now use Allen-head screws). A cable (purple +24V wire and black ground wire) with a keyed three-prong plug connects the blower to the backplane power bus to deliver power from the power supplies (see the blower power connection in Figure 1).

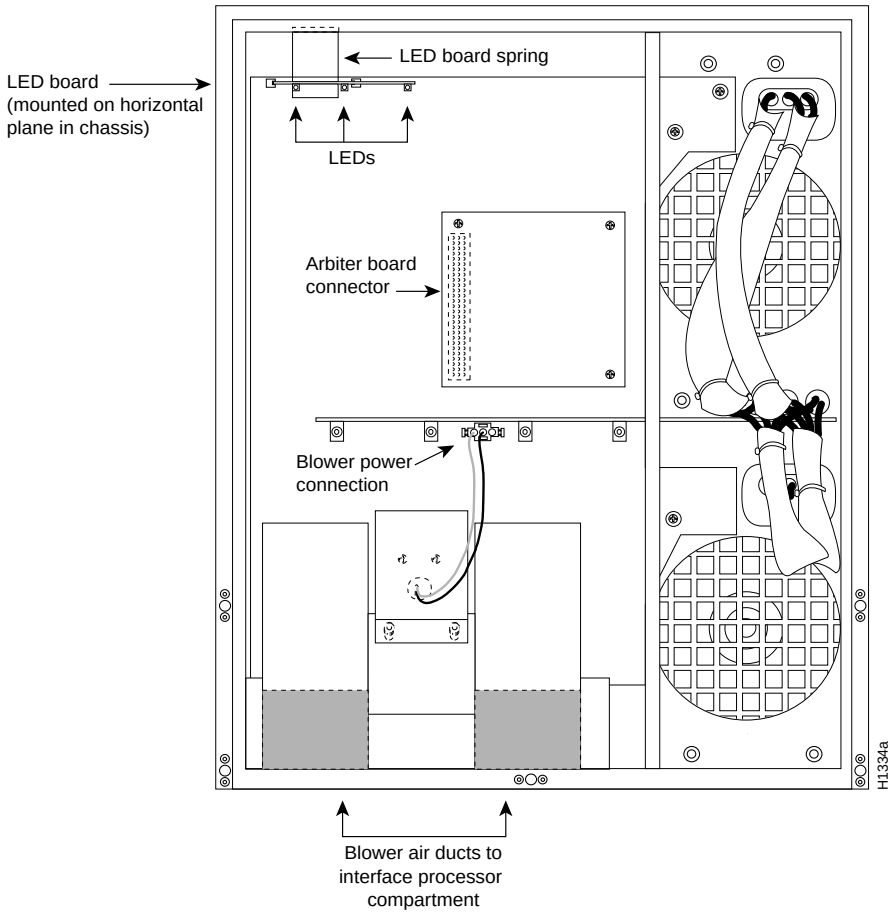

Figure 1 Cisco 7000 Internal Chassis Components, Front View

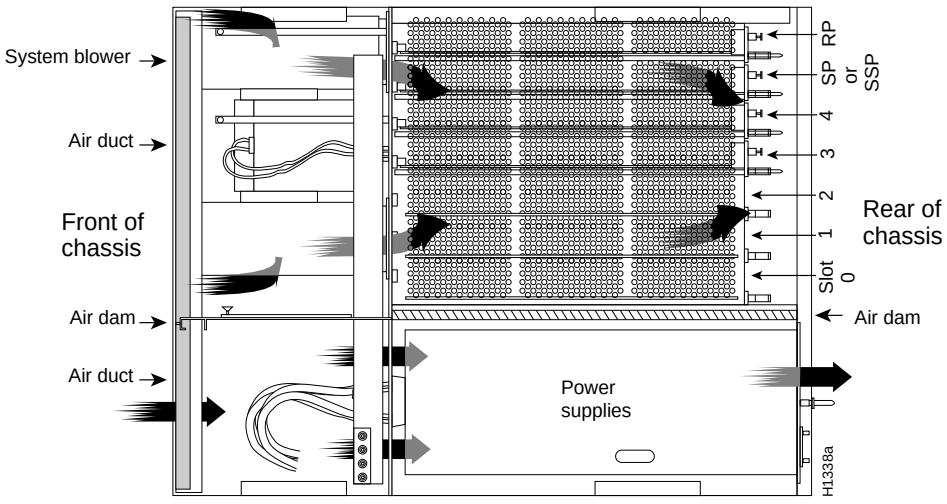

Figure 2 Internal Air Flow, Top-Down View of Chassis

Caution: Operate the system only if the blower is installed and functioning properly. The blower prevents an overtemperature condition that can result in severe equipment damage.

The air filter fits into the lower frame of the top front chassis panel (see Figure 3). Maintaining a consistent air filter cleaning schedule helps to maintain normal system operation. A dirty filter can prohibit the flow of cooling air into the chassis and may cause an overtemperature condition.

You need only remove the bottom front chassis panel to access the filter. Although you should not operate the system for more than a minute without the filter in place, you can briefly remove the filter to vacuum it and immediately replace it. Vacuuming the filter while it is still in the panel is likely to dislodge dust particles into the chassis interior. You can also remove the filter and wash it in warm water, and replace it when it is completely dry. While the filter is drying, install a spare filter or shut down the system.

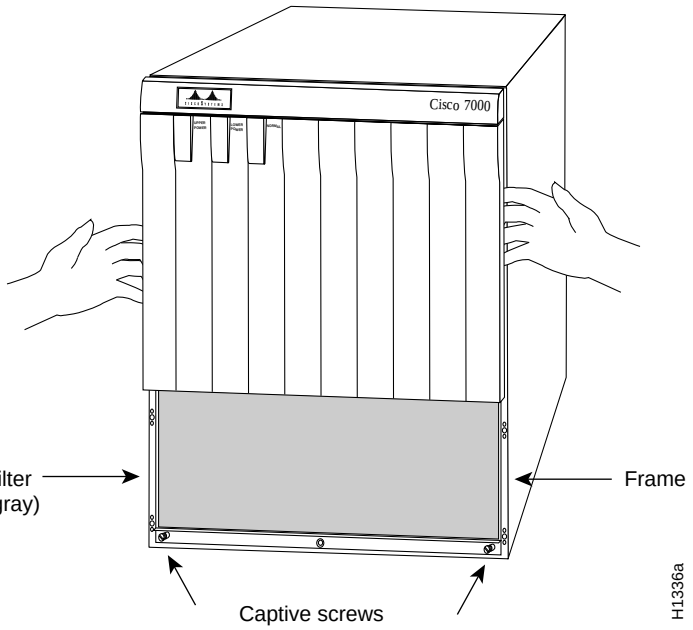

Figure 3 Chassis Air Filter and Top Front Panel

Prerequisites

Before you begin this installation, review the safety guidelines in this section to avoid injuring yourself or damaging the equipment.

Safety Guidelines

The following guidelines will help to ensure your safety and protect the equipment. This list is not inclusive of all potentially hazardous situations, so *be alert*.

- You can remove the bottom front chassis panel and replace the air filter while the system is operating, but you must turn all power supplies OFF and disconnect power cords before removing the top front chassis panel to access the chassis interior. Dangerous current levels are present on the backplane when power is on.
- Do not work alone when potentially hazardous conditions exist.
- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.
- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Never assume that power has been disconnected from a circuit; always check.

In addition, use the following guidelines when working with any equipment that is connected to telephone wiring or other network cabling.

- Never install telephone wiring during a lightening storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

List of Parts and Tools

You need the following tools to clean or replace the air filter, and to replace the blower:

- To clean the air filter, you need a small hand vacuum.
- To remove and wash the filter, or to replace it with a new filter, you might need a small (3/16-inch) flat-blade screwdriver to push the edges of the filter back into the frame of the top front panel.
- To replace the system blower, you need the following tools:
  - To remove the top front chassis panel, you need a medium (No. 2 Phillips or 3/16-inch flat-blade) screwdriver. Earlier chassis (the first several hundred shipped) use slotted screws, and later chassis use Phillips screws to secure the top front panel to the chassis. No tools are required to remove the bottom front chassis panel.
  - To loosen the captive screws on the blower, you need a long (9 inches or longer) No. 2 Phillips screwdriver or a long (9 inches or longer) 3-mm center-hex Allen wrench (the first few hundred systems shipped use Phillips screws; all subsequent chassis use Allen-head screws). A 3-mm Allen-head T-handle driver is shipped with all spare blowers.

  Before beginning the replacement procedure, check the blower to determine which tools you will need.

Removing and Replacing the Front Chassis Panels

To access the air filter, you must remove the bottom front chassis panel. To access the chassis interior to replace the blower, you must remove the top and bottom front chassis panels to. Carefully follow the instructions for removing and replacing the top front panel because you can damage or destroy the LED board or top front panel by forcing a misaligned panel onto or off of the chassis body.

Warning: Before accessing the chassis interior, turn all power supply switches OFF (O) and unplug the power cord. When the power is ON (|), high current (100A) is exposed on the backplane and around the power supply and wiring harnesses.

Removing the Panels

You must remove the bottom front panel before you can remove the top front panel. The plastic bottom front panel is attached to the chassis with ball studs. The top front panel is attached to the chassis with two captive screws. The EMI shielding around the outer edge of the top front panel acts as a spring and compresses when you push the panel into the chassis to keep the panel fitted tightly into the chassis opening.

To remove the front panels, perform the following steps:

Step 1: Grasp the bottom edge of the bottom chassis panel.

Step 2: Pull the bottom of the panel out about one inch, then place your fingers behind the sides of the panel and pull it off the chassis (see Figure 4).

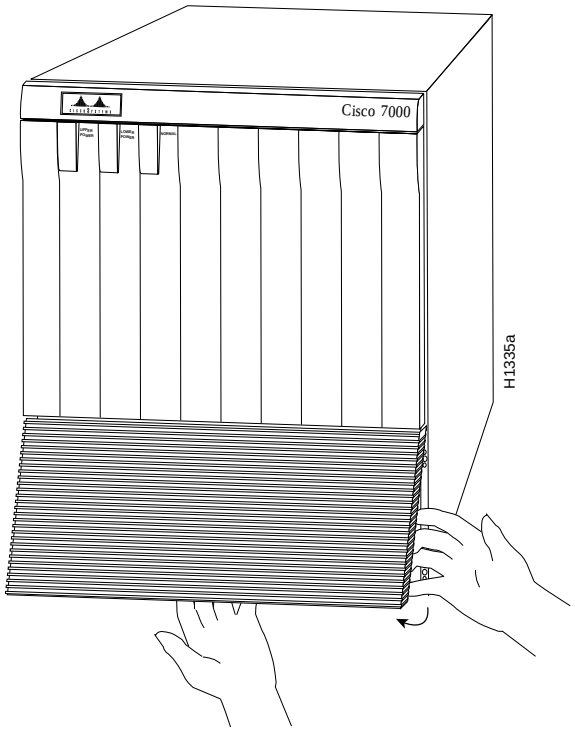

Figure 4 Removing the Bottom Front Panel

Step 3: On the top front panel, use a screwdriver to loosen the two captive screws at the bottom edge of the panel frame.

Step 4: Place one hand against the top front center of the panel to brace it (see Figure 5a). The top of the panel acts as a pivot point when you pull the bottom out and away from the chassis.

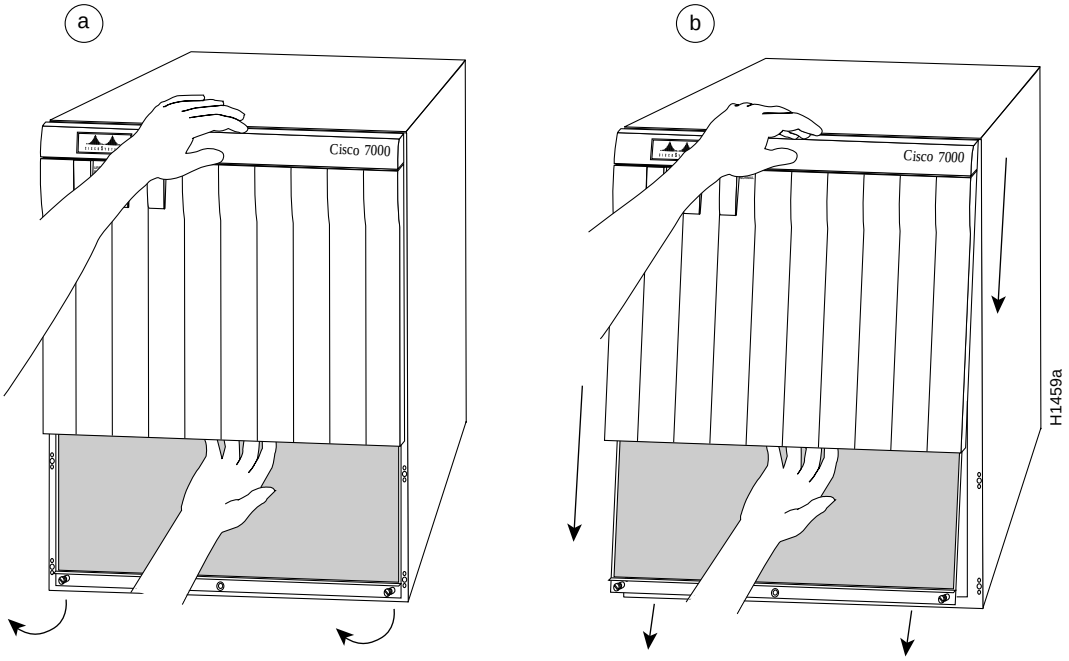

Figure 5 Removing the Top Front Panel

Step 5: With your other hand, grasp the front of the panel by inserting your fingers into the opening on the underside of the bezel (see Figure 5a).

Step 6: While pushing slightly against the top of the panel to constrain it, pivot the bottom edge of the frame outward about two inches (see Figure 5a). Because of the tightly compressed EMI shielding, you will have to use significant force to pull the bottom of the panel outward. However, be careful that you do not pull the panel more than two inches away from the chassis, or you can damage the inner bezel or LED board.

Step 7: When the bottom of the frame clears the chassis opening, keep your hands in the same positions and pull the panel downward and off the chassis (see Figure 5b).

Replacing the Panels

To replace the front panels, perform the following steps:

Step 1: Grasp the sides of the top panel with both hands (see Figure 6a).

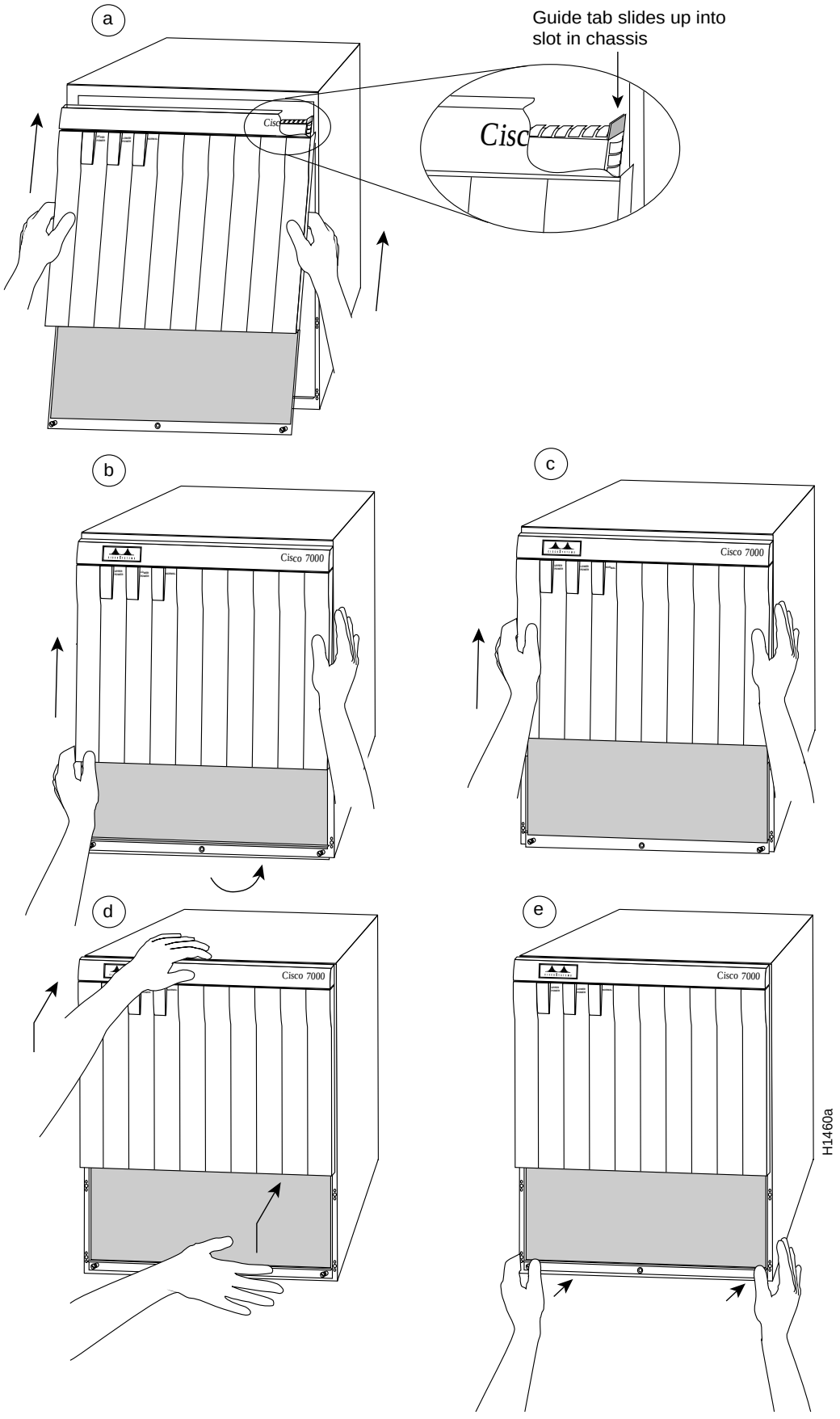

Figure 6 Replacing the Top Front Panel

Step 2: Two guide tabs at the top edges of the panel fit into two slots in the top edges of the chassis opening. Tilt the top of the panel back (away from you) about 30 degrees from vertical and slide the two guide tabs into the chassis slots (see Figure 6a).

Step 3: Check the top of the panel and make sure it is lined up with the top of the chassis opening. Failure to align the panel at this point can result in equipment damage when performing the next step.

Step 4: Push the panel upward to push the tabs into the slots (see Figure 6a) and pivot the bottom of the panel toward the chassis until the panel frame meets the chassis (see Figure 6b). Maintain a steady upward pressure to keep the guide tabs in the chassis slots.

Step 5: When the panel is flush against the front of the chassis, push the panel upward until the bottom of the panel is level with the bottom of the chassis opening (see Figure 6c).

Step 6: While holding the panel in place, place one palm against the top front center of the panel to brace it, and place the other against the lip near the bottom edge of the frame (see Figure 6d).

Step 7: Push the panel upward and back into the chassis opening until the tabs on the front sides of the panel are flush against the front of the chassis (see Figure 6d). You will have to use significant force to compress the EMI shielding enough to fit into the opening. If the panel resists, pull it slightly downward and make sure that the panel is lined up with the top and sides of the opening in the chassis.

Step 8: When the tabs on the front sides of the panel are flush against the sides of the chassis, tighten the two captive screws in the bottom edge of the frame.

Step 9: To replace the bottom front panel, place the ball studs on the back of the panel over the holes in the front lip of the chassis and push the panel onto the chassis until the ball studs snap into place.

This completes the chassis front panel removal and replacement procedures.

Cleaning and Replacing the Air Filter

The air filter removes dust from the air drawn in by the blower. The edges of the air filter fit into the lower frame of the top front chassis panel (see Figure 3). Remove and vacuum the air filter at least once every two weeks (more often in unusually dusty environments). You can also wash the filter, but ensure that it is completely dry before replacing it in the chassis. Have spares on hand in case the filter tears or becomes worn, or if you have to remove and wash it. A dirty filter could restrict the flow of cooling air into the chassis and could cause an overtemperature condition. You need only remove the bottom front chassis panel to access the filter.

Caution: Never place a wet filter in the chassis; the moisture drawn into the chassis can damage the equipment.

To clean or replace the filter, do the following:

Step 1: Remove the bottom front panel (see "Removing the Panels" on page 6). The edges of the air filter fit into the lower frame of the top front panel.

Step 2: Remove the filter by grasping it in the center and pulling the edges out of the frame.

Step 3: Check the condition of the filter. If the filter is dirty, or if it appears worn or torn, discard it after you ensure that you have a spare on hand.

Step 4: If you will wash the filter, refer to step 6 to install a temporary replacement. If a replacement is not available, shut down the system until the filter is dry and you can safely replace it. You can leave the system running for a minute or less in order to vacuum the filter.

Step 5: Vacuum the filter or wash the filter in running water, or discard it and replace it with a new filter.

Caution: Never place a wet filter in the chassis; moisture drawn into the chassis can damage the equipment.

Step 6: Place the new or clean, *dry* filter over the frame and push the edges into it with your fingers. Ensure that all edges are tucked into the frame.

Step 7: To replace the bottom front panel, align the bottom of the panel with the holes on the front of the chassis, then push the edges in until the ball studs snap into place.

Replacing the Chassis Blower

The blower is located at the bottom of the chassis interior (see Figure 1). Two air ducts on the rear of the blower, shown shaded in the illustration, fit snugly into the two cutouts in the backplane. The blower is secured to the backplane with three large captive screws, which are shown in Figure 7. The captive screws on most blowers are 3-mm center-hex Allen-head screws, but the earliest chassis shipped used Phillips-head screws. A 3-mm T-handle driver with a long (9-inch) handle is shipped with the spare blower.

Although the far left captive screw on the blower is slightly obscured from view by the left lip of the chassis and the left blower air duct, an access hole in the lip of the chassis provides access to this screw. By inserting the T-handle driver (or screwdriver) straight into the access hole, you should be able to find the screw without any trouble. However, if you do have trouble finding the screw, and if the lighting around the chassis is poor, you may need a flashlight to locate the screw and position the driver correctly.

Warning: Before accessing the chassis interior, turn the power switch to OFF (O) and unplug the power cord. When the power is ON, dangerous current levels are present on the backplane.

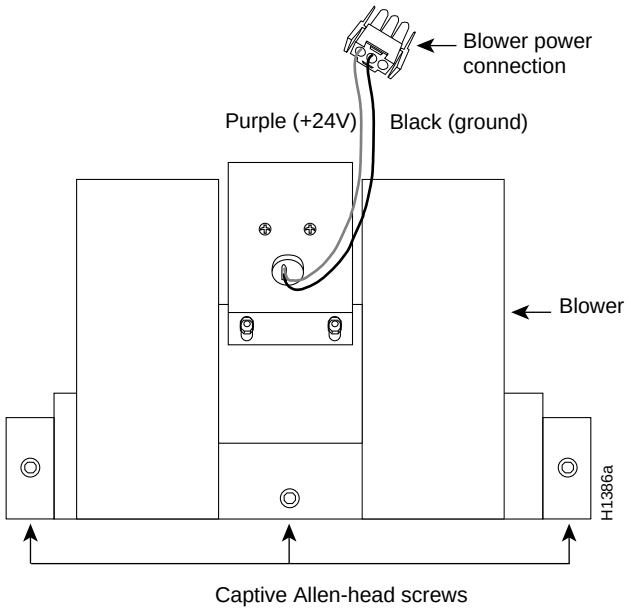

Figure 7 Chassis Blower

Removing the Blower

Remove the existing chassis blower as follows:

Step 1: On each installed power supply, turn the power switch to OFF (O) and unplug the power cord from AC source.

Step 2: Remove the front panels according to the procedure in "Removing and Replacing the Front Chassis Panels" on page 6.

Step 3: Locate the blower (see Figure 1), which is mounted to the bottom of the backplane, and the blower power connector (see Figure 8), which is connected to the backplane under the white power bus bar. Note the orientation of the power connector and its orientation in the backplane port, with the flat side down.

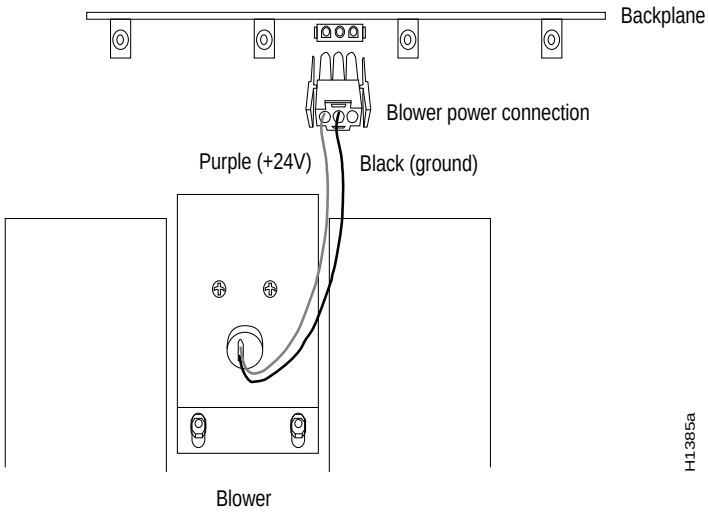

Figure 8 Blower Power Connector

Step 4: Disconnect the blower's power connector from the backplane by pinching the sides of the connector inward and pulling the connector out and away from the backplane. Lay the connector and wiring on top of the blower to keep it out of the way while you remove the blower.

Step 5: Using the long T-handle driver or Phillips screwdriver, loosen each of the three captive screws by turning them counterclockwise two full turns. Use the access hole in the lower lip of the chassis to guide the driver straight into the hole to the for left screw.

Step 6: When all three screws are loosened, unscrew them completely from the backplane. These captive screws are fixed to the blower; do not attempt to remove them completely.

Step 7: Two air ducts on the blower extend into the two cutouts in the backplane (see Figure 1). Grasp the blower with both hands and pull it outward (toward you and away from the backplane) while gently rocking it slightly up and down, and left to right, to free the blower ducts from the backplane.

Step 8: If the blower does not budge, check the three screws and ensure that they are free (they are fixed to the blower, but they should spin freely).

Step 9: Pull the blower outward using steady pressure and wiggling it until it is free from the backplane.

Step 10: Lift the blower out of the chassis and place it aside.

Step 11: Do not replace the front chassis panels until you install a new blower. If the system is inadvertently turned on without the blower installed, the internal chassis components may overheat, which can result in severe equipment damage.

Caution: Operate the system only if the blower is installed and functioning properly. The blower prevents an overtemperature condition that can result in severe equipment damage.

Installing a New Blower

Install the new chassis blower as follows:

Step 1: Ensure that the power supplies are still turned OFF.

Warning: Before accessing the chassis interior, turn the system power OFF and unplug the power cord. Use extreme caution when working near the backplane; high voltage is present when the system is operating.

Step 2: Note the orientation of the two air ducts on the back of the new blower and the two cutouts in the backplane. The two ducts fit snugly into the backplane cutouts.

Step 3: Hold the blower with the two air ducts facing away from you, and the three captive screws along the bottom of the side facing you (in the orientation shown in Figure 1). Lay the connector and wiring on top of the blower to keep it out of the way while you install the blower.

Step 4: Place the blower into the front chassis cavity so it rests on the floor of the chassis, then lift the blower up slightly and align the air ducts with the backplane cutouts.

Step 5: Push the air ducts into the cutouts. If necessary, wiggle the blower slightly as you are pushing it inward (the ducts fit snugly into the cutouts) until the edges of the blower meet the backplane.

Step 6: Use the T-handle driver or screwdriver to turn each of the captive screws clockwise about two full turns to ensure that they are aligned in the backplane holes. You should not feel much resistance. If a screw is hard to turn, do not force it. Wiggle the blower around, ensure that the screw is straight, and try tightening the screw again. If after several attempts the screw does not tighten easily, refer to the following section, "Checking the Installation" for further instructions.

Step 7: Tighten each of the three captive screws by turning them clockwise. Use the same alignment hole in the chassis to guide the driver to the far left screw.

Step 8: Locate the blower power connector port (see Figure 8), which is under the white power bar on the backplane. Both the port and the connector are keyed so the notched or flat edge of the connector is at the bottom.

Step 9: Hold the blower power connector with the flat edge down and the red or purple (+24V) wire to the left, and plug the connector into the backplane connector. When the connector is fully inserted, two plastic tabs snap outward to secure the connector in place.

Step 10: Replace the top and bottom front chassis panels (refer to "Removing and Replacing the Front Chassis Panels" on page 6) and proceed to the next section to verify the installation.

Checking the Installation

Perform the following steps to verify that the new blower is installed correctly.

Step 1: Turn all power supplies back ON. The AC Power LED on all power supplies should light. If any do not, or if the DC Fail LED is lit, the power supply has failed. Check the power cables to ensure they are connected.

Step 2: Listen for the blower; you should immediately hear it operating. If you do not hear it, turn OFF the system power and do the following:

- Remove the top and bottom front chassis panels (refer to "Removing and Replacing the Front Chassis Panels" on page 6).
- Check the blower power connector and ensure that it is fully seated in the backplane port by pinching the sides and pushing it firmly into the port.
- Check the two wires between the blower and the power connector: the red or purple +24V wire and the black ground wire. Ensure that they have not pulled out of the power connector by pinching each wire near the back connector and pushing it firmly into the connector.
- Replace the front chassis panels, turn the power supplies back ON, and listen for the blower.

Step 3: If after several attempts the blower does not operate, or if you experience trouble with the installation (for instance, if the captive blower screws do not align with the backplane holes), contact a service representative or refer to "Obtaining Technical Assistance" on page 2.

This completes the blower replacement.

This document is to be used in conjunction with the *Cisco 7000 Hardware Installation and Maintenance* publication.