GRF 400/1600 Getting Started - 1.4 Update

Ascend Customer Service

Ascend Customer Service provides a variety of options for obtaining technical assistance, information about Ascend products and services, and software upgrades.

Finding information and software on the Internet

Visit Ascend's Web site at `http://www.ascend.com` for technical information, product information, and descriptions of available services.

Visit Ascend's FTP site at `ftp.ascend.com` for software upgrades, release notes, and addenda to this manual.

Obtaining Technical Assistance

You can obtain technical assistance by telephone, email, fax, or modem, as well as over the Internet.

Enabling Ascend to assist you

If you need to contact Ascend for help with a problem, make sure that you have the following information when you call or that you include it in your correspondence:

- Product name and model.
- Software and hardware options.
- Software version.
- Service Profile Identifiers (SPIDs) associated with your product.
- Your local telephone company's switch type and operating mode, such as AT&T 5ESS Custom or Northern Telecom National ISDN-1.
- Whether you are routing or bridging with your Ascend product.
- Type of computer you are using.
- Description of the problem.

Calling Ascend from within the United States

In the U.S., you can take advantage of Priority Technical Assistance or an Ascend Advantage Pak service contract, or you can call to request assistance.

Priority Technical Assistance

If you need to talk to an engineer right away, call (900) 555-ASND (2763) to reach Ascend's Priority Call queue. The charge of $2.95 per minute does not begin to accrue until you are connected to an engineer. Average wait times are less than three minutes.

Ascend Advantage Pak

Ascend Advantage Pak is a one-year service contract that includes overnight advance replacement of failed products, technical support, software maintenance releases, and software

update releases. For more information, call (800) ASCEND-4 (272-3634), or access Ascend's Web site at `www.ascend.com` and select Services and Support, then Advantage Service Family.

Other telephone numbers

For a menu of Ascend's services, call (800) ASCEND-4 (272-3634). Or call (510) 769-6001 for an operator.

Calling Ascend from outside the United States

You can contact Ascend by telephone from outside the United States at one of the following numbers:

Telephone outside the United States	(510) 769-8027 or (800) 697-4772
Australia/Asia Pacific	(+61) 3 9656 7000 apac.support@ascend.com http://apac.ascend.com/contacts.html
Austria/Germany/Switzerland	(+33) 492 96 5672
Benelux	(+33) 492 96 5674
France	(+33) 492 96 5673
Italy	(+33) 492 96 5676
Japan	(+81) 3 5325 7397
Middle East/Africa	(+33) 492 96 5679
Scandinavia	(+33) 492 96 5677
Singapore	(+65) 738 7723
Spain/Portugal	(+33) 492 96 5675
UK	(+33) 492 96 5671

Obtaining assistance through correspondence

You can send questions to Ascend in one of the following ways:

- Email—support@ascend.com
- E-mail (in Asia Pacific)—apac.support@ascend.com
- E-mail (in Europe and the UK)—emeasupport@ascend.com
- Fax—(510) 814-2312
- Customer Support BBS (by modem)—(510) 814-2302
- Write to Ascend at the following address:

Attn: Customer Service
Ascend Communications, Inc.
One Ascend Plaza
1701 Harbor Bay Parkway
Alameda, CA 94502-3002

Important safety instructions

The following safety instructions apply to the GRF router models GRF-4-AC, GRF-4-DC, GRF-16-AC, and GRF-16-DC except as noted:

1 Read and follow all warning notices and instructions marked on the product or included in the manual.

2 Do not attempt to service this product yourself, as opening or removing covers and/or components may expose you to dangerous high voltage points or other risks. Refer all servicing to qualified service personnel.

3 The maximum recommended ambient temperature for all GRF router models is 104˚ Fahrenheit (40˚ Celsius). Care should be given to allow sufficient air circulation or space between units when the GRF chassis is installed in a closed or multi-unit rack assembly because the operating ambient temperature of the rack environment might be greater than room ambient.

4 Slots and openings in the GRF cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, maintain a minimum of 4 inches clearance on the top and sides of the GRF 400 router, and a minimum of 6 inches on the top and sides of the GRF 1600 router.

5 Installation of the GRF 400 or 1600 in a rack without sufficient air flow can be unsafe.

6 If a GRF router is installed in a rack, the rack should safely support the combined weight of all equipment it supports.
   - A fully loaded, redundant-power GRF 400 weighs 38.5 lbs (17.3 kg).
   - A fully loaded, single-power GRF 400 weighs 32.5 lbs (14.6 kg).
   - A four card, redundant-power GRF 1600 weighs 147 lbs (66.2 kg).
   - A four card, single-power GRF 1600 weighs 127 lbs (57.2 kg).

7 The connections and equipment that supply power to GRF routers should be capable of operating safely with the maximum power requirements of the particular GRF model. In the event of a power overload, the supply circuits and supply wiring should not become hazardous.

8 Models with AC power inputs are intended to be used with a three-wire grounding type plug - a plug which has a grounding pin. This is a safety feature. Equipment grounding is vital to ensure safe operation. Do not defeat the purpose of the grounding type plug by modifying the plug or using an adapter.

9 Prior to installation, use an outlet tester or a voltmeter to check the AC receptacle for the presence of earth ground. If the receptacle is not properly grounded, the installation must not continue until a qualified electrician has corrected the problem. Similarly, in the case of DC input power, check the DC ground (s).

10 If a three-wire grounding type power source is not available, consult a qualified electrician to determine another method of grounding the equipment.

11 Models with DC power inputs must be connected to an earth ground through the terminal block Earth/Chassis Ground connectors. This is a safety feature. Equipment grounding is vital to ensure safe operation.

12 Install DC-equipped GRF 400 and 1600 routers only in restricted access areas in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

13 Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.

14 Industry-standard cables are provided with this product. Special cables that may be required by the regulatory inspection authority for the installation site are the responsibility of the customer.

15 When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

Wichtige Sicherheitshinweise

Die folgenden Sicherheitshinweise gelten für die GRF-Oberfräsenmodelle GRF-4AC,
GRF-4-DC, GRF-16-AC und GRF-16-DC, außer wenn anderweitig angegeben:

1   Lesen und befolgen Sie alle am Produkt angebrachten und im Handbuch enthaltenen
    Warnhinweise und Anleitungen.

2   Versuchen Sie nicht, dieses Gerät selbst zu warten bzw. die Abdeckung zu öffnen oder
    Bauteile zu entfernen. Hochspannungsgefahr. Die Wartung muß durch qualifiziertes
    Fachpersonal ausgeführt werden.

3   Die empfohlene maximale Umgebungstemperatur für alle GRF-Oberfräsenmodelle liegt
    bei 40º C. Sorgen Sie für gute Belüftung bzw. ausreichenden Abstand zwischen einzelnen
    Geräten, wenn das GRF-Gehäuse in einem Einzel- oder Mehrfach-Einschubrahmen
    installiert werden soll, da die Betriebstemperatur in dem Einschubrahmen evtl. höher als
    die Raumtemperatur sein kann.

4   Schlitze und Öffnungen im GRF-Gehäuse dienen zur Belüftung. Um einen einwandfreien
    Betrieb des Produktes zu gewährleisten und um Überhitzung vorzubeugen, jeweils oben
    und an den Seiten der GRF-400-Oberfräse mindestens 10,16 cm und an der
    GRF-1600-Oberfräse mindesten 15,24 cm Freiraum vorsehen.

5   Bei unzureichender Belüftung ist die Installation eines GRF-400 oder 1600 in einem
    Einschubrahmen gefährlich.

6   Bei Installation einer GRF-Oberfräse in einem Einschubrahmen, muß dieser das
    Gesamtgewicht aller darin installierten Geräte sicher tragen können.

    –   Ein komplett bestückter Redundanzstrom-GRF-400 wiegt 17,3 kg.

    –   Ein komplett bestückter Einzelstrom-GRF-400 wiegt 14,9 kg.

    –   Ein mit vier Karten bestückter Redundanzstrom-GRF-1600 wiegt 66,2 kg.

    –   Ein mit vier Karten bestückter Einzelstrom-GRF-1600 wiegt 57,2 kg.

7   Die Adapter und Geräte, die die GRF-Oberfräsen mit Strom versorgen, sollten auch bei
    maximaler Stromanforderung des einzelnen GRF-Modells noch sicher laufen. Im Fall
    einer Stromüberlastung sollten die Versorgungskreise und kabel keine Gefahrenquelle
    darstellen.

8   Alle mit Netzeingängen versehenen Geräte müssen mit einem vorschriftsmäßigen Stecker
    bestückt sein. Der Stecker bietet die notwendige Erdung und darf in keiner Weise
    modifiziert oder mit einem Adapter verwendet werden.

9   Überprüfen Sie vor der Installation mit Hilfe eines Steckdosentestgerätes oder eines
    Voltmeters die Erdung der Netzsteckdose. Sollte die Steckdose nicht ordnungsgemäß
    geerdet sein, darf mit der Installation erst fortgefahren werden, wenn ein qualifizierter
    Elektriker dieses Problem behoben hat. Handelt es sich um einen Gleichstromeingang ist
    dieser in gleicher Weise auf ordnungsgemäße Erdung zu überprüfen.

10 Ist keine 3polige geerdete Stromquelle vorhanden, beauftragen Sie einen qualifizierten
    Elektriker damit, das Gerät auf andere Weise zu erden.

11 Bei Modellen mit Gleichstromeingängen muß ein Erdungsdraht entweder an der Klemmleiste oder an einer Gehäuseschraube angeschlossen werden. Hierbei handelt es sich um eine Sicherheitseinrichtung. Die Erdung des Gerätes ist eine wichtige Voraussetzung für den sicheren Betrieb.

12 Die gleichstromausgerüsteten Oberfräsenmodelle GRF-400- und GRF-1600-Oberfräse dürfen nur in Bereichen mit beschränktem Zugang, unter Berücksichtigung der anwendbaren Bestimmungen für Elektroinstallationen sowie der Standards ANSI/NFPA 70 installiert werden.

13 Keine Gegenstände auf das Netzkabel stellen. Das Kabel so verlegen, daß Personen nicht versehentlich darauf treten können.

14 Standardkabel sind im Lieferumfang des Produkts enthalten. Sonderkabel, die evtl. gemäß den örtlichen Bestimmungen für die Installation erforderlich sind, sind vom Kunden zu stellen.

15 Zur Installation in der endgültigen Konfiguration muß das Produkt den am Installationsort geltenden Sicherheitsstandards und bestimmungen entsprechen. Genauere Informationen erhalten Sie ggf. bei den zuständigen Behörden.

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About This Guide

About the 1.4 Update

The 1.4 GRF manual set is updated to include new features added since software release 1.4.6. GateD information is now provided in a new document, the *GRF GateD Manual*.

How to use this guide

The *GRF 400/1600 Getting Started* guide contains these chapters:

- Chapter 1, "Getting Acquainted with the GRF 400," describes the GRF 400 system components and operating environment.

- Chapter 2, "Getting Acquainted with the GRF 1600," describes the GRF 1600 system components and operating environment.

- Chapter 3, "Rack Mount and Power On Procedures," describes the rack mounting procedure for each GRF model, and provides system power on procedures for AC and DC power supplies.

- Chapter 4, "Initial System Set-up," explains the first-time configuration script, the Command-line Interface (CLI), and system set up for logging, PCMCIA devices, and other system tasks that bring the GRF to an operational state, ready for media card cabling and verification.

- Chapter 5, "Cabling and Verifying Media Cards," describes the set of available IP media cards, their LED activity, and provides the cable requirements for each card.

- Appendix A, "GRF Specifications," lists technical specifications for the GRF routers and the IP media cards.

- Appendix B, "Warranty," contains the product warranty information.

- Appendix C, "GRF 400 Agency Notices," contains the GRF 400 agency information.

- Appendix D, "GRF 1600 Agency Notices," contains the GRF 1600 agency information.

The guide also includes an index.

Helpful things to know

Configuring and monitoring the GRF requires that a Network Administrator have experience with and an understanding of UNIX systems, and the ability to navigate in a UNIX environment. Knowledge of UNIX, its tools, utilities, and editors is useful, as is experience with administering and maintaining a UNIX system.

Configuring the GRF requires network experience and familiarity with:

– UNIX systems and commands

– IP protocol and routing operations

– IP internetworking

The Network Administrator must understand how TCP/IP internetworks are assembled; what interconnections represent legal topologies; how networks, hosts, and routers are assigned IP addresses and configured into operation; and how to determine and specify route table (routing) information about the constructed internetwork(s). Although not required, a high-level understanding of SNMP is useful.

Related publications

Here are some related publications that you may find useful:

•   *Internetworking with TCP/IP,* Volume 1 and 2, by Douglas E. Comer, and David L. Stevens. Prentice-Hall,

•   *TCP/IP Illustrated,* Volumes 1 and 2*,* by W. Richard Stevens. Addison-Wesley, 1994.

•   *Interconnections*, Radia Perlman. Addison-Wesley, 1992. Recommended for information about routers and bridging.

•   *Routing in the Internet,* by Christian Huitema. Prentice Hall PTR, 1995. Recommended for information about IP, OSPF, CIDR, IP multicast, and mobile IP.

•   *TCP/IP Network Administration*, by Craig Hunt. O'Reilly & Associates, Inc. 1994. Recommended for network management information.

•   *Essential System Administration,* Æleen Frisch. O'Reilly & Associates, Inc. 1991. Recommended for network management information.

Documentation conventions

Ascend uses standard documentation conventions, which are as follows:

Convention	Meaning
Monospace text	Represents text that appears on your computer's screen, or that could appear on your computer's screen.
Boldface monospace text	Represents characters that you enter exactly as shown (unless the characters are also in *italics*—see *Italics*, below). If you could enter the characters but are not specifically instructed to, they do not appear in boldface.
Italics	Represent variable information. Do not enter the words themselves in the command. Enter the information they represent. In ordinary text, italics are used for titles of publications, for some terms that would otherwise be in quotation marks, and to show emphasis.
[ ]	Square brackets indicate an optional argument you might add to a command. To include such an argument, type only the information inside the brackets. Do not type the brackets unless they appear in bold type.
|	Separates command choices that are mutually exclusive.
Key1-Key2	Represents a combination keystroke. To enter a combination keystroke, press the first key and hold it down while you press one or more other keys. Release all the keys at the same time. (For example, Ctrl-H means hold down the Control key and press the H key.)
Press Enter	Means press the Enter, or Return, key or its equivalent on your computer.
Note:	Introduces important additional information.
⚠ **Caution:**	Warns that a failure to follow the recommended procedure could result in loss of data or damage to equipment.
⚡ **Warning:**	Warns that a failure to take appropriate safety precautions could result in physical injury.

Manual set

The GRF 1.4 Update documentation set consists of the following manuals:

- *GRF 400/1600 Getting Started 1.4 Update*   (this manual)

- *GRF Configuration and Management 1.4 Update*

- *GRF Reference Guide 1.4 Update*

- *GRF GateD Manual*

Getting Acquainted with the GRF 400

1

This chapter describes the components in a GRF 400 router that you need to be familiar with as you set up and install the equipment.

At the end of this chapter is a one-page preview of the tasks to set up and install the GRF. Please read through the list, the tasks are described in the order they appear.

After you have completed this introduction to the GRF 400, go to chapter 3. It contains information for rack-mounting the GRF 400 and procedures you use to power on AC and DC systems.

Chapter 1 covers these topics:

Note: The GRF 400 has hardware that integrates the router management hardware previously contained in the RMS node with components on the GRF 400 control board. A GRF 400 system currently using an RMS node can be upgraded by replacing its control board (optional) and installing 1.4 software.

What is the GRF 400?

The GRF 400 is a high-performance IP switch designed for high-volume, large-scale public and private backbone applications. It has these main features:

- Performs Layer-3 switching across 4 gigabits/second aggregate bandwidth

- Supports large suite of routing protocols

- Accommodates 1–4 media cards, available media are ATM OC-3c, ATM OC-12c, 10/100Base-T Ethernet (4- and 8-port), HSSI, HIPPI, SONET OC-3c, and FDDI

- Provides advanced dynamic routing, basic filtering, OSPF multicast, SNMP v1, IPv4

- Accommodates redundant, hot swappable power supplies

- Supports a 400W AC power supply unit

- Supports a -48VDC power supply (negative 48V)

- Manages 150K-entry route tables, batch updating with 20 routes per second

The GRF 400 chassis can be mounted in a standard 19" rack unit or on a table. The chassis weighs between 26 and 40 pounds (11.9–18.2 kg), depending upon the number of media cards and power supplies installed.

Which items are included in your system?

This section helps you confirm the items in your system.

- Each system includes a GRF 400 base unit.

- Base unit components vary depending upon the type/number of media cards and power supplies ordered.

- Software is pre-installed at the factory.

AC power cord

If you ordered the GRF with one (two) AC power supply, make sure the shipping box contains:

- one (two) AC power cords

If your GRF 400 has a redundant AC power supply, you should have two power cords.

AC power cord requirements

Use only the AC power cord included with your product or an equivalent cord:

- North America: UL listed, CSA certified, type SJT or SVT, 3-conductor, 18AWG minimum

- outside of North America: Agency-approved for the country of use, cord type H05VVF3G1.0, 3-conductor, 1.0mm^2, rated 250V, 10A, plug type suitable for country of use.

Site-supplied components

To boot the GRF 400, you must attach a VT100-compatible terminal directly to the control board, and you must supply:

• a standard RS-232 null modem cable and the terminal

Optionally, if you later want to directly connect the GRF to a site LAN, you must supply:

• a cross-over 10Base-T Ethernet cable to connect the LAN to a receptacle on the control board

Components you can add

In addition to media cards, options you can order from Ascend include:

• 400W AC power supplies

• negative 48V DC power supplies

• upgrades to internal control board DRAM, 128MB is standard shipping size, can be upgraded in 64MB increments to a maximum of 512MB

 Memory upgrades may only be obtained from Ascend, do not use other sources.

• ATA disk devices in a PCMCIA slot for system logging and backup

 Ascend certifies the following ATA-compliant devices for GRF operation:

 – Kingston Datapak 520MB, P/N CT520RM

 – Sandisk 175MB Flash, P/N SDP3B

 – Sandisk 85MB Flash, P/N SDP3B-85-101

 – Aved 85MB Flash, P/N AVEF385MB25ATA501

 Ascend offers only the 85 MB Flash directly (GRF-AC-FLASH). Customers may purchase the other devices through an external source.

• Two models of PCMCIA modems have been tested with the GRF, they are available from:

 – MegaHertz, model CC3288 (28.8Kbps)

 – US Robotics, model 1626 (28.8Kbps, some with 33.6Kbps upgrade)

Overview of the GRF 400 base unit

Figure 1-1 shows the GRF 400 base unit from the front. The rack-mountable chassis is 5.25" high and 19" wide. When you install the GRF, you must provide six to ten inches of side clearance for ambient air intake and heated air exhaust. All ventilation is to the sides.

(g0002)
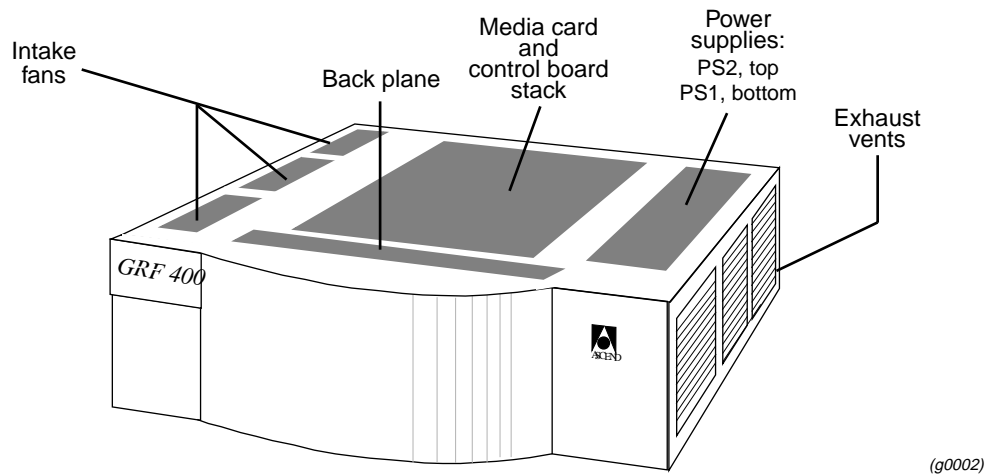
Figure 1-1. GRF 400 base unit and component (front view)

Figure 1-2 shows the chassis from the cable panel. Power supplies are on the left. The control board is on the top of the card stack to the right, the four media cards are in the slots below:
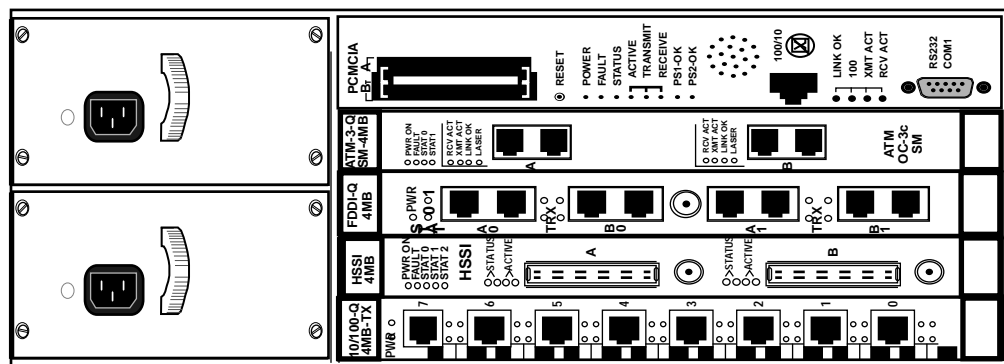
Figure 1-2. Cable panel view of GRF 400

The GRF 400 has four media card slots, 0–3. Slots are numbered top to bottom as shown in Figure 1-3, the control board is always 66:

(g0009)
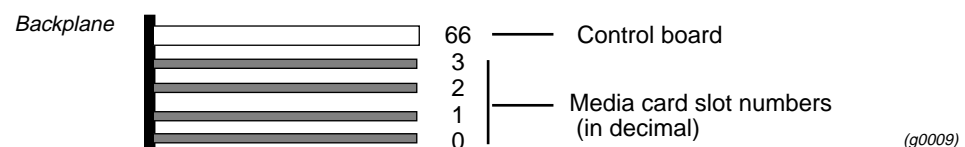
Figure 1-3. Media card and control board stack with slots numbered

Control board

GRF 400 control board hardware runs the router management software (RMS). RMS is the communications and control software for the media cards. Other control board components are the system RAM, internal flash memory, switch hardware, Ethernet connector, and PCMCIA device slots. The control board is field-replaceable, but not hot swappable.

```
        PCMCIA
         B  A
```

RESET

POWER
FAULT
STATUS
ACTIVE
TRANSMIT
RECEIVE
COM BUS
PS1-OK
PS2-OK

100/10

LINK OK
100
XMT ACT
RCV ACT
ETHERNET
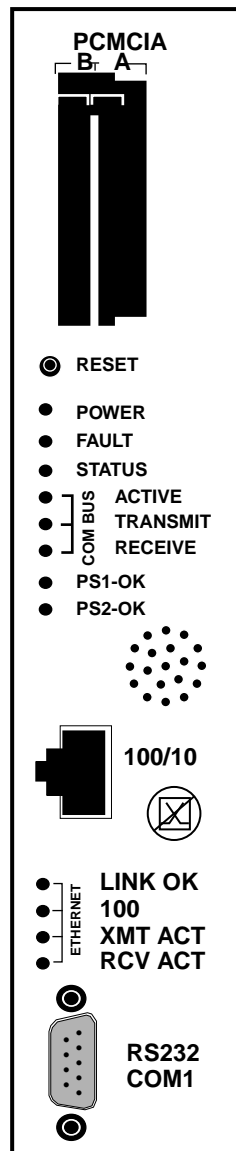
RS232
COM1

A hardware reset button, receptacles for Ethernet and RS-232 connections, and power, status and fault LEDs are on the control board's faceplate, shown left.

PCMCIA slots can contain an external flash memory device and a PCMCIA modem attachment.

The system can be reset by depressing the reset button, but a software command reset is preferable since it saves files and leaves the system in order.

LEDs provide status for control board and chassis components.

The faceplate speaker functions as a typical PC speaker, it chimes during system boot, for example. The control board has another component that sounds an audible alarm when the operating temperature level is exceeded.

The control board has temperature monitoring (sensor) and reporting (alarm) capabilities. The router management software provides a command (**temp**) to check the current board-surface operating temperature. If excessive temperature levels are reached, the router management software triggers the control board's audible alarm. If levels are exceeded, the management software will shut the system down. The management software also monitors the power supply units, issuing power failure warnings to the user interface via grconslog if power problems are detected. The LEDs do not reflect the actual location of power supplies in the chassis: power supply 2 is on top, power supply 1 is on the bottom.

A 10/100 megabit Ethernet receptacle (autosensing) supports a connection to the administrative LAN. A set of four LEDs indicate activity and connection rate (10 or 100 mbs).

The VT-100 terminal attaches to the serial port.

Switch control

Each media card is on a switch port. Switch control manages media card requests to connect through the switch to the switch port occupied by a destination media card. Switch logic determines if the target port is available and, if it is, enables the connection. A special bus carries the request and grant traffic for available switch ports.

System memory

Figure 1-4 illustrates the RAM and flash memory components on the GRF control board:
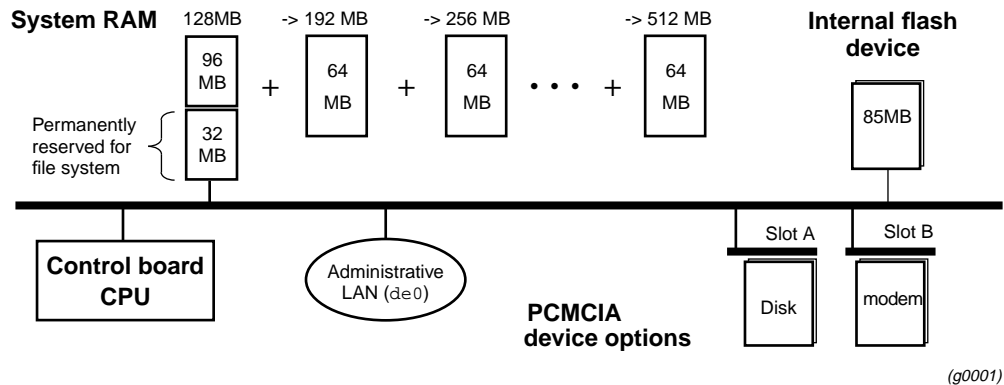
Figure 1-4. Memory components and options on the control board

RAM   The GRF 400 is equipped with a minimum of 128MB of internal RAM, 32MB of which are permanently reserved for the file system, including logs and configuration files. The remaining 96MB are used by the operating system and user applications such as GateD.

Figure 1-5 shows the area of system RAM that can be expanded to meet site requirements.
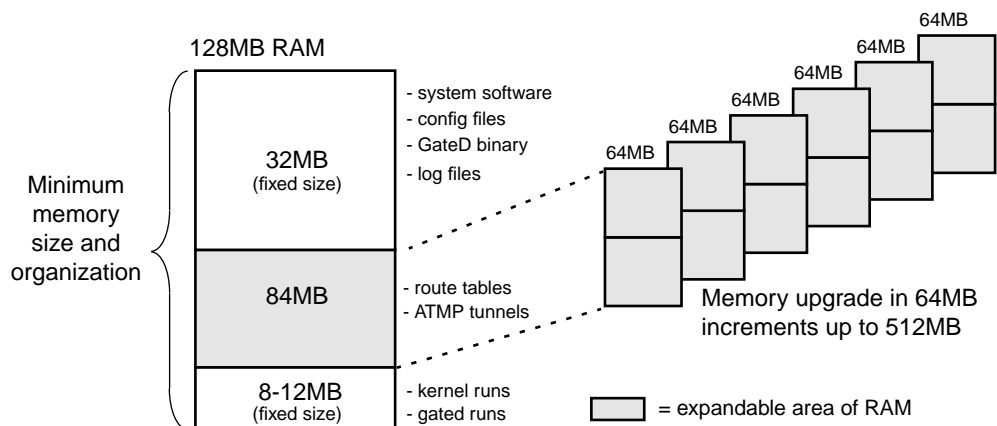
Figure 1-5. Expandable area of system memory

System memory can be upgraded in 64MB increments up to a total of 512MB, including the 32MB always reserved for the file system. To permit the software to operate in the allocated memory, certain portions of standard UNIX, such as man page files, are omitted. Man pages for GRF commands are maintained.

Because file system space is limited, you should configure logging to be done remotely via **syslog** or locally to external flash. Additional system memory supports route tables and other protocol data, and cannot be used for storing logs.

Internal flash   The GRF has an internal 85MB ATA flash device from which the system boots. This memory is available for storing different versions of operating software and site configurations.

External flash   PCMCIA slots on the control board support various sizes of ATA flash devices. Although external flash can be used to back up and share router configurations among multiple GRF systems, a GRF cannot boot from an external flash device. Local logging and dumping to external flash is also supported. The **grwrite** command writes files from system RAM to internal flash, **grsnapshot** copies files between internal and external flash devices. Commands for flash device management are discussed in the *GRF Configuration and Management* manual.

PCMCIA devices   PCMCIA slot A is used for a portable external disk device. A PCMCIA modem device can operate in either slot A or B. Instructions for configuring the modem and a disk device are in chapter 4.

Fans

Three intake fans push air across the media cards, control board, and power supplies. Warmed air exhausts out the side vents next to the power supplies. If the unit is installed in a rack, the sides of the GRF chassis should not be adjacent to a device in the next rack. Be sure that the intake vents do not draw in air exhausted by another device. Fans are integral to the GRF 400 chassis and must be replaced by certified personnel.

Fan "too slow" message

You may occasionally see a message in the /messages log file similar to this:

```
Jul 20 04:00:25 tn-btvt-1-E0-1 kernel: rmb0: RMB Fan 0 is too slow
```

This message can be generated when the low-priority task of updating the fan rotation count has been replaced by a higher-priority communication bus activity. Unless you see it repeated frequently in a five-minute period, you can ignore it. If the message is repeated, use the **temp** command to check the chassis temperature.

Backplane

The GRF 400 backplane spans the width of the chassis and is fixed in place. The backplane is not a field replaceable unit.

The backplane supplies power to the media cards and control board. The control board and media cards exchange configuration and status information through the 80 megabit/second communications bus located on the backplane.

Communications bus

The communications bus (com bus) is a separate data path for configuration, control, monitoring functions. This bus connects the control board to the media cards independently of the switch connection to each card, and is not used for routed data between media cards. Route table update packets received by the media cards are also sent across the com bus to the router manager software and do not compete with normal IP data traffic.

Battery

The control board has a small 3V lithium battery to store BIOS CMOS configuration and for powering the real time clock if the GRF is powered off.

⚠ **Caution:** Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Vorsicht: Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

Attention: Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

Power supplies

The GRF 400 can use either AC or DC (negative 48VDC) power supplies. GRF systems are shipped with the power supply installed. Power supplies are housed in open frame drawers for cooling by the chassis fans. Only qualified personnel can service and replace GRF 400 power supplies.

Remember that the GRF 400 does not have a power on/off switch. When the power supplies receive current, the GRF powers on and, since the software is already loaded, immediately begins to boot.

Redundant units

Two power supplies can be installed for redundancy. When two units are present, both are active, load-sharing devices. If one fails, the other unit ramps up to provide the full load. Each power supply has an LED on the control board.

Looking from the cabling end of the chassis, the power supplies are mounted on the left side. The bottom power supply is numbered 1, and the upper supply is numbered 2. In a non-redundant system, the single power supply unit can be installed in either 1 or 2, it does not matter.

If a unit failure occurs in a redundant system, the failed unit can be hot swapped out. The unit being removed must be unplugged or disconnected from its AC or DC power source.

Failure notification

If a power supply fails, you will see failure messages on-screen at the user interface. The `/var/log/gr.console` log file will also contain related messages. The green PS1-OK or PS2-OK LED on the control board goes off to indicate a power supply failure. If you do not already have a replacement unit, order one from Ascend.

Description of the AC power supply

The GRF 400 400W AC power supply provides +5V to all media cards, control board, and backplane. Remember that the GRF 400 chassis does not have a power on/off switch. When you plug the AC power supply cord into a live outlet, the GRF powers on and, since the software is already loaded, immediately begins to boot.

The GRF 400 can be ordered with one or a redundant pair of AC power supply units. The AC unit is available only from Ascend.

Powering on a GRF 400 power supply is described in Chapter 3.

A note about redundant AC supplies

When the GRF 400 is equipped with redundant AC power supplies, please note the following when powering on (plugging) or powering off (unplugging) the GRF unit:

Caution: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords. Care must be taken to correctly connect each power supply to separate AC power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

Incompatibilities between AC power supply models

For some time the GRF 400 has been equipped with 400W power supplies manufactured by Astec.

The standard AC power supply is being switched to a unit manufactured by Artesyn (previously Zytec). Refer to Figure 1-6 and Figure 1-7 for front panel illustrations of both types of power supplies.

The Astec and Artesyn power supplies are incompatible. The two models do not consistently support load sharing between them, and their incompatibilities can mask a unit failure. As a result, the two models must not be installed together in the same GRF 400 chassis.

This installation requirement is critical in the following situations:

*   when a system with a single Astec unit intends to install a second unit for redundancy.
    If you intend to add a redundant unit to a GRF 400 with a single Astec unit installed (black handle), you must switch to two Artesyn units.
*   when a system with dual Astec units has a failure and needs a replacement unit.
    If you have a failure in a GRF 400 configured with dual Astec units, you must switch to two Artesyn units.

• units might be swapped at sites having multiple GRF 400 units with different power supplies.

If you swap power supplies, remember you cannot mix models in the same GRF chassis.

Contact your Ascend sales representative to order the appropriate power supply units.

Astec supplies have a black pull handle as shown in Figure 1-6:

Black handle

(This label is present only when a second supply is installed.)

CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.
ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.

Figure 1-6. Front of Astec AC power supply drawer.

The Artesyn power supply has a silver pull handle as shown in Figure 1-7:

Silver handle

CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.

100-240V

ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.

ATTENTION: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

(This label is present only when a second supply is installed.)

Figure 1-7. Front of Artesyn AC power supply drawer.

Note:
When replacing Astec units in a redundant system with Artesyn (previously Zytec) supplies, the units can be hot swapped, there is no need to power off the GRF unit. Do not leave one of each type of supply (one Artesyn and one Astec unit) "mixed" in the GRF 400 for an extended period of time. To keep the GRF 400 up and running, mixing power supplies during a brief hot swap is acceptable.

Description of the 48V DC power supply

The GRF 400 can be ordered with one or a redundant pair of negative 48V DC power supply units. The DC unit is available only from Ascend.

Attaching DC supply wiring to the DC power supplies is described in Chapter 3.

The terminals and markings of a GRF 400 DC power supply are shown in Figure 1-8:
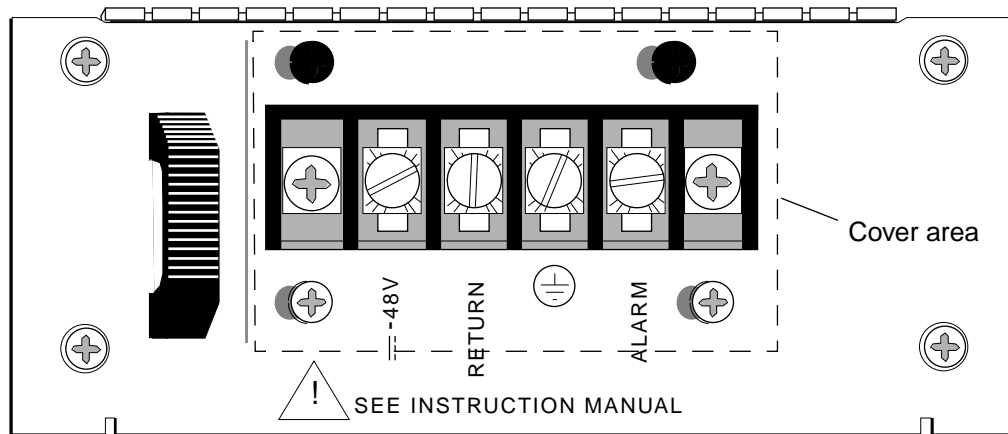
Figure 1-8. Front of -48V power supply drawer.

Redundant DC supply safety considerations

The notice shown below appears on the lower edge of the GRF 400 DC power supply:

⚠ SEE INSTRUCTION MANUAL

and refers to the following caution:

If the GRF is equipped with redundant DC power supplies, please note the following when powering off (disconnecting) the GRF unit:

Caution: This unit has two power inputs. For total isolation from electrical shock and energy hazard, disconnect both power inputs. Care must be taken to correctly connect each power supply to separate power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Stromeingänge. Um das Gerät vollständig vom Netz zu trennen, unterbrechen Sie den Anschluß mit beiden Eingängen, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux sources d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux sources d'alimentation.

Installation preview

Now that you are familiar with the GRF 400, this page gives you a preview of the tasks you will do to install the GRF, and what the other chapters in this *Getting Started* manual cover:

1   Rack mount and ground the GRF chassis. *(chapter 3)*

2   Insert any additional media cards. The GRF is shipped with all ordered media cards installed, if you have others to install, insert them now. *(chapter 3)*

3   Attach a VT 100-compatible terminal or laptop PC to the serial port (RS-232) on the GRF control board. The terminal is used to enter the initial IP configuration information and to monitor system boot. Later you can connect the GRF to the administrative Ethernet and disconnect the terminal. *(chapter 3)*

4   Power on the GRF by plugging in the AC power supply or wiring the DC power supply.
The GRF has no on/off switch, and ships with software already loaded. When you apply current to the power supplies, the GRF begins to boot. Watch the control board LEDs to see the status of the system during and after boot. *(chapter 3)*

5   The first time a GRF is powered on, a configuration script automatically runs. The script prompts you to enter the router's system IP address and host name. You must supply this information to communicate with the GRF and to later connect the GRF to your administrative Ethernet. *(chapter 4)*
The script also prompts you to begin to configure remote logging by setting up a **syslog** server. If you choose to configure "local" logging to a PCMCIA device, just press the <Enter> key at those prompts.

6   Log in as `root`. Optionally, you can change the preset password for `root`. *(chapter 4)*

7   Configure logging, there are several options. Procedures to set up local PCMCIA and network logging are in this manual. *(chapter 4)*
Optionally, you can install and configure a PCMCIA modem connection to the GRF.

8   Connect the GRF maintenance Ethernet interface to your site's administrative LAN. Use the Ethernet connector on the control board. If you like, you can now disconnect the VT 100 terminal. *(chapter 4)*

9   Attach the media card cables. *(chapter 5)*

At the end of this manual, you are ready to configure the media card interfaces, network services, and protocols. This information is covered in the *GRF Configuration and Management* manual.

Getting Acquainted with the GRF 1600

2

This chapter describes the components in a GRF 1600 router that you need to be familiar with as you set up and install the equipment.

At the end of this chapter is a one-page preview of the tasks to set up and install the GRF. Please read through the list, the tasks are described in the order they appear.

After you have completed this introduction to the GRF 1600, go to chapter 3. It contains information for rack-mounting the GRF 1600 and procedures you use to power on AC and DC systems.

Chapter 2 covers these topics:

Note: The GRF 1600 replaces the GR-II (GigaRouter) and its attached RMS node as an Ascend high-performance router product.

What is the GRF 1600?

The GRF 1600 is a high-performance IP switch designed for high-volume, large-scale public and private backbone applications. It has these main features:

- Performs Layer-3 switching across 16 gigabits/second aggregate bandwidth

- Supports large suite of routing protocols

- Accommodates 1–16 media cards, available media are ATM OC-3c, ATM OC-12c, 10/100Base-T Ethernet (4- and 8-port), HSSI, HIPPI, SONET OC-3c, and FDDI

- Provides advanced dynamic routing, basic packet filtering, OSPF multicast, SNMP v1, IPv4

- Accommodates redundant, hot swappable power supplies

- Supports an 1100W AC power supply unit

- Supports a -48VDC power supply (negative 48V)

- Manages 150K-entry route table, batch updating with 20 routes per second

The GRF 1600 chassis can be mounted in a standard 19" rack unit or on a table.

The chassis weighs between 107 and 124 pounds (49–56 kg), depending upon the number of power supplies installed. Side rails are recommended to be installed in the rack unit before attempting to insert a GRF 1600. Side rails will help to support the heavy unit as the team inserts the chassis and fastens it to the rack.

⚠ **Caution:** Because of its weight, moving the GRF 1600 into a rack requires a two-person team.

Vorsicht: Aufgrund seines Gewichts sind zur Installation des GRF 1600 auf dem Regal zwei Personen erforderlich.

Which items are included in your system?

This section helps you confirm the items in your system.

- Each system includes a GRF 1600 base unit.

- Unit contents vary depending upon the type/number of media cards ordered.

- Software is pre-installed at the factory.

AC power cord

For AC systems, make sure the shipping box contains an AC power cord. If your GRF 1600 has a redundant AC power supply, you should have two power cords.

- one (two) AC power cords

AC power cord requirements

Use only the power cord included with your product or an equivalent cord:

- North America:
  UL listed, CSA certified, type SJT or SVT, 3-conductor, 18AWG minimum

- outside of North America:

  Agency-approved for the country of use, cord type H05VVF3G1.5, 3-conductor,

  1.5mm^2, rated 250V, 16A; plug type suitable for country of use

Site-supplied components

To boot the GRF 1600, you must attach a VT100-compatible terminal directly to the serial
receptacle on the control board, and you must supply:

- a standard RS-232 null modem cable

- a VT100-compatible terminal

Optionally, if you later want to directly connect the GRF to a site LAN, you must supply:

- a cross-over 10Base-T Ethernet cable to connect the LAN to the Ethernet receptacle on the
  control board

Components you can add

In addition to media cards, GRF 1600 options you can order from Ascend include:

- 1100W AC power supplies

- a locking clamp for the AC power supply is available from Panel Components
  Corporation, P/N 85910051, (515) 673-5000

- negative 48V DC power supplies

- upgrades to internal control board DRAM, 128MB is standard shipping size, can be
  upgraded in 64MB increments to a maximum of 512MB

  Memory upgrades may be obtained only from Ascend, do not use other sources.

- ATA disk devices in a PCMCIA slot for system logging and backup

  Ascend certifies the following ATA-compliant devices for GRF operation:

  – Kingston Datapak 520MB, P/N CT520RM

  – Sandisk 175MB Flash, P/N SDP3B

  – Sandisk 85MB Flash, P/N SDP3B-85-101

  – Aved 85MB Flash, P/N AVEF385MB25ATA501

  Ascend offers only the 85 MB Flash directly (GRF-AC-FLASH). Customers may
  purchase the other devices through an external source.

- Two models of PCMCIA modems have been tested with the GRF, they are available from:

  – MegaHertz, model CC3288 (28.8Kbps)

  – US Robotics, model 1626 (28.8Kbps, some with 33.6Kbps upgrade)

Overview of the GRF 1600 base unit

Figure 2-1 shows the GRF 1600 base unit from the front of the cabinet. All cables and power cords attach at the rear panel. The GRF 1600 chassis is organized into three sections.

In the top section, a pair of high-speed impeller fans draw air up through the media cards and exhaust it out vents on each side of the chassis. These vents must not be obstructed in any way. When you install the GRF, you must provide a minimum of 6 inches of clearance on the sides of the unit and keep the front and back clear of obstruction. The backplane and system cards are installed in the middle section, above the air intake plenum. Intake vents are at each chassis side and front. Power supplies are in the bottom section. Their internal fans exhaust air out the lower chassis front and require a minimum of six inches of clearance.

Note the hand holds on the chassis sides, these are especially helpful when installing the GRF in a rack.
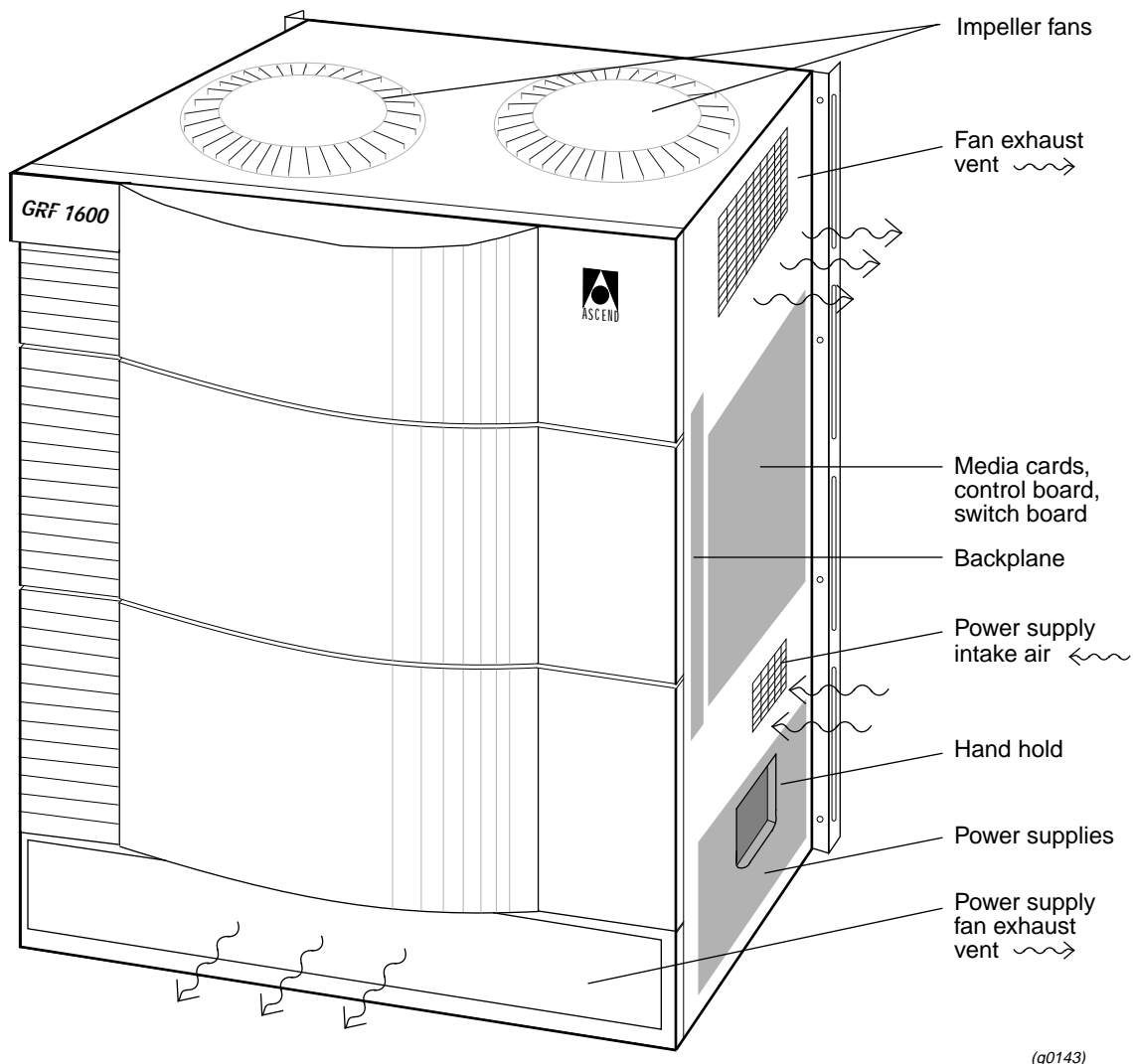
Figure 2-1. GRF 1600 base unit and component areas (front view)

The rear panel of the GRF 1600 chassis is shown in Figure 2-2. At the top is a fan tray that houses a pair of motorized impeller fans, the tray is replaceable as a single unit.

The top and bottom of the media card section are open grids through which the fans draw air through the chassis air intake vents. The media cards slide in along the guide in each slot and plug into their connector on the backplane. Solid vertical partitions separate the control board and the switch board from the media cards.
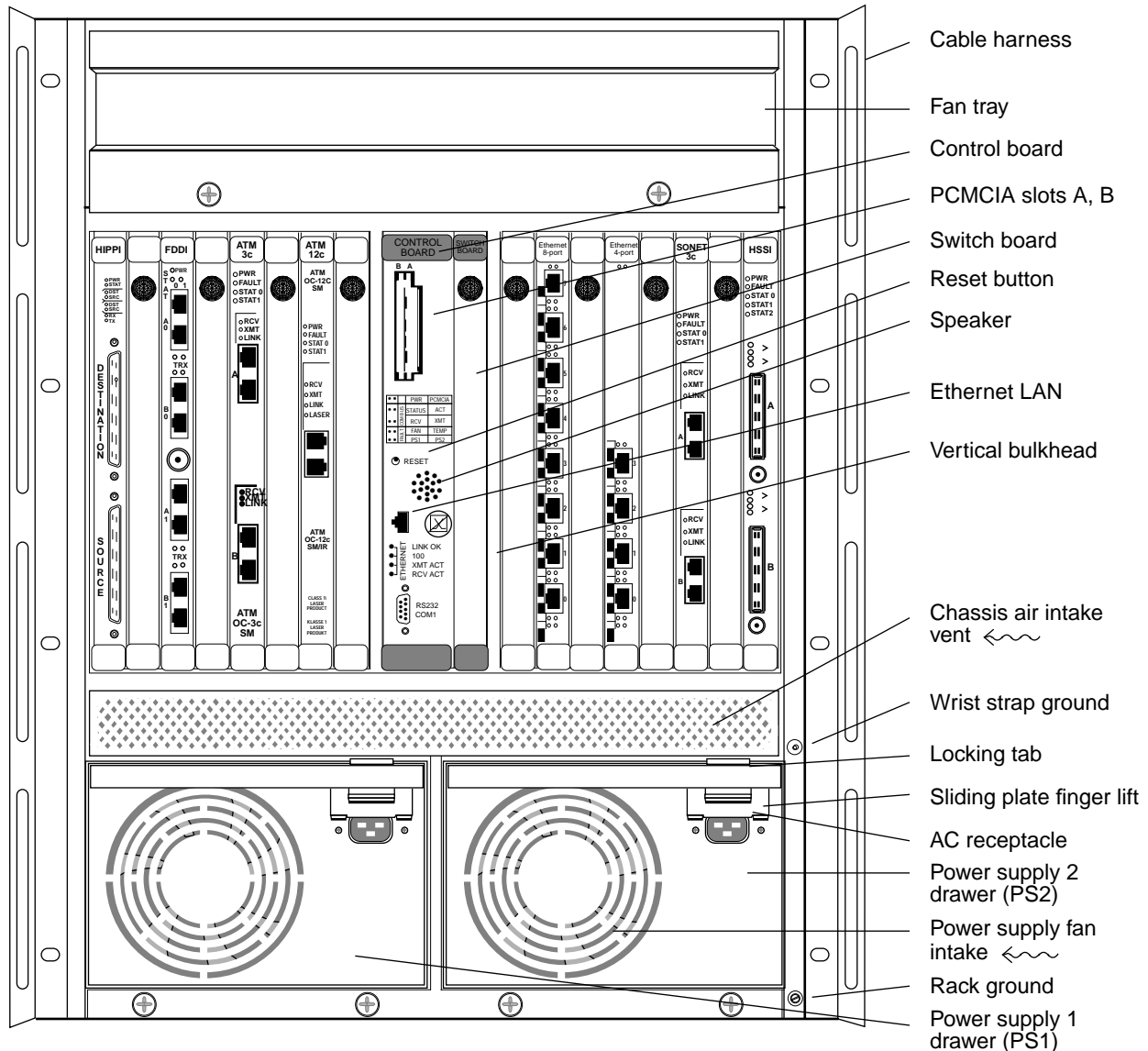
Figure 2-2. Rear panel view of GRF 1600

Two ground connectors are on the right edge of the chassis, the upper is for a wrist strap and the lower is for the rack ground.

The power supply compartment is completely separate from the rest of the chassis. Each power supply is in an enclosed drawer and is cooled by an internal fan. A locking tab prevents the drawer from being opened accidentally when the AC cord is plugged into the unit. The PS1 or PS2 LED on the control board lights to indicate a problem with a specific power supply.

Media cards

Note: To operate properly, a GRF 1600 requires a minimum of two media cards installed. Also, a face plate cover must be installed in any unused slot to maintain cooling flows.

The GRF 1600 has 16 media card slots, 0–15, a control board, and a switch board.Slots are numbered left to right as shown in Figure 2-3, the control board is always 66:
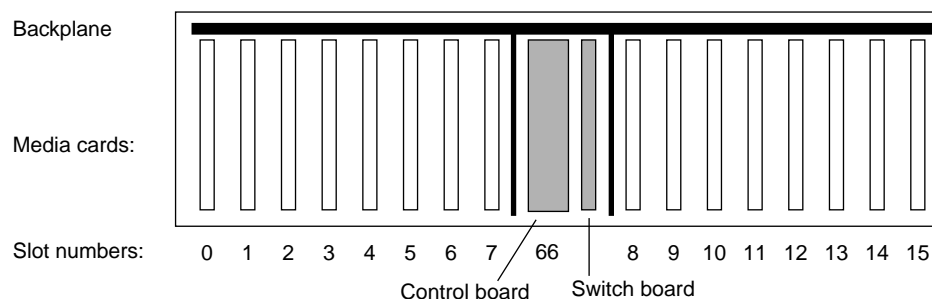
Figure 2-3. Top view of GRF 1600 chassis with slots numbered

Chassis fans

Two motorized impeller fans cool the chassis, excluding the power supply compartment. The fans operate in tandem. At start-up, both fans operate at 100% of RPM capability. Gradually each fan slows down so that, in normal conditions, each fan operates at 50% speed. When the GRF is plugged in, you can hear the changes in fan speeds. Tachometers on each fan unit ensure steady, sufficient airflow. When a tachometer detects that a fan is dropping below the 50% rate, it causes a signal to the other fan to speed up. When a problem occurs with either fan, the control board "FAN" LED lights. The GRF 1600 fan tray is site replaceable, but must be returned to Ascend for service. The fan tray sits on a pair of guides and is held in place by two captured screws.

The fan tray is not hot swappable.

Before you replace a fan tray, you must power down the GRF and remove current from BOTH power supplies.

Use the **shutdown** command:
```
# shutdown -r now
```

The amount of time the GRF 1600 can operate with a failed fan depends upon the number of installed media cards and the ambient air temperature. The temperature sensor on the control board shuts the GRF down if the operating temperature is exceeded.

Control board

GRF 1600 control board hardware runs the router management software (RMS). RMS is the communications and control software for the media cards. Other control board components are the system RAM, internal flash memory, Ethernet connector, and PCMCIA device slots. The control board is field-replaceable, but not hot swappable.
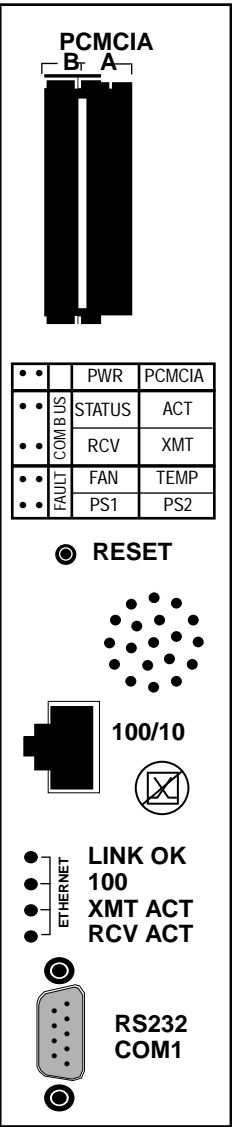
A hardware reset button, receptacles for Ethernet and RS-232 connections, and power, fan, status and fault LEDs are on the board's faceplate, shown left.

PCMCIA slots can contain an external flash memory device and a PCMCIA modem attachment.

LEDs provide status for control board and chassis components.

The system can be reset by depressing the reset button, but a software command reset is preferable since it saves files and leaves the system in order.

The faceplate speaker functions as a typical PC speaker, it chimes during system boot, for example. The control board has another component that sounds an audible alarm when the operating temperature level is exceeded.

The control board has temperature monitoring (sensor) and reporting (alarm) capabilities. The router management software provides a command (**temp**) to check the current board-surface operating temperature. If excessive temperature levels are reached, the router management software triggers the control board's audible alarm. If levels are exceeded, the management software will shut the system down. The management software also monitors the power supply units, issuing power failure warnings to the user interface via grconslog if power problems are detected.

A 10/100 megabit Ethernet receptacle (autosensing) supports a connection to the administrative LAN. A set of four LEDs indicate activity and connection rate (10 or 100 mbs).

TheVT-100 terminal attaches to the serial port.

Switch board

The 16x16 switch chip and switch control logic reside on the GRF 1600 switch board. The switch board is field-replaceable, but not hot swappable. It is installed to the right of the control board in the central chamber.

Switch control

Each media card is on a switch port. Switch control manages media card requests to connect through the switch to the switch port occupied by a destination media card. Switch logic determines if the target port is available and, if it is, enables the connection. A special bus carries the request and grant traffic for available switch ports.

Battery

The control board has a small 3V lithium battery to store BIOS CMOS configuration and for powering the real time clock if the GRF is powered off.

⚠ **Caution:** Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Vorsicht: Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

Attention: Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

Backplane

The GRF 1600 backplane spans the width of the chassis and is fixed in place. The backplane is not a field replaceable unit.

The backplane supplies power to the media cards and control board. The control board and media cards exchange configuration and status information through the 80 megabit/second communications bus located on the backplane.

Communications bus

The communications bus (com bus) is a separate data path for configuration, control, monitoring functions. This bus connects the control board to the media cards independently of the switch connection to each card, and is not used for routed data between media cards. Route table update packets received by the media cards are also sent across the com bus to the router manager software and do not compete with normal IP data traffic.

System memory

Figure 2-4 illustrates the RAM and flash memory components on the GRF control board:

(g0001)
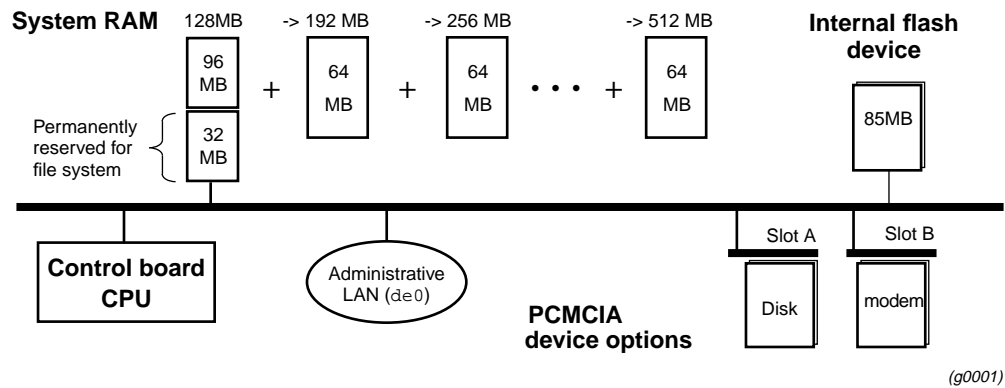
Figure 2-4. Memory components and options on the control board

RAM   The GRF 1600 is equipped with a minimum of 128MB internal RAM, 32MB of which are permanently reserved for the file system, including logs and configuration files. The remaining 96MB are used by the operating system and user applications such as GateD.

Figure 2-5 shows the area of system RAM that can be expanded to meet site requirements.
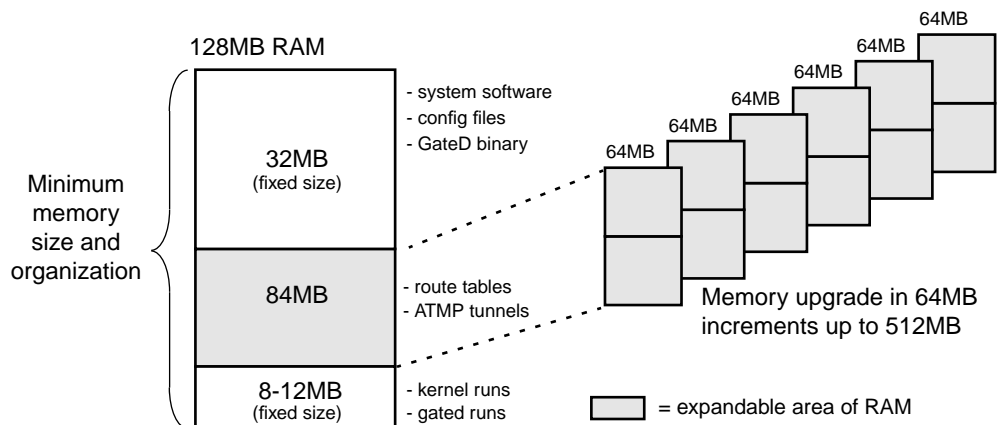
Figure 2-5. Expandable area of system memory

System memory can be upgraded in 64MB increments up to a total of 512MB, including the 32MB always reserved for the file system. To permit the software to operate in the allocated memory, certain portions of standard UNIX, such as man page files, are omitted. Man pages for GRF commands are maintained.

Because file system space is limited, you should configure logging to be done remotely via **syslog** or locally to external flash. Additional system memory supports route tables and other protocol data, and cannot be used for storing logs.

Internal flash   The GRF has an internal 85MB ATA flash device from which the system boots. This memory is available for storing different versions of operating software and site configurations.

External flash   PCMCIA slots on the control board support various sizes of ATA flash devices. Although external flash can be used to back up and share router configurations among multiple GRF systems, a GRF cannot boot from an external flash device. Local logging and dumping to external flash is also supported. The **grwrite** command writes files from system RAM to internal flash, **grsnapshot** copies files between internal and external flash devices. Commands for flash device management are discussed in the *GRF Configuration and management* manual.

PCMCIA devices   PCMCIA slot A is used for a portable external flash device. A PCMCIA modem device can operate in either slot A or B. Instructions for configuring the modem and a disk device are in chapter 4.

Power supply options

The GRF 1600 uses either AC or DC (negative 48VDC) power supplies. GRF systems are shipped with the power supply installed. Power supplies are housed at the bottom of the chassis in self-contained, self-cooled drawers. Visible from the cabling end of the chassis, power supply 1 (PS1 LED) is on the left, power supply 2 (PS2 LED) is on the right. In a non-redundant system, the single power supply unit can be installed in either 1 or 2, it does not matter. Only qualified personnel can service and replace GRF 1600 power supplies.

Two power supplies can be installed for redundancy. When two units are present, both are active, load-sharing devices. If one fails, the other unit ramps up to provide the full load. Each power supply has an LED (PS1, PS2) on the control board. If a unit failure occurs in a redundant system, the failed unit can be hot swapped out. The unit being removed must be unplugged or disconnected from its AC or DC power source.

Each power supply has an internal fan to cool that unit. Air is drawn in at the drawer front and exhausted out the rear of the drawer. If a power supply overheats, its internal regulators will shut the unit down.

Power supply failure notification

If a power supply fails, you will see failure messages on-screen at the user interface. The `gr.console` log file will also contain related messages. The amber PS1 or PS2 LED on the GRF 1600 control board will come on to indicate a power supply failure. If you do not already have a replacement unit, order one from Ascend.

Warning: A failed power supply must be replaced by certified personnel only.

Warnung: Das Netzteil darf nur von einer Fachkraft ausgewechselt werden.

Description of the AC power supplies

The GRF 1600 1100W AC power supply provides +48V to the fans and +5.0V to all media cards, control board, switch board, and backplane. Remember that the GRF 1600 chassis does not have a power on/off switch. When you plug the AC power supply cord into a live outlet, the GRF powers on and, since the software is already loaded, immediately begins to boot.

Figure 2-6 shows the front of an AC power supply drawer and its locking tab components.

Locking tab in down (unlocked) position

When locking tab is down, power plug cannot be inserted

Power supply air intake fan

CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.
ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.
ATTENTION: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

100-240V

Warning label is placed face-up on the horizontal edge below the intake fan.

Locking tab in up (locked) position

Drawer handle

Sliding plate

Finger lift

When locking tab is up, power plug can be inserted

Figure 2-6. Front of GRF 1600 AC power supply drawer and locking tab

AC drawer locking tab

The AC power supply drawers have a locking mechanisn that prevents anyone from removing a drawer while the unit has a power cord plugged in. Refer to the diagram below.

Before you plug the cord into the power supply, you can see that a plate covers part of the AC receptacle. You can easily slide this plate up to insert the cord. The locking tab stays up in the locked position and prevents the drawer from being pulled out while the power cord is plugged in.

The locking tab is at the top edge of the sliding plate. Immediately below the sliding plate and at either side of the receptacle are two small screws. These screws attach the AC receptacle to the drawer front. They also are used to attach a power cord clamp. The screws can be untightened 3 or 4 turns to allow the clamp to slide under, but they should never be fully removed.
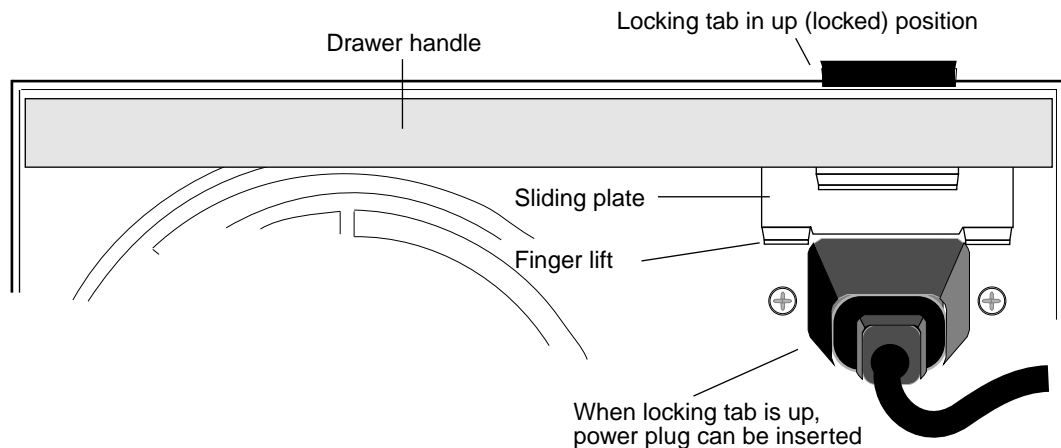
How to obtain a clamp

Ascend does not supply cord clamps. Clamps are available from the Panel Components Corporation, P/N 85910051, at (515) 673-5000.

AC power supply safety considerations

Caution: The power supplies contain hazardous voltages and energy levels.

- Do not attempt to service yourself. Refer all servicing to qualified personnel.
- Double-pole/neutral fusing.

Vorsicht: In den Netzteilen liegen Hochspannung und gefährliche Energiepegel an.

- Versuchen Sie nicht, das Gerät selbst zu warten. Alle Reparaturarbeiten sind von Fachkräften auszuführen.
- Zweipolige/Neutralleiter-Sicherung

Redundant AC supply safety considerations

If the GRF is equipped with redundant AC power supplies, please note the following when powering on (plugging in) and powering off (unplugging) the GRF unit:

Caution: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords. Care must be taken to correctly connect each power supply to separate AC power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollstandig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

The warning label shown in Figure 2-7 is required when a second power supply is installed in a pre-existing system to provide redundancy. When a GRF is shipped with a single power supply, this label is not on the power supply unit. If a customer orders a redundant power supply, a set of labels is included, along with instructions to attach a label to each unit.

CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.
ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.
ATTENTION: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.
100-240V

Figure 2-7. Warning label required for redundant supplies

The label is actually attached to the top edge of the fastening knob compartment at the bottom of the unit, facing upwards.

Minimum media card load requirement

Redundant GRF 1600 power supplies require a minimum load installed equal to two media cards. If the minimum media card load is not met, the supplies may generate false power supply failure messages. While the power supply units are not damaged during this condition, misleading error messages may be logged in `/var/log/grconsole.log`.

When redundant power supplies are installed in a GRF 1600 chassis, you must keep at least two media cards inserted to meet the minimum load requirement. Minimum load can be problematical when power supplies are operating in the redundant or current share mode, particularly on high current output supplies. It is recommended that the GRF 1600 only be operated with at least two media cards installed.

Description of the 48VDC power supplies

The GRF 1600 1100W DC power supply provides +48V to the fans and +5.0V to all media cards, and the control board, switch board, and backplane. Directions for attaching DC input wiring to the DC power supply are in chapter 3.

The GRF 1600 does not have a chassis-based power switch. Instead, each DC power supply has its own on/off switch. You cannot put the switch to on unless the power supply drawer is properly inserted into the chassis. The DC drawer has a locking tab that prevents the drawer from being pulled out while the switch is on. You must switch the power off and drop the locking tab down before you can remove a power supply. Refer to Figure 2-8.
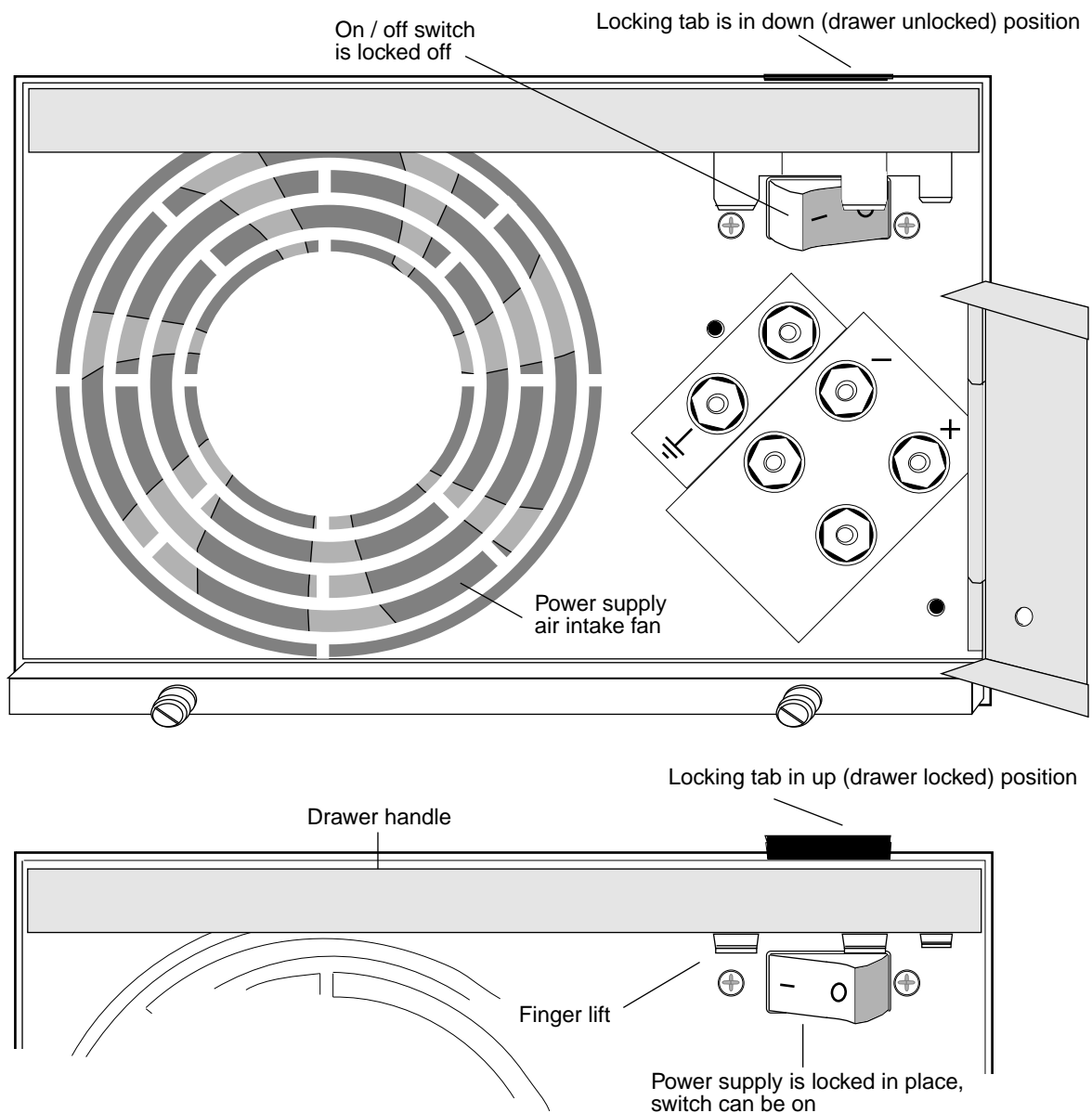
Figure 2-8. Front panel of GRF 1600 DC power supply

DC drawer locking tab

The DC power supply drawers have a locking mechanisn that prevents anyone from removing a drawer while the unit is powered on. Refer to Figure 2-8.

The locking tab is at the top edge of the sliding plate. When the power switch is on, the locking tab stays up in the locked position and prevents the drawer from being pulled out. When the power is switched off, the tab drops down and the power supply drawer can be removed.

DC power supply safety considerations

Caution: The power supplies contain hazardous voltages and energy levels.

- Do not attempt to service yourself. Refer all servicing to qualified personnel.

Vorsicht: In den Netzteilen liegen Hochspannung und gefährliche Energiepegel an.
- Versuchen Sie nicht, das Gerät selbst zu warten. Alle Reparaturarbeiten sind von Fachkräften auszuführen.

Redundant DC supply safety considerations

If the GRF is equipped with redundant DC power supplies, please note the following when powering on and powering off the GRF unit:

Caution: This unit has two power inputs. For total isolation from electrical shock and energy hazard, disconnect both supply inputs. Care must be taken to correctly connect each power supply to separate AC power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Stromeingänge. Um das Gerät vollständig vom Netz zu trennen, unterbrechen Sie den Anschluß mit beiden Eingängen, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux sources d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux sources d'alimentation.

Minimum media card load requirement

Redundant GRF 1600 power supplies require a minimum load installed equal to two media cards. If the minimum media card load is not met, the supplies may generate false power supply failure messages. While the power supply units are not damaged during this condition, misleading error messages may be logged in `/var/log/grconsole.log`.

When redundant power supplies are installed in a GRF 1600 chassis, you must keep at least two media cards inserted to meet the minimum load requirement. Minimum load can be problematical when power supplies are operating in the redundant or current share mode, particularly on high current output supplies. It is recommended that the GRF 1600 only be operated with at least two media cards installed.

Installation preview

Now that you are familiar with the GRF 1600, this page gives you a preview of the tasks you will do to install the GRF, and what the other chapters in this *Getting Started* manual cover:

1 Rack mount and ground the GRF chassis. *(chapter 3)*

2 Insert any additional media cards. The GRF is shipped with all ordered media cards installed, if you have others to install, insert them now. *(chapter 3)*

3 Attach a VT 100-compatible terminal or laptop PC to the serial port (RS-232) on the GRF control board. The terminal is used to enter the initial IP configuration information and to monitor system boot. Later you can connect the GRF to the administrative Ethernet and disconnect the terminal. *(chapter 3)*

4 Power on the GRF by plugging in the AC power supply or wiring the DC power supply.
The GRF has no on/off switch, and ships with software already loaded. When you apply current to the power supplies, the GRF begins to boot. Watch the control board LEDs to see the status of the system during and after boot. *(chapter 3)*

5 The first time a GRF is powered on, a configuration script automatically runs. The script prompts you to enter the router's system IP address and host name. You must supply this information to communicate with the GRF and to later connect the GRF to your administrative Ethernet. *(chapter 4)*
The script also prompts you to begin to configure remote logging by setting up a **syslog** server. If you choose to configure "local" logging to a PCMCIA device, just press the <Enter> key at those prompts.

6 Log in as root. Optionally, you can change the preset password for root. *(chapter 4)*

7 Configure logging, there are several options. Procedures to set up local PCMCIA and network logging are in this manual. *(chapter 4)*
Optionally, you can install and configure a PCMCIA modem connection to the GRF.

8 Connect the GRF maintenance Ethernet interface to your site's administrative LAN. Use the Ethernet connector on the control board. If you like, you can now disconnect the VT 100 terminal. *(chapter 4)*

9 Attach the media card cables. *(chapter 5)*

At the end of this manual, you are ready to configure the media card interfaces, network services, and protocols. This information is covered in the *GRF Configuration and Management* manual.

Rack Mount and Power On Procedures

3

Chapter 3 describes how to rack mount and power on the GRF routers. This includes AC and DC power supplies for the GRF 400 and GRF 1600.

This manual is organized so that you attach cables after power on and can watch the progress of the control board and media card LEDs for indications of normal or error conditions. Chapter 5 contains descriptions of all media card LEDs.

The chapter includes these topics:

Note:
The GRF 400 and GRF 1600 are static sensitive. An ESD wrist strap must be worn when you move or otherwise touch the chassis. Each chassis has a wrist strap ground site for connecting your wrist strap.

GRF 400

GRF 1600

Wrist strap grounding sites
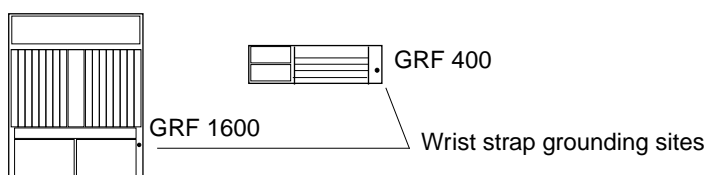
Rack mounting the GRF 400

Before you begin installing the GRF 400, make sure you have these items:

– A VT-100 terminal to attach to the control board RS-232 port

– A locally-connected host or workstation that can ping the GRF

– Media cables appropriate to the media cards that were ordered

– If applicable, any media cards that shipped separately

Servicing clearances

Media cards and power supply drawers are 16 inches long. You need three feet of working space to access and remove hot-swappable components at the GRF 400 cable panel.

Power and ground requirements

Caution: If using a power strip or similar supply, make sure the power requirements of the chassis, plus the cumulative power draw of any other equipment in the rack, do not overload the supply circuit.

Vorsicht: Wird ein Sammelstecker oder ähnlicher Netzanschluß verwendet, ist darauf zu achten, daß die Stromerfordernisse des Rahmens gemeinsam mit dem kumulativen Stromverbrauch anderer Geräte auf dem Regal den Versorgungsschaltkreis nicht überbelasten.

Warning: For safe operation, this equipment must be properly grounded.

– The chassis should be reliably earth grounded to the rack equipment.

– This earth ground connection must be maintained when supply connection is other than direct connection to the branch circuit.

Warnung: Zur Gewährleistung eines sicheren Betriebs muß dieses Gerät vorschriftsmäßig geerdet sein.

– Der Geräterahmen muß richtig am Regalbauteil geerdet sein.

– Dieser Masseanschluß muß bewahrt werden, wenn die Stromversorgung nicht direkt über den Anschluß an den Abzweigstromkreis erfolgt.

Rack-mounting requirements

If you are rack-mounting the GRF 400 base unit:

–   Always stack the rack from the bottom up to ensure a stable and safe rack.

–   The installation of GRF 400 and other units within the rack should not reduce the air flow within the rack. The maximum recommended ambient temperature for the GRF 400 is 40˚ C (104˚ F).

–   Make sure you have a two-unit air gap for cooling and cables between the GRF and any other equipment installed in the rack.

–   Determine that the cumulative power requirements of the GRF 400 plus other equipment in the rack do not overload the rack supply circuit and/or wiring.

Ventilation requirements

When installing, please consider the location of the GRF in relation to other devices located in an adjacent rack. Ensure that the GRF's air intake is not drawing directly upon heated air from another unit. Figure 3-1 shows air intake and exhaust areas. When you install the GRF, you must provide six to ten inches of side clearance.
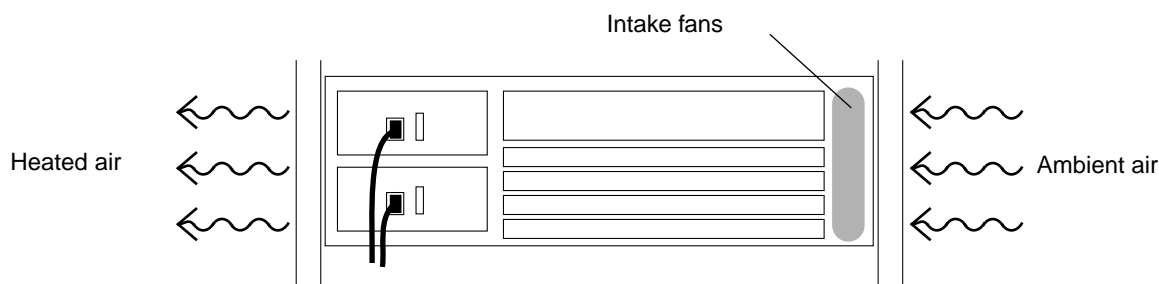
Figure 3-1. Air intake and exhaust areas of the GRF 400

Ventilation must comply with these requirements:

–   The installation of the GRF 400 and other units within the rack should not reduce the air flow within the rack. The maximum recommended ambient temperature for the GRF is 40˚ C (104˚ F).

–   Make sure you have a two-unit air gap for cooling and cables between the GRF and any other equipment in the rack.

What to do next...

With the chassis securely in place, the next step is to apply power to the GRF. Go to the section "Attaching a VT-100 terminal".

If you have media cards that are not installed in the GRF, install them first. Go on to the section, "Inserting a media card".

Rack mounting the GRF 1600

Before you begin installation, make sure you have these items:

– A VT-100 terminal to attach to the control board RS-232 port

– A locally-connected host or workstation that can ping the GRF

– Media cables appropriate to the media cards that were ordered

– If applicable, any media cards that shipped separately

Servicing clearances

Media cards and power supply drawers are 16 inches long. You need three feet of working space to access and remove hot-swappable components at the GRF 1600 cable panel.

Grounding

The GRF 1600 has a rack grounding terminal on the lower right side of the cable panel. Also on the right side, above the power supply units, there is a wrist strap ground receptacle.

Warning: For safe operation, this equipment must be properly grounded.

The chassis should be reliably earth grounded to the rack equipment.

This earth ground connection must be maintained when supply connection is other than direct connection to the branch circuit.

Warnung: Zur Gewährleistung eines sicheren Betriebs muß dieses Gerät vorschriftsmäßig geerdet sein.

Der Geräterahmen muß richtig am Regalbauteil geerdet sein.

Dieser Masseanschluß muß bewahrt werden, wenn die Stromversorgung nicht direkt über den Anschluß an den Abzweigstromkreis erfolgt.

Power requirements

Determine that the cumulative power requirements of the GRF 1600 plus other equipment in the rack do not overload the supply circuit and/or wiring of the rack.

Caution: If using a power strip or similar supply, make sure the power requirements of the chassis, plus the cumulative power draw of any other equipment in the rack, do not overload the supply circuit.

Vorsicht: Wird ein Sammelstecker oder ähnlicher Netzanschluß verwendet, ist darauf zu achten, daß die Stromerfordernisse des Rahmens gemeinsam mit dem kumulativen Stromverbrauch anderer Geräte auf dem Regal den Versorgungsschaltkreis nicht überbelasten.

Ventilation requirements

Ventilation must comply with these requirements:

– The installation of the GRF 1600 and other units within the rack should not reduce the air flow within the rack. The maximum recommended ambient temperature for the GRF is 40˚ C (104˚ F).

– Make sure you have a two-unit air gap for cooling and cables between the GRF and any other equipment in the rack.

Additionally, please consider the location of the GRF 1600 in relation to other devices located in an adjacent rack. Ensure that the GRF's air intake is not drawing directly upon heated air from another unit. Figure 3-2 shows air intake and exhaust areas. When you install the GRF, you must provide six to ten inches of side clearance.
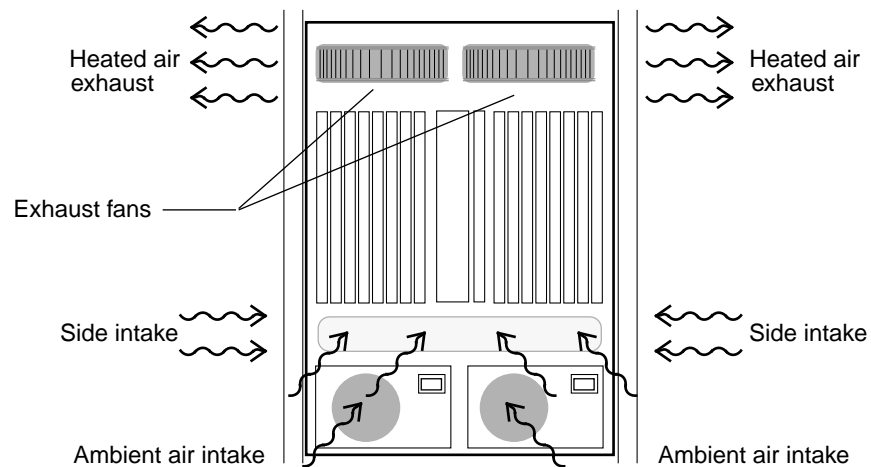
Figure 3-2. Air intake and exhaust areas of the GRF 1600

Rack depth

If the media cards require flat cables, the minimum rack depth required to install a GRF 1600 is 26" (66.7 cm), and the rack must be EMI/RFI shielded.

If the media cards require round, shielded cable, the minimum rack depth should be 27" (69 cm).

Side rails

– If you rack-mount the GRF 1600, Ascend recommends you install side rails in the rack before attempting to insert a GRF 1600. Side rails support the 107-124 pound unit as the team inserts the chassis and fastens it to the rack. The internal width of the GRF 1600 chassis is 17.375" (44.1 cm).

Rack-mounting procedure

ALWAYS stack the rack from the bottom up to ensure a stable and safe rack.

⚠

Caution: Because of its weight, installing the GRF 1600 into a rack requires a two-person team.

Vorsicht: Aufgrund seines Gewichts sind zur Installation des GRF 1600 auf dem Regal zwei Personen erforderlich.

You need two people to safely maneuver the GRF 1600 into a standard 19" rack. First, make sure the rack will not roll or otherwise move. One person should stand on each side of the chassis. Use the handholds on the chassis side to carry the weight of the unit.

This stick figure drawing illustrates how to support the chassis as you insert it.

– Both people use the handholds to carry most of the weight.

– The person on the left keeps their other hand under the front of the chassis, supporting the weight and making sure it doesn't tip down.

– The person on the right has their other hand on the top of the unit, keeping the unit properly balanced.
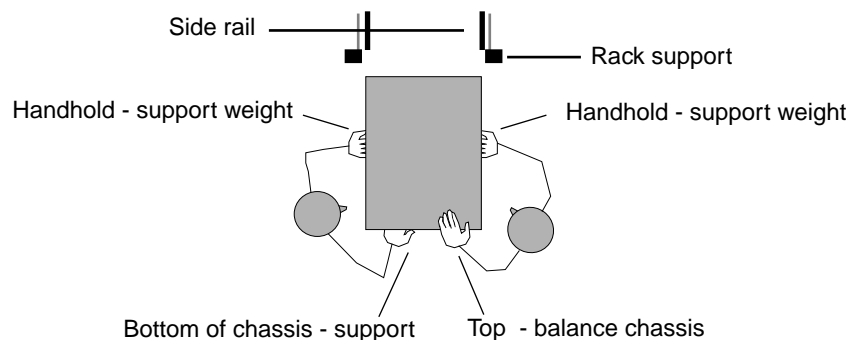
Figure 3-3. Diagram of proper way to move GRF 1600 into rack

To start, position the lower edges of the chassis on the side rails. Slide the chassis in until the hands using the handholds are at the rack support with the side rails supporting the GRF weight. Let go of the handholds, push the chassis in three or four inches till the handholds are past the rack supports, then use the handholds as necessary to push the chassis all the way in.

What to do next...

With the chassis securely in place, the next step is to apply power to the GRF. Go to the section "Attaching a VT-100 terminal."

If you have media cards that are not installed in the GRF, install them first. Go on to the next section, "Inserting a media card".

Inserting a media card

Note: To operate properly, a GRF 400 should have at least one media card installed. The GRF 1600 requires that a minimum of two media cards be installed. Also, a face plate cover must be installed in any unused slot to maintain cooling flows.

Media cards are actually two logic boards joined to make a single component. As shown in Figure 3-4, the smaller board on the right is the serial interface, also called the serial daughter card. The larger one on the left is the media board and has the network ports. Together they comprise a GRF media card.

The media card serial and part numbers are printed at the lower edge of the card, near the bottom finger grip/extractor.
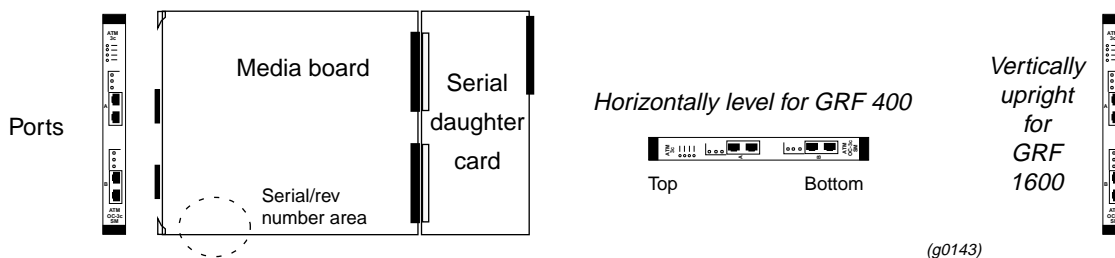
Figure 3-4. Media card components

The boards are joined by two 100-pin connectors and reinforcing plates. Even so, this joint retains some flex and must be carefully supported, especially when inserting the media card into a chassis.

Warning: The backplanes of both the GRF 400 and the GRF 1600 contain hazardous energy levels.

When replacing a media card, remove only one card at a time. Removing more than one card will expose the operator to this energy hazard.

Warnung: An den Rückwandplatinen des GRF 400 und GRF 1600 liegen gefährliche Hochspannungen ab.

Zum Auswechseln der Medienkarte jeweils nur eine Karte entfernen. Bei zwei gleichzeitig entfernten Karten ist der Bediener gefährlichen Spannungen ausgesetzt.

ESD requirements

⚠️ **Caution:** GRF media cards are hot swappable and can be installed when the GRF is running. However, media card are highly susceptible to damage from electrostatic discharge, you must wear a grounded, conductive wrist strap anytime you handle a media card.

Wear a grounded, conductive wrist strap when removing, replacing, and/or handling individual electronic components. Make sure the metallic elements in the band directly touch your exposed skin.
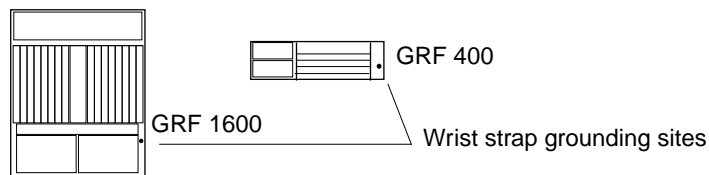
GRF 400

GRF 1600

Wrist strap grounding sites

Insertion procedure

1 When you are properly grounded, remove the media card from its anti-static container.

2 Hold the media card with the network ports facing you.

GRF 400

Turn the card horizontal, the top of the media card should be on the left, the bottom of the card should be on the right. As you start, make sure you visually identify the left and right guide pair for this particular slot.

Keeping the media card horizontally level, insert the card fully into the slot, you will feel the card joining with the 100-pin connector on the backplane.

GRF 1600

As you start, make sure you visually identify the top and bottom guide pair for this particular slot. Have one hand under the card, lightly supporting its weight. Rest just the edge of the bottom corner of the card in the bottom guide. Then, bring the top edge of the card into the top guide. This will help you keep the card level as you slide it in.

Keeping the media card vertically upright, insert the card fully into the slot.

You will feel the card joining with the 100-pin connector on the backplane.

3 When fully inserted, the card's face plate should be flush against the chassis back panel.

Note: Do not force the card into the slot. Doing so can damage the card or slot connector.

4 Tighten the screws at each end of the face plate.

Attaching a VT-100 terminal

You must connect the VT-100 compatible terminal to the control board's RS-232 serial port BEFORE you power on the GRF. After the system boots, you will enter system IP and host name configuration information in the first time power on script from the terminal. This task is described in chapter 4.

You can stay at the terminal to perform the rest of the system configuration or you can connect the GRF to the administrative Ethernet and continue configuration from there. After the GRF can be accessed from the administrative Ethernet, the serial connection is no longer required.
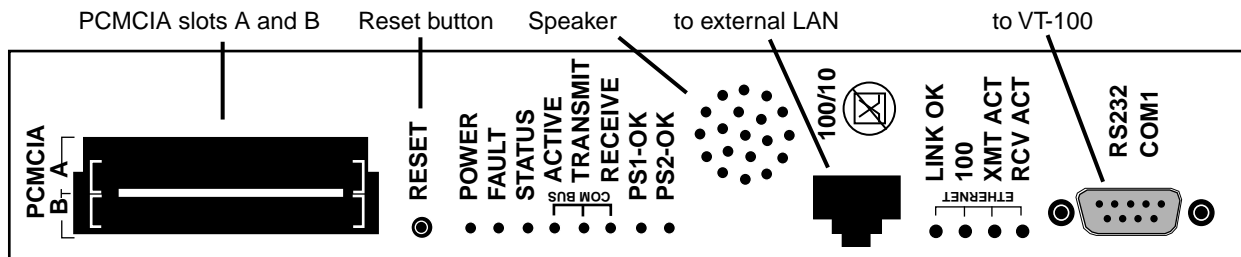
Figure 3-5. Connectors on a control board

As shown in Figure 3-5, the control board provides multiple connection sites. Use a null modem cable (console cross-over cable) to attach the terminal to the RS-232 serial connector site. (A GRF 400 control board is shown here, the GRF 1600 serial port is the same.)

VT-100 terminal settings

Terminal settings are 9600 bits/second, 8-bits, no parity, 1 stop bit

Laptop PC

You can attach a laptop PC that meets the following requirements:

– Windows 3.11 or Windows/NT operating system

– a VT 100 terminal emulation program set to the proper communication port

– settings of 9600 bits/second, 8-bits, no parity, 1 stop bit

What to do next...

With the terminal attached to the serial port, go on to "Powering on the GRF 400" or "Powering on the GRF 1600".

Powering on the GRF 400

As described earlier in this chapter, the initial start-up of the GRF requires a directly-attached terminal for logging in as `root`. This terminal should be connected before you power on the GRF so you can monitor the start up and boot messages that begin immediately.

The GRF 400 is powered by either AC or negative 48V DC power supplies.

This section includes procedures for both types of power supply:

   –   applying power to AC power supplies

   –   wiring and applying power to DC power supplies

The GRF chassis does not have a power on/off switch. When the power cord is plugged in to a power outlet or when the DC wiring set is connected to a source supply, the GRF is powered on. It takes a few seconds for the power supply(s) to cycle before power is supplied to the back panel and the media cards.

When the GRF is powered on, it begins to boot. You can see the boot messages displayed on the VT-100 screen. As it boots, the GRF runs a series of internal diagnostics. The first time a GRF is powered on, the boot process runs a system configuration script. In this script you assign the GRF a host name, configure the maintenance Ethernet, and optionally specify a **syslog** server. The GRF supports remote logging via a **syslog** server as well as local logging (and dumps) to an external flash device.

Media cards will boot automatically and come up ready to operate.

The speaker on the control board faceplate emits audible beeps as the board boots.

Redundant power supplies

Installing redundant power supplies ensures against failures of individual units in the chassis. If possible, attach each power supply into a different power source.

Power supply failure notification

If a GRF power supply fails, you will see failure messages on-screen at the user interface. The `gr.console` log file will also contain related messages. The PS1 or PS2 amber LED on the control board will light, indicating a power supply failure. If you do not already have a replacement unit, order one from Ascend.

Warning: A failed power supply must be replaced by certified personnel only.

Warnung: Das Netzteil darf nur von einer Fachkraft ausgewechselt werden.

Interpreting GRF 400 control board LEDs

Watch the control board LEDs as the GRF powers up. Figure 3-6 shows the LEDs on the control board face plate. Table 3-1 has a description of each LED including start-up activity.
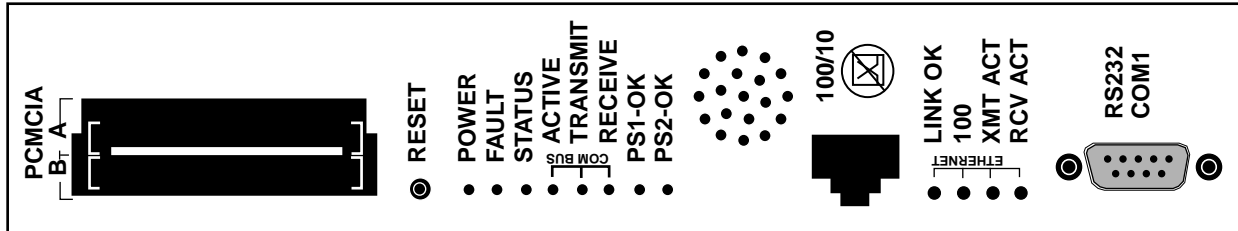
Figure 3-6. GRF 400 control board faceplate and LEDs

Table 3-1. Descriptions of GRF 400 control board LEDs

LED	Description
POWER	This green LED is on when the GRF power is on.
FAULT	This amber LED flashes once as the board starts self-test; then flashes once again when self-test completes. If the Fault LED turns on and remains on, an error condition has been detected.
STATUS	This green LED is on and flashes a "heartbeat" during positive board operation.
COM BUS ACTIVE	This green LED flashes during bus activity.
COM BUS TRANSMIT	This green LED flashes during bus activity.
COM BUS RECEIVE	This green LED flashes during bus activity.
PS1-OK	This green LED is on when power supply 1 is operating at required level. If the power supply fails, the LED goes off.
PS2-OK	This green LED is on when power supply 2 is operating at required level. If the power supply fails, the LED goes off.
LINK OK	This green LED is on while the Ethernet connection from the control board is good.
100	This green LED is on when the Ethernet is in 100Base-T mode. The LED is off under 10Base-T mode.
XMT ACT	This green LED flashes while data is sent to the management software.
RCV ACT	This green LED flashes while data is received from the management software.

During start-up, media card "PWR" LEDs come on green. This manual is organized so that you attach cables after power on and can watch the progress of each card's LEDs for indication of normal or error conditions. Chapter 5 contains descriptions of all media card LEDs.

Applying AC power to the GRF 400

The GRF 400 does not have an on/off switch. Therefore, you must first plug the power cord into the AC power supply BEFORE you plug the cord into a wall or other receptacle.

Caution: The power supplies contain hazardous voltages and energy levels.

- Do not attempt to service a unit yourself. Refer all servicing to qualified personnel.

- Double-pole/neutral fusing.

- For continued protection against risk of fire, replace only with the same type and rating of fuses. Replace F3 and F4 only with recognized 6.3A, 250V, fast-acting fuses. Replace F5 only with 5.0A, 250V, fast-acting fuse.

Vorsicht: In den Netzteilen liegen Hochspannung und gefährliche Energiepegel an.

- Versuchen Sie nicht, das Gerät selbst zu warten. Alle Reparaturarbeiten sind von Fachkräften auszuführen.

- Zweipolige/Neutralleiter-Sicherung

- Nur mit Sicherungen des gleichen Typs und der gleichen Leistung ersetzen, um jegliche Feuergefahr zu vermeiden. F3 und F4 nur mit anerkannten Schnellsicherungen mit 6,3 A, 250 V, ersetzen. F5 nur mit Schnellsicherungen mit 5,0 A, 250 V, ersetzen.

Plug-in steps

Here are the plug-in steps for AC power supplies shipped in your GRF 400:

1   Start with the AC power cord NOT plugged into the power source.

2   Check that the power supply unit is pushed fully into the chassis.

3   Connect the power cord into the AC receptacle on the power supply drawer.

4   Last, plug the power cord into the appropriate rack or wall outlet.

A note about redundant AC supplies

When the GRF 400 is equipped with redundant AC power supplies, please note the following when powering on (plugging) or powering off (unplugging) the GRF unit:

Caution: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords. Care must be taken to correctly connect each power supply to separate AC power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

Labeling a redundant AC power supply

The warning label shown in Figure 3-7 is required when a second power supply is installed in a pre-existing system to provide redundancy. When a GRF is shipped with a single power supply, this label will not be on the power supply unit. If a customer orders a redundant power supply, a set of labels is included, along with instructions to attach a label to each unit.

Astec label

!

CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.

ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.

Artesyn label

100-240V

CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.

ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.

ATTENTION: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

Figure 3-7. Warning label required for redundant AC supplies

Replacing a redundant AC power supply

If you need to replace one of a redundant set of AC power supplies, remember that there are incompatibilities between two brands of AC power supplies used in GRF 400s. You must make sure that you do not mix Astec and Artesyn units.

Specific information about and an illustration of each type of AC unit are provided in chapter 1, please refer to that chapter before you order or install a replacement unit.

What to do next...

With the terminal attached to the serial port and AC power applied to the GRF 400, the system has automatically booted. Go to the next chapter. Chapter 4 describes the first-time configuration script and initial system tasks that bring the GRF to an operational state, ready for media card cabling and verification.

Applying DC power to the GRF 400

Site installation requirements

⚠

Warning: The DC power supply must be installed only in restricted access areas (dedicated equipment rooms, equipment closets, or the like) in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70.
Connect to a 48V DC source which is electrically isolated from the AC source and which is reliably connected to earth.

This equipment is designed to permit the connection of the grounded conductor of the DC supply circuit to the grounding conductor at the equipment. If this connection is made, all of the following conditions must be met:

- This equipment shall be connected directly to the DC supply system grounding electrode conductor or bonding jumper from a grounding terminal bar or bus to which the DC supply system grounding electrode conductor is connected.

- This equipment shall be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the grounded conductor of the same DC supply circuit and the grounding conductor, and also the point of grounding of the DC system. The DC system shall not be grounded elsewhere.

- The DC supply source is to be located within the same premises as the equipment.

- There shall be no switching or disconnecting devices in the grounded circuit conductor between the DC source and the point of connection of the grounding electrode conductor.

- All DC input wiring shall be routed away from any sharp edges and properly secured in place to prevent chaffing and to provide strain relief. This may be achieved by tie wrapping the wires to the rack frame or by equivalent means.

⚠

Warning: A readily accessible disconnect device must be provided in the fixed wiring for a DC power supply. It must be suitable for the rated voltage and current specified.

Warnung: In der Festverdrahtung für ein Gleichstromnetzteil muß ein leicht zugänglicher Trennschalter vorgesehen werden. Er muß für die angegebene Nennspannung und den Nennstrom geeignet sein.

DC terminals

Figure 3-8 shows the four terminals on the front of the -48V DC (negative) power supply drawer. Ascend ships the DC unit fitted with an aluminum cover over the terminal area. The cover is flipped up to attach the DC input wiring. After the DC unit is properly wired, you must also secure the cover using the two screws.

Please read through the steps before you begin, refer to Figure 3-8 as you review.
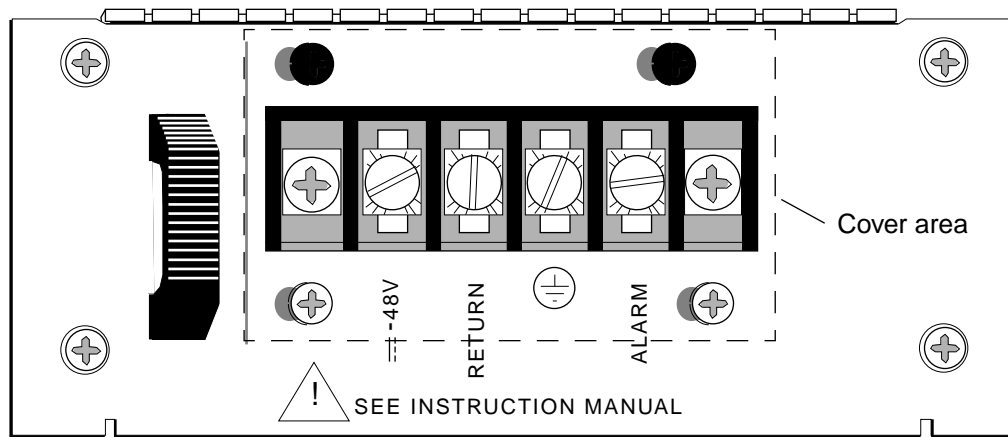
Figure 3-8. Front of -48V power supply drawer.

Caution: The first terminal on the left is a NEGATIVE 48V. The second terminal from the left is NEGATIVE 48V Return.

Vorsicht: Der erste Anschluß links ist 48V MINUS. Der zweite Anschluß von links ist die Rückleitung mit 48V MINUS.

When you connect DC wires, remember that the first terminal on the left is NEGATIVE 48V. The second terminal from the left is NEGATIVE 48V "RETURN."

If you connect the two DC wires incorrectly, you blow the input fuses —the DC power supply will not work now. The power supplies may only be serviced by a qualified trained service technician.

Always connect a protective earth ground to the terminal with this label:

Site alarm option

The right-most terminal, labeled "ALARM", enables you to attach the DC power supply to a site alarm unit. If power fails to reach the backplane of the GRF 400, an internal relay activates and applies the RETURN for the -48V to the site alarm terminal. This output is fused at 0.5A. When wiring this output, use only UL-recognized terminal lug and conductor suitably rated for the voltage and current.

Wiring procedure

Here are the steps to attach a wire set to a GRF 400 DC power supply:

1   Do not have the DC wire set attached to a power source.

The GRF 400 does not have an on or off switch, and a "live" wire will immediately apply power. Shut off the DC source before you begin to attach any wires.

2   Check that the power supply drawers are pushed fully into the chassis. Undo the two screws from the aluminum cover and flip the cover back.

3   Attach wires in this order:

a. Connect a protective earth ground to the terminal with this symbol:

b. Attach the negative 48V wire to the first terminal on the left, it is marked "-48V."

c. Attach the negative 48V return to the terminal marked "RETURN."

When you connect DC wires, remember that the first terminal on the left is NEGATIVE 48V. The second terminal from the left is NEGATIVE 48V "RETURN". If you connect the two DC wires incorrectly, you blow the input fuses —the DC power supply will not work now. The power supplies may only be serviced by a qualified trained service technician.

4   If you are connecting the GRF to a site alarm unit, connect the alarm unit to the right-most terminal, labeled "ALARM." If power fails to reach the backplane of the GRF 400, an internal relay activates and applies the RETURN for the -48V to the site alarm terminal. This output is fused at 0.5A.

5   Flip the cover back down and replace the two screws.

6   Connect the DC wire set connector to the power source. The GRF will start up and boot.

Fuses

Caution: The power supplies contain hazardous voltages and energy levels.

- Do not attempt to service a unit yourself. Refer all servicing to qualified personnel.
- Double-pole/neutral fusing.
- For continued protection against risk of fire, replace only with the same type and rating of fuses. Replace F3 and F4 only with recognized 10.0A, 250V, fast-acting fuses. Replace F5 only with 0.5A, 250V, fast-acting fuse.

Vorsicht: In den Netzteilen liegen Hochspannung und gefährliche Energiepegel an.

- Versuchen Sie nicht, das Gerät selbst zu warten. Alle Reparaturarbeiten sind von Fachkräften auszuführen.
- Zweipolige/Neutralleiter-Sicherung
- Nur mit Sicherungen des gleichen Typs und der gleichen Leistung ersetzen, um jegliche Feuergefahr zu vermeiden. F3 und F4 nur mit anerkannten Schnellsicherungen mit 10,0 A, 250 V, ersetzen. F5 nur mit Schnellsicherungen mit 0,5 A, 250 V, ersetzen.

Redundant DC supply safety considerations

The notice shown below appears on the lower edge of the GRF 400 DC power supply:

⚠ SEE INSTRUCTION MANUAL

and refers to the following caution:

If the GRF is equipped with redundant DC power supplies, please note the following when powering off (disconnecting) the GRF unit:

Caution: This unit has two power inputs. For total isolation from electrical shock and energy hazard, disconnect both power inputs. Care must be taken to correctly connect each power supply to separate power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Stromeingänge. Um das Gerät vollständig vom Netz zu trennen, unterbrechen Sie den Anschluß mit beiden Eingängen, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux sources d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux sources d'alimentation.

What to do next...

With the terminal attached to the serial port and DC power applied to the GRF 400, the system has automatically booted. Go to the next chapter. Chapter 4 describes the first-time configuration script and initial system tasks that bring the GRF to an operational state, ready for media card cabling and verification.

Powering on the GRF 1600

As described earlier in this chapter, the initial start-up of the GRF requires a directly-attached terminal for logging in as root. The terminal should be connected BEFORE you power on the GRF so you can monitor the start up and boot messages that begin immediately. The GRF 1600 is powered by either 1100W AC or negative 48V DC power supplies.

This section includes procedures for both types of power supply:

– applying power to AC power supplies

The GRF chassis does not have a power on/off switch. The AC power supply does not have an on/off switch. As a result, when the AC power cord is plugged in to a power outlet, the GRF is powered on. It takes a few seconds for the power supply(s) to cycle before power is supplied to the back panel and the media cards.

– wiring and applying power to DC power supplies

A GRF 1600 DC power supply does have a power on/off switch on its front panel. After the DC wiring set is attached and carries current, this switch controls the application of current to the DC power supply.

When the GRF is powered on, it begins to boot. You can see the boot messages displayed on the terminal screen. As it boots, the GRF runs a series of internal diagnostics. The first time a GRF is powered on, the boot process runs a system configuration script. In this script you assign the GRF a host name, configure the maintenance Ethernet, and optionally specify a **syslog** server. The GRF supports remote logging via a **syslog** server as well as local logging (and dumps) to an external flash device.

Media cards will boot automatically and come up ready to operate.

The speaker on the control board faceplate emits audible beeps as the board boots.

Redundant power supplies

Installing redundant power supplies ensures against failures of individual units in the chassis. If possible, attach each power supply into a different power source.

Power supply failure notification

If a GRF 1600 power supply fails, you will see failure messages on-screen at the user interface. The gr.console log file will also contain related messages. The PS1 or PS2 amber LED on the control board will light, indicating a power supply failure. If you do not already have a replacement unit, order one from Ascend.

Warning: A failed power supply must be replaced by certified personnel only.

Warnung: Das Netzteil darf nur von einer Fachkraft ausgewechselt werden.

Interpreting GRF 1600 control board LEDs

Watch the control board LEDs as the GRF powers on. Figure 3-9 shows the LED table of options. Table 3-2 has a description of each LED, including any start-up activity.
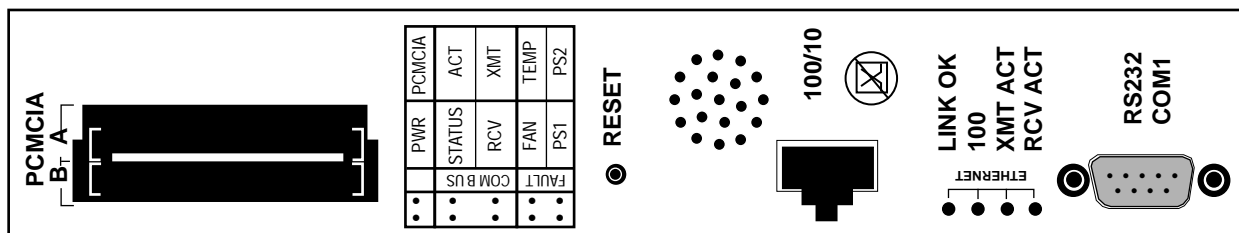
Figure 3-9. GRF 1600 control board faceplate and LEDs

Table 3-2. Descriptions of GRF 1600 control board LEDs

LED	Description
POWER	This green LED is on when the GRF power is on.
PCMCIA	This green LED lights when either PCMCIA slot is in use.
STATUS	This green LED is on and flashes a "heartbeat" once a second during positive board operation.
ACT	This green LED flashes during com bus activity.
RCV	This green LED flashes during com bus activity.
XMT	This green LED flashes during com bus activity.
FAN	This amber LED is off during normal fan operation. FAN comes on when either Fan1 or Fan2, or both, failed.
TEMP	This amber LED remains off while temperature level is acceptable. TEMP comes on if operating temperature level is exceeded. You will also hear an alarm.
PS1 and PS2	This amber LED is on when a power supply failure is detected. The LED is normally off when the power supply is operating correctly.
LINK OK	This green LED is on while the Ethernet connection from the control board is good.
100	This green LED is on while the 100BaseT link is operating and off under 10Base-T mode.
XMT ACT	This green LED flashes while data is sent to admin node.
RCV ACT	This green LED flashes as data is received from admin node.

During start-up, media card "PWR" LEDs come on green. This manual is organized so that you attach cables after power on and can watch the progress of each card's LEDs for signs of normal or error conditions. Chapter 5 contains descriptions of all media card LEDs.

Applying AC power to the GRF 1600

The GRF 1600 chassis does not have an on/off switch. Therefore, plug the AC power cord into the unit's AC power supply BEFORE you plug the cord into a wall or other receptacle.

You can obtain and install a power cord locking clamp to prevent the power cord from being accidentally pulled out of the AC power supply.

⚠ **Caution:** The power supplies contain hazardous voltages and energy levels.

• Do not attempt to service a unit yourself. Refer all servicing to qualified personnel.

• Double-pole/neutral fusing.

• For continued protection against risk of fire, replace only with the same type and rating of fuses. Replace F3 and F4 only with recognized 6.3A, 250V, fast-acting fuses. Replace F5 only with 5.0A, 250V, fast-acting fuse.

Vorsicht: In den Netzteilen liegen Hochspannung und gefährliche Energiepegel an.

• Versuchen Sie nicht, das Gerät selbst zu warten. Alle Reparaturarbeiten sind von Fachkräften auszuführen.

• Zweipolige/Neutralleiter-Sicherung

• Nur mit Sicherungen des gleichen Typs und der gleichen Leistung ersetzen, um jegliche Feuergefahr zu vermeiden. F3 und F4 nur mit anerkannten Schnellsicherungen mit 6,3 A, 250 V, ersetzen. F5 nur mit Schnellsicherungen mit 5,0 A, 250 V, ersetzen.

Plug-in steps

Here are the power on steps with AC power supplies installed in your GRF 1600:

1 Start with the AC power cord NOT plugged into the power source.

2 Check that the power supply drawer is pushed fully into the GRF chassis.

3 If you are using a locking clamp to secure the power cord, refer to the next section, "Installing a power cord locking clamp", for instructions to install the clamp.

4 Connect the power cord into the AC receptacle on the power supply drawer.

5 Last, plug the power cord into the appropriate rack or wall outlet.

Installing a power cord locking clamp

⚠ **Warning:** If the power supply is equipped with a power cord clamp, the socket outlet must be located near the equipment and shall be easily accessible. The power cord shall have a maximum length of 3 meters (10 feet).

This warning is important because in an emergency, the only safe way to remove power from the GRF is to unplug it at the wall or socket outlet. In effect, if a clamp is used, the wall or socket outlet serves as the GRF's AC disconnect.

Warnung: Wenn das Netzteil mit einer Netzkabelklemme ausgestattet ist, muß sich die Steckdose nahe dem Gerät befinden und leicht zugänglich sein. Das Netzkabel darf nicht länger als 3 m sein.

Dieser Warnhinweis ist sehr wichtig, da die Stromversorgung des GRF in einem Notfall nur durch Herausziehen des Netzsteckers von der Wandsteckdose getrennt werden kann. Bei Verwendung einer Klemme dient die Wandsteckdose oder Steckdose zum Ausschalten des GRF.

Figure 3-10 shows the clamp itself and also as it installed on the AC power supply drawer.
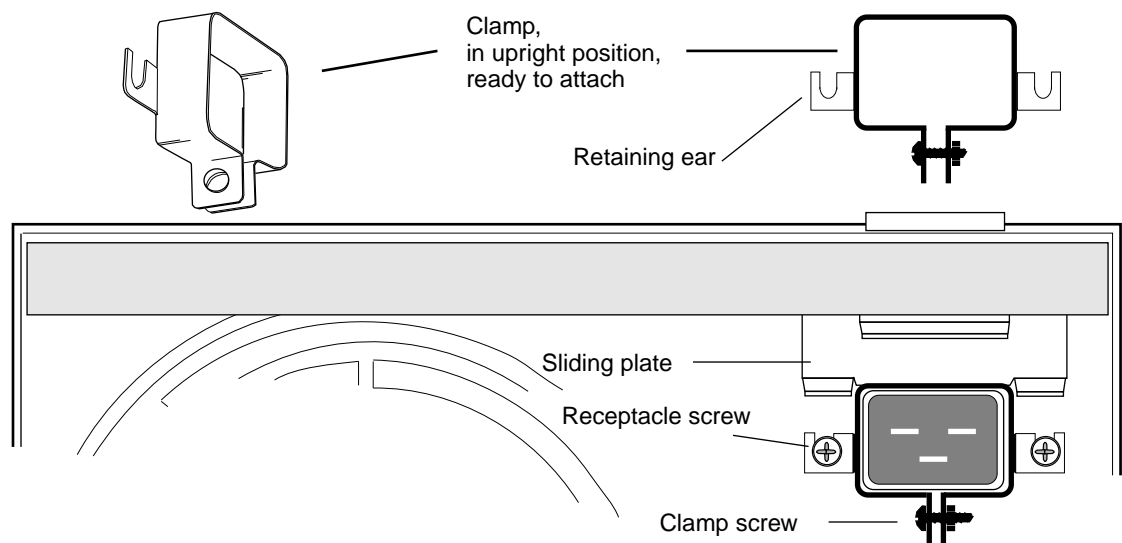
Figure 3-10. AC power supply with a power cord locking clamp installed

A receptacle screw is on each side of the AC receptacle on the power supply unit. The primary purpose of these screws is to attach the AC receptacle to the drawer front. They can also be used to attach a power cord clamp.

The screws can be untightened 3 or 4 turns, enough to slide the clamp under, but should NEVER be fully removed since their primary purpose is to hold the AC receptacle unit in place. DO NOT COMPLETELY REMOVE THE SCREWS.

Install the cord clamp before you plug the cord into either the GRF or the outlet.

Clamp procedure

1   First, slip the clamp over the cord connector, then lift the sliding plate and plug in the connector.

2   Loosen the receptacle screws just far enough to slide the clamp retaining ears underneath. DO NOT COMPLETELY REMOVE THE SCREWS.

3   Tighten the screws.

4   Now you can plug the cord into the AC source.

How to obtain a clamp

Ascend does not supply cord clamps. Clamps are available from the Panel Components Corporation, P/N 85910051, at (515) 673-5000.

A note about redundant AC supplies

When the GRF 1600 is equipped with redundant AC power supplies, please note the following when powering on (plugging in) or powering off (unplugging) the GRF unit:

Caution: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords. Care must be taken to correctly connect each power supply to separate AC power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

Labeling a redundant AC power supply

The warning label shown in Figure 3-11 is required when a second power supply is installed in a pre-existing system to provide redundancy. When a GRF is shipped with a single AC power supply, this label will not be on the power supply unit. If a customer orders a redundant AC power supply, a set of labels is included, along with instructions to attach a label to each unit.

CAUTION: This unit has two power supply cords.   For total isolation from electrical shock and energy hazard, disconnect both supply cords.
ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.
ATTENTION: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

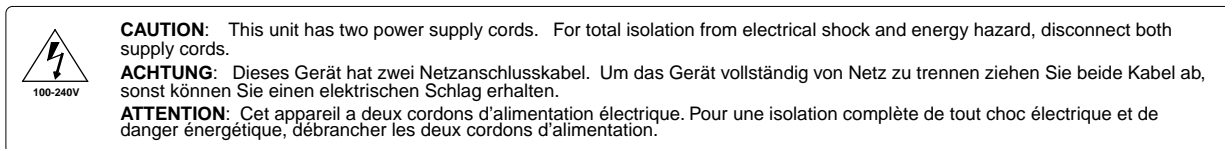*Figure 3-11. Warning label required for redundant supplies*

What to do next...

With the terminal attached to the serial port and AC power applied to the GRF 1600, the system has automatically booted. Go to the next chapter. Chapter 4 describes the first-time configuration script and initial system tasks that bring the GRF to an operational state, ready for media card cabling and verification.

Applying DC power to the GRF 1600

Site installation requirements

⚠️ **Warning:** The DC power supply must be installed only in restricted access areas (dedicated equipment rooms, equipment closets, or the like) in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70.

Connect to a 48V DC source which is electrically isolated from the AC source and which is reliably connected to earth.

This equipment is designed to permit the connection of the grounded conductor of the DC supply circuit to the grounding conductor at the equipment. If this connection is made, all of the following conditions must be met:

• This equipment shall be connected directly to the DC supply system grounding electrode conductor or bonding jumper from a grounding terminal bar or bus to which the DC supply system grounding electrode conductor is connected.

• This equipment shall be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the grounded conductor of the same DC supply circuit and the grounding conductor, and also the point of grounding of the DC system. The DC system shall not be grounded elsewhere.

• The DC supply source is to be located within the same premises as the equipment.

• There shall be no switching or disconnecting devices in the grounded circuit conductor between the DC source and the point of connection of the grounding electrode conductor.

• All DC input wiring shall be routed away from any sharp edges and properly secured in place to prevent chaffing and to provide strain relief. This may be achieved by tie wrapping the wires to the rack frame or by equivalent means.

⚠️ **Warning:** A readily accessible disconnect device must be provided in the fixed wiring for a DC power supply. It must be suitable for the rated voltage and current specified.

Warnung: In der Festverdrahtung für ein Gleichstromnetzteil muß ein leicht zugänglicher Trennschalter vorgesehen werden. Er muß für die angegebene Nennspannung und den Nennstrom geeignet sein.

⚠️ **Caution:** The power supplies contain hazardous voltages and energy levels.

• Do not attempt to service a unit yourself. Refer all servicing to qualified personnel.

Vorsicht: In den Netzteilen liegen Hochspannung und gefährliche Energiepegel an.

• Versuchen Sie nicht, das Gerät selbst zu warten. Alle Reparaturarbeiten sind von Fachkräften auszuführen.

DC terminals

Ascend ships the DC unit fitted with an aluminum cover over the terminal area. Remove the two screws securing the cover to attach the DC input wiring. After the DC unit is properly wired, you must close the cover and replace the two screws.

Figure 3-12 shows the three terminal pairs on the front of the 48V DC (negative) power supply drawer. The NEGATIVE 48V and POSITIVE 48V terminal pairs are circled.

⚠ **Warning:** If you connect the NEGATIVE and POSITIVE DC wires incorrectly, damage to the power supply may result and it will not function. The power supplies may only be serviced by a qualified trained service technician.

Wiring the DC supply

Before you begin, please read through the steps and refer to Figure 3-12 and Figure 3-13.

Wire and lug requirements:

- Use AWG #6 stranded copper wire.
- Use two-hole, short barrel copper lugs with 1/4 inch stud
  —Thomas & Betts, P/N 54205, or equivalent.
- Wire and lug must be UL Recognized and CSA Certified.
- Crimp wire and barrel using the correct crimping tool, Thomas & Betts hand crimper P/N TBM20S, or a crimper specified for use with equivalent lug.

Always connect a protective earth ground to the terminal pair with this label:
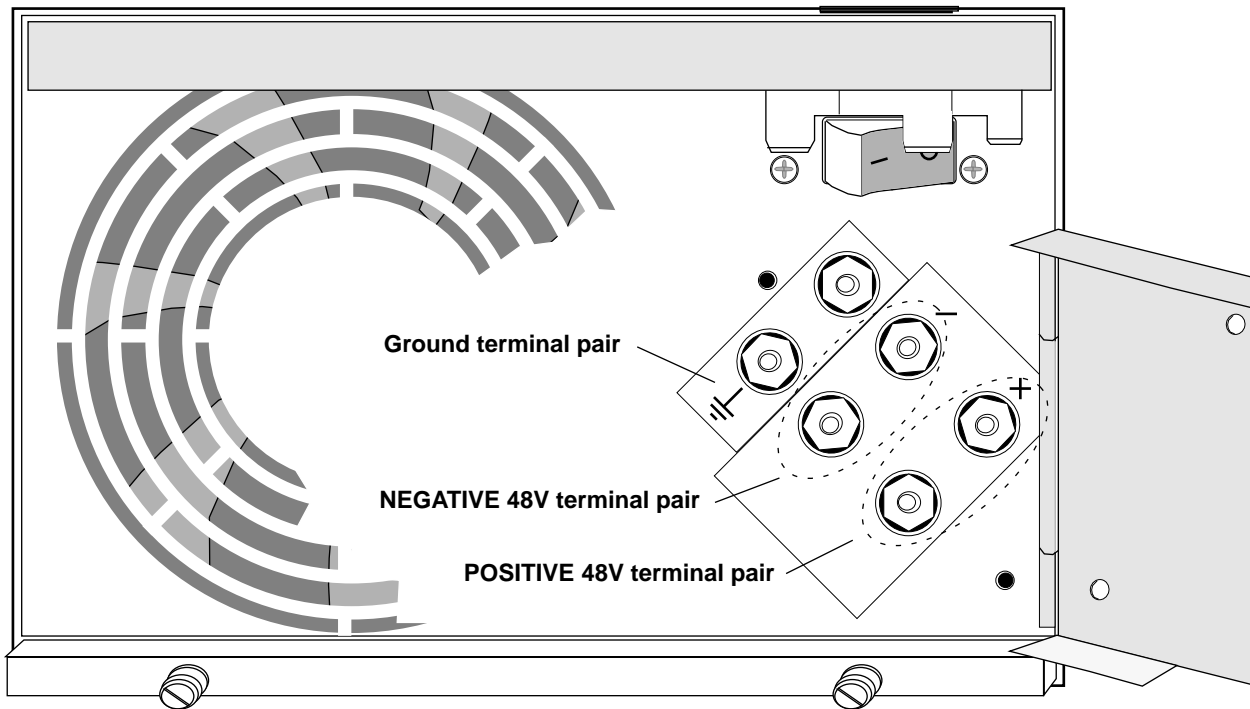
Figure 3-12. Terminal pairs on GRF 1600 DC power supply

Wiring procedure:

1 Disconnect power to the cables that you will attach to the DC power supply. Check that the power supply switch is set to off and that the power supply drawers are pushed fully into the chassis.

2 Undo the two screws from the aluminum cover and swing the cover open.

3 Remove the top hex nut and copper washer from each terminal.

4 Attach two-hole lug wires in this order:

a. a protective earth ground wire to the pair markedwith this symbol:

b. to the NEGATIVE 48V terminal pair marked "–".

c. to the POSITIVE 48V terminal pair marked "+".

5 Replace the copper washer first, then tighten the hex nut on each terminal. Torque hardware between 20- and 24-in. lbs.

6 Close the cover and replace the two screws.

7 Apply power to the wires.

8 Lift the tab and press the power switch to on. The GRF will start up and boot.

Figure 3-13 shows the DC terminals when fully wired.
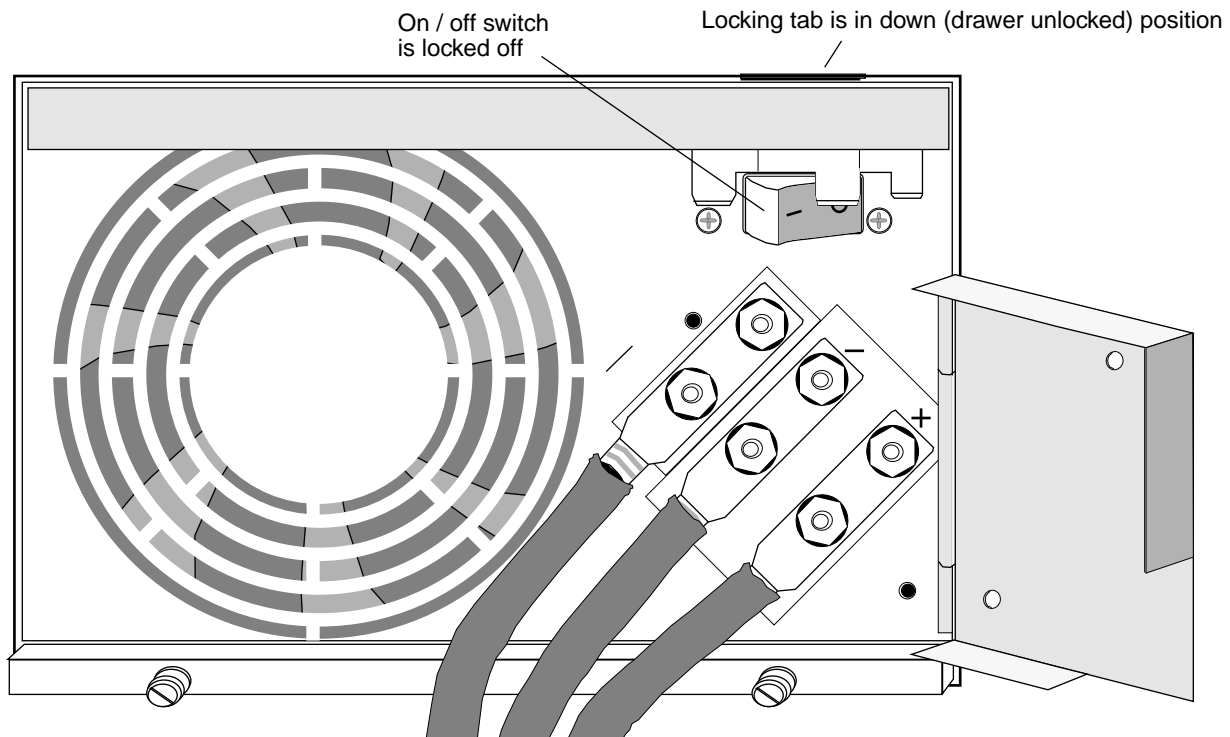
Figure 3-13. DC supply wires attached to GRF 1600 DC terminal pairs

Locking tab

The GRF 1600 DC power supply has a locking tab that unlocks the power drawer only when the switch in the off position. When the switch is in the off position, the switch cannot be set on without lifting the tab and locking the power drawer in the chassis. When the switch is in the on position, it can easily be switched off.

Labeling a redundant DC power supply

The warning label shown in Figure 3-14 is required when a second DC power supply is installed in a pre-existing GRF 1600 to provide redundancy.

When a GRF is shipped with a single power supply, this label will not be on the power supply unit. If later a customer orders a redundant power supply, a set of labels is included, along with instructions to attach a label to each unit.

This notice must appear on the DC power supply terminal cover in the space enclosed by dotted lines. Hash marks are provided at two corners to help you position the new label.
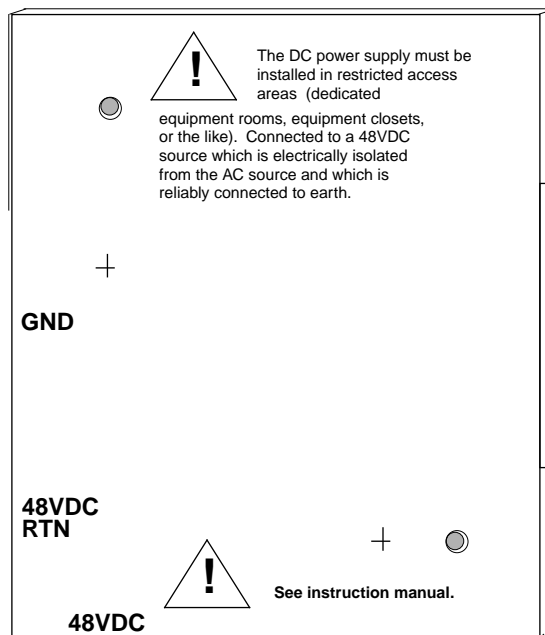
Figure 3-14. Warning label required for redundant DC power supply cover

Powering off a GRF

The GRF does not have an on/off switch. To power down a GRF system, first use the **shutdown** command to cleanly shut down the operating system:

```
# shutdown -r now
```

Systems with AC power supplies

After you execute the **shutdown** command, unplug the the AC power cord from the receptacle or other power source.

If the GRF is equipped with redundant AC power supplies, please note the following when powering off the unit:

Caution: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords. Care must be taken to correctly connect each power supply to separate AC power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollstandig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

Systems with DC power supplies

GRF 400

After you execute the **shutdown** command, use the disconnect device in the site's fixed wiring to shut off current from the DC source.

GRF 1600

After you execute the **shutdown** command, push the DC power supply switch to the off position. If you are going to remove the supply wiring, you must use the disconnect device in the site's fixed wiring to shut off current from the DC source.

What to do next...

With the terminal attached to the serial port and DC power applied to the GRF 1600, the system has automatically booted. Go to the next chapter. Chapter 4 describes the first-time configuration script and initial system tasks that bring the GRF to an operational state, ready for media card cabling and verification.

Initial System Set-up

<div style="text-align: right">4</div>

Chapter 4 describes the first-time configuration script and initial system tasks that bring the GRF to an operational state, ready for media card cabling and verification. The procedures are the same for the GRF 400 and the GRF 1600, any differences are noted.

Chapter 4 covers the following topics:

First communication with the router

This section describes what you see at the terminal after you power on a GRF.

When you plug in the GRF, it powers on and begins to boot. Boot activity is displayed on the screen.

First-time power on configuration script

The first-time configuration script runs automatically only at this time. It only runs again when invoked.

The script prompts for the following information:

– host name for GRF

– if you wish to configure the maintenance Ethernet interface

– IP address on GRF's maintenance Ethernet adapter

– netmask for GRF IP address

– if you want a default (static) route to another router on the maintenance Ethernet

– that router's IP address

You can see your answers when they are displayed at the end of the script. You have the option to rerun the script to make changes or to simply drop your responses:

```
You have now answered all the questions necessary for basic network
configuration.  If you didn't make any mistakes while entering your
answers, simply continue and the appropriate configuration files
will be created.

If you wish to exit this program without writing out the
configuration files, type <Control>-C.

Your current answers are:

Host Name: grf.tester.com
IP Address: 198.168.160.133
Ethernet interface: de0 (Digital DC33333/22222/11111)
Special Netmask:
Default Route: (none)

Do you wish to go through the questions again? [yes]
```

Enter no if you have no changes. The script automatically saves your entries to the appropriate configuration file.

The de0 reference is to the internal name for the control board's Ethernet interface through which the GRF connects to your site's maintenace/administrative LAN. You will see an entry for de0 in the /etc/grifconfig.conf configuration file when you add media card interface and IP address information to that file, the script enters the de0 entry as it completes.

Changing the configuration script later

If later you need to change any of the information you entered in the first-time configuration script, run the script again. Enter:

```
# config_netstart
```

The script will run again and will re-prompt for the same information.

Logging in as root

After the configuration script completes, you are prompted to press the Enter key. When you do, the `User:` prompt appears.for the first log in.

You need to log in as user `root`. The preset password for `root` is `Ascend` (Ascend with a capital A).

Here is the process:
```
Press <Enter> to continue.
User:
```

At the `User` prompt, type: `root`
```
User: root
Password:
```

Use the preset password, type: `Ascend`

`Password:` • • • • • •

When a password is entered, it is not echoed (displayed) on the screen.
The `super>` prompt appears:

`super>`

The `super>` prompt indicates you are in the Command Line Interface (CLI), and are logged in as `root`.

Changing the root password

GRF systems are shipped with `Ascend` *(capital A)* preset as the `root` password. As a security precaution, Ascend recommends that you change this preset password now, before you begin to configure.

At the super> prompt, execute the **sh** command to create a UNIX shell, the UNIX prompt appears:

```
super> sh
#
```

At the # prompt, type: `passwd` and you are prompted to enter the old password:

```
#  passwd
Old password:
```

You are prompted to enter the new password: (use 8 alphanumeric characters)

`New password:` • • • • • • • •

You are prompted to enter the new password again:

`Retype new password:`   • • • • • • • •

`#`

The next task is to learn about the GRF user interface. You have already used its primary components, the Command Line Interface and the UNIX shell.

Overview of GRF user interface components

This overview is intended to help you understand what is happening in the procedures that make up the rest of this chapter. The procedures use the Command Line Interface and the UNIX shell. As you do the procedures, you will use CLI commands and will also open a UNIX shell and edit configuration files or execute UNIX commands.

The GRF user environment consists of two main components, the Command Line Interface (CLI), and the UNIX shell. There is also a set of low-level **maint** commands.

Command Line Interface (CLI)
The Command Line Interface, usually called CLI, supports a set of profiles and a large set of GRF and UNIX-like commands. There are five profiles that contain parameters for five areas:

– System profile, includes IP address, host name, hardware characteristics

– Card profile, includes media type, protocol, port parameters, ICMP settings

– User profile(s), a profile for each defined user, includes access, password

– Dump profile, defines dump events and storage

– Load profile, defines which are the running binaries

Profiles are described in detail in the *GRF Configuration and Management* manual.

The GRF UNIX-like system management and configuration commands are available in the CLI. At the CLI prompt (usually super>) enter a "?" to retrieve the list of available commands. Refer to the *GRF Reference Guide* for a description of each CLI command.

When you log in to a GRF as root, you automatically get the CLI shell. In the CLI, root is super user, hence the super> prompt.

UNIX shell
While in the CLI you use the **sh** command to open a UNIX shell. The shell supports standard UNIX commands and the GRF UNIX-like commands. You can manage the GRF using the UNIX network and configuration management commands. The GRF also has a number of configuration files that you edit with a UNIX editor, you must be in the shell to edit GRF configuration files.

To configure and manage the GRF, you will use both the CLI command set and the UNIX shell. Type **exit** to leave the shell. When you exit the UNIX shell, you can execute CLI-only commands.

maint commands
A third component is the set of **maint** commands specific to each media card. The **maint** commands display low-level card-specific statistics and counts. These commands are documented within each media card's configuration information in the *GRF Configuration and Management* manual. Ethernet **maint** commands are in the Ethernet chapter, for example.

As noted, this is a brief overview. The *GRF Configuration and Management* manual provides information and examples using the CLI profiles and commands.

Configure logging

When the GRF first boots and loads, logging is not enabled. System memory restrictions on the GRF control board require that logging be to other storage. If target storage is not specified to receive log entries, log entries are not saved.

There are three options for logging, procedures for each are in the next several sections:

– "local" logging and dumping to an external PCMCIA flash device inserted in the control board

– remote logging (network) to a **syslog** server

– remote logging (network) to an NFS-mounted file system

Logs

Three logs provide specific information useful for monitoring and debugging GRF operations. If you are working with Customer Support, these are the three logs they will need to see:

– `/var/log/gr.console`

– `/var/log/messages`

– `/var/log/gr.boot`

The `/var/portcards` directory only contains media card dump files. These include the dumps from media card panics and dumps created when automatic dumping is selected via the **grreset -D** command (media card dumps when it comes back up). The `/var/crash` directory contains dumps from BSD kernel crashes. Other log files in the `/var/log` directory collect low-level information useful primarily to system developers.

To display the contents of a specific log file, change directory to `/var/log` and use the **more** command to display the contents of a specific log file. To access output of **grconsole** log, use this sequence of commands:

```
# cd /var/log
# more gr.console
```

Dumps

Dumps are compressed to save space, and the compressed files are appended with `.gz`.

Dumps provide specific information useful for monitoring and debugging GRF operations. If you are working with Customer Support, they may ask for a system or media card dump. The procedure to install a PCMCIA device for logging also specifies that dumps be sent to the device.

System dump

If the GRF is reset or it panics, a dump is saved in the `/var/crash` directory under the naming convention `bsdx.core` where `x` is the number of the dump, 1, 2, 3...and so on. A system dump is usually too large to send by e-mail. Customer Support will tell you how to send it to them.

The **grsavecore** command copies and formats information generated from a kernel panic as the data is written to standard output. The formatted data is written to grsavecore.out in the /var/crash directory.

Media card dumps

The **grdump** program saves and manages media card dumps. By default, two dumps are saved per day for each media card. Dumps are collected from media cards when they panic or when they are reset by the system administrator using the **grreset -D** command.

Media card dumps are stored in /var/portcards in a file named with the convention grdump.n.x.gz where n is the card slot number and x is the number of the saved dump, 1, 2, 3....

A media card dump is generally 4–8MB, and can sometimes be e-mailed. Customer Support will tell you how to send it to them.

Panic dumps sent to external storage device

The **mountf** and **grdump** commands enable the **grdump** program to work with an external storage device to capture media card dumps.

When a media card panics and there is a formatted external flash device plugged into either PCMCIA slot, a copy of the dump is automatically saved under the portcards directory of the external flash.

Logging and dumping to a PCMCIA device

Ascend recommends logging be done either remotely or locally to an external PCMCIA device.

Because system memory (RAM) provides a fixed amount of log storage, upgrading a GRF's RAM increases storage for route tables and other routing data, and does not provide additional space to store logs and dumps. Logs and dumps can be sent either to a spinning disk device inserted in PCMCIA slot A or to an external flash device inserted in either PCMCIA slot.

You can install a PCMCIA device any time after the GRF is powered on and is running. However, logging is not enabled until you install the device and complete this configuration procedure. Logged messages can be helpful while you are bringing up and configuring media cards.

Use the procedure in this section to ready the PCMCIA device and to send logs and dumps to the device. The procedure is done only once to set up local logs and dumps, and is not affected by software updates or system reboots.

Note that the external PCMCIA device is used only for storage. You cannot boot the GRF router from an external device.

List of devices

Ascend certifies the following ATA-compliant devices for GRF operation:

- – Kingston Datapak 520MB, P/N CT520RM
- – Sandisk 175MB Flash, P/N SDP3B
- – Sandisk 85MB Flash, P/N SDP3B-85-101
- – Aved 85MB Flash, P/N AVEF385MB25ATA501

Ascend offers only the 85 MB Flash directly (GRF-AC-FLASH). Customers may purchase the other devices through an external source.

ATA Type-II device dimensions are 85.6 mm x 54.0 mm x 5.0 mm. ATA Type-III device dimensions are 85.6 mm x 54.0 mm x 10.5 mm.

Managing PCMCIA slots

Three commands enable remote management of PCMCIA slots. The **csconfig** *slot_number* command returns status of each PCMCIA slot. The **csconfig** *slot_number* **up** and **csconfig** *slot_number* **down** commands mark the specified PCMCIA slot up or down, respectively. An example is included in the device installation procedure which follows.

Do not remove a mounted PCMCIA device from the slot, unmount it first. You will get an error message if you remove a mounted device.

Installing a PCMCIA device

The procedure formats and initializes an external device (flash or disk), temporarily mounts it on /mnt, creates subdirectories and symbolic links, and creates a permanent site file for storing the symbolic links. The example installs a flash device into slot A and specifies that logs and dumps be sent to directories on the device. You do not need to specify whether the device is a flash or spinning disk.

The PCMCIA device is named according to the slot it occupies:

- /dev/wd2a, the device residing in slot A (often a spinning disk)

- /dev/wd3a , the device residing in slot B (a flash disk or modem)

1   Insert the PCMCIA device into slot A on the GRF control board.

The thickness of a spinning disk device requires it be installed in slot A. A flash disk or modem can be installed in either A or B.

2   Log in as root to the GRF, start the UNIX shell, and execute these commands from the shell:

```
prompt> sh
#

# cd /
# iflash -A
# mountf -A -w -m /mnt
# mkdir /mnt/crash
# mkdir /mnt/portcards
# cd /var
# mv crash crash.orig
# mv portcards portcards.orig
# ln -s /var/log/portcards /var/portcards
# ln -s /var/log/crash /var/crash
# grsite --perm portcards crash
# cd /var/log
# pax -rw -pe -v . /mnt
# umountf -A
```

3   Edit the file /etc/fstab:

```
# cd /etc
# vi fstab
```

Use the UNIX editor to add this line as shown at the bottom of the excerpt:

```
/dev/wd2a  /var/log  ufs   rw  0 2  #PCMCIA slot A, use wd3a for B
```

Here is the portion of the file where you will add the specified line:

```
# Filesystem mount table information.  See the fstab(5) man page
# and the /etc/fstab.sample file for more information and examples.
#
# Each line is of the form:
# device    mount_point    type    flags    dump    fsck_pass
#
# Note that multiple flags (when used) are specified as a
```

```
# comma separated list without spaces.
#
# Blank lines and lines beginning with `#' are comments.
#
/dev/rd0a      /      ufs   rw  0 0
/dev/wd2a  /var/log ufs   rw  0 2  #PCMCIA slot A, use wd3a for B
```

4 Edit the file /etc/syslog.conf to specify the location where the logs will be kept.

After you edit /etc/syslog.conf, you need to send a HUP signal to **syslogd**.

When installing a spinning disk or flash disk

Uncomment the local log configuration lines in the "Log messages to Disk" section by removing #disk# from each line and specify /var/log as the directory for each log:

These are the first four lines in the section:

```
#disk#*.err;*.notice;kern.debug;lpr,auth.info;mail.crit /var/log/mes-
sages
#disk# cron.info                        /var/log/cron
#disk# local0.info                      /var/log/gritd.packets
#disk# local1.info                      /var/log/gr.console
```

The entries should now look like the following:

```
*.err;*.notice;kern.debug;lpr,auth.info;mail.crit    /var/log/messages
cron.info                        /var/log/cron
local0.info                      /var/log/gritd.packets
local1.info                      /var/log/gr.console
local2.*                         /var/log/gr.boot
local3.*                         /var/log/grinchd.log
local4.*                         /var/log/gr.conferrs
local5.*                         /var/log/mib2d.log
```

Touch the files

Touch each file to create it, here is an example:

```
#cd /var/log
# touch gritd.packets gr.console gr.boot grinchd.log gr.conferrs
mib2d.log
```

Restart syslogd

Determine the PID (process ID) for the **syslog** daemon and restart it:

```
# ps -ax | grep syslogd

# kill -HUP <PID>
```

Optional task:
Step 5 is only for sites that had previously configured logging to **syslogd** or NFS.
New installations can go onto Step 6.

5   If you had previously configured your GRF to log messages to a directory other than
/var/log, you changed settings in /etc/grclean.conf and /etc/grclean.logs.conf
files. Go back into those files now and change the log directory.

Modify /etc/grclean.conf and /etc/grclean.logs.conf to reflect the new log
directory.

The /etc/grclean.conf file specifies which log and dump files the **grclean** program
compresses, archives, and deletes.

The /etc/grclean.conf file entries should look like the following:

```
####################################################################
# port card dump files.
####################################################################
hold=4
size=1
remove=y
local=y
logfile=/var/portcards/grdump.*
####################################################################
# cleanup our own log file, if necessary.
####################################################################
DEFAULTS
hold=2
local=y
size=10000
logfile=/var/log/grclean.log
```

The /etc/grclean.logs.conf file is used to set size limits on log files. Here are some
sample entries:

```
************************************************************************
* Log files that used to be archived by the /etc/{daily|weekly|monthly}
* scripts.
************************************************************************
size=150000
logfile=/var/log/gr.console
size=11000
logfile=/var/log/gr.boot
```

6   Save all changes and reboot:

```
# grwrite -v
# reboot -i
```

7   Verify that the PCMCIA interface and device are up. The **csconfig** command returns
information about both external ports:

```
# csconfig -a
            Slot 0: flags=0x3<UP,RUNNING>
              Attached device: wdc2
              Manufacturer Name: "Kingston Technology"
              Product Name: "DataPak 520"
```

```
                Function ID: 4 (PC card ATA)
                Assigned IRQ: 11
                Assigned I/O port1: 0x3d0-0x3df
          Slot 1: flags=0x5<UP,EMPTY>
```

If you specify the slot number (0 or 1), **csconfig** retunrs information about the specified slot. This example looks at the flash disk in slot B:

```
# csconfig 1
     Slot 1: flags=0x3<UP,RUNNING>
       Attached device: wdc1
       Manufacturer Name: "SunDisk"
       Product Name: "SDP"
       Additional Info1: "5/3 0.6"
       Function ID: 4 (PC card ATA)
       Assigned IRQ: 11
       Assigned I/O port1: 0x3d0-0x3df
```

8   To run a quick test, execute the **grconslog** command. This command verifies that logging is correctly configured, so if it runs, the PCMCIA installation has been performed correctly:

```
# grconslog
```

iflash command - caution !

The PCMCIA procedure uses the **iflash** command. The **iflash** command determines the geometry of an installed PCMCIA ATA Type-II or Type-III storage device, and can format the device for use in a GRF.

Caution: By default, **iflash** does not initialize a flash that already has a file system installed. The **-f** option overrides the check and forces any data on the target device to be overwritten. Use this option only if you wish to erase the existing contents of a flash device.

When you use **iflash** without **-f**, you are informed when there is a file system already on the device and reminded that you must use the **-f** option to overwrite it. Because of its "force" capability, use the **iflash -f** command with caution.

Setting up a syslog server

One way to log over the network is to use **syslog** and set up a remote **syslogd** server (syslog host). A syslog server is another workstation on the maintenance/administrative LAN that has sufficient memory to store log files. You can configure remote logging during initial installation via the configuration script or you can change to remote logging at any time. Both procedures are described in this section.

In the shell, use a UNIX editor to edit the /etc/syslog.conf configuration file and set up a remote syslog server. The remote syslog or logging server is another node on your LAN that runs the syslog daemon, **syslogd**.

The GRF /etc/syslog.conf file configures the GRF to send log messages to a syslog server on your local network. These logs include:

```
gritd.packets
gr.console
gr.boot
grinchd.log
gr.conferrs
mib2d.log
```

Follow these steps to configure the GRF and the syslog server for network logging:

1 On the GRF, open the /etc/syslog.conf file and uncomment these lines in the " Log messages to Network" section by removing #net# from each line:

```
#Log messages to Network
#
#net#*.err;kern.debug;auth.notice;mail.crit      @server.domain.com
#net#*.notice;kern.debug;lpr,auth.info;mail.crit  @server.domain.com
#net#cron.info                                    @server.domain.com
#net#local0.info                                  @server.domain.com
#net#local1.info                                  @server.domain.com
#net#local2.*                                     @server.domain.com
#net#local3.*                                     @server.domain.com
#net#local4.*                                     @server.domain.com
#net#local5.*                                     @server.domain.com
```

While you are still in the /etc/syslog.conf file, replace all instances of "server.domain.com" with the domain name of the syslog server that will receive the log messages.

2 On the GRF, add the IP address and host name of the syslog server to /etc/hosts.

3 On the GRF, run the **grwrite** command to save the changes to the /etc configuration files (/etc/syslog.conf and /etc/hosts).

4 Now log in to the syslog server and add these file names to the server's /etc/syslog.conf file:

```
local0.info /var/log/gritd.packets
local1.info /var/log/gr.console
local2.* /var/log/gr.boot
local3.* /var/log/grinchd.log
local4.* /var/log/gr.conferrs
```

```
local5.* /var/log/mib2d.log
```

5 On the syslog server, use the **touch** command to create the log files in the
server's `/var/log` directory or wherever log files normally reside on the server:

```
# cd /var/log/
# touch gritd.packets gr.console gr.boot grinchd.log gr.conferrs
mib2d.log
```

6 On the syslog server, kill and restart **syslogd**.

syslogd must be running with the `-i` option to enable "internet listening."

If **syslogd** is not running with `-i`, kill it and restart it. The **syslogd** `pid` can be found in the
file `/var/run/syslog.pid`. You will lose any messages sent to syslog during the
kill/restart processes.

Note: `/etc/rc` is shipped with `-i` enabled. Users cannot save a modified copy of
`/etc/rc`. Any changes made are lost at the next reboot.

7 On the GRF, kill and restart **syslogd**.

Because **syslogd** is usually run before the domain name server (**named**) at boot time, you
need to add an entry to `/etc/hosts` that describes the host you want to send to.

Here is a sample entry in `/etc/hosts`:

```
222.222.11.93          server.domain.com
```

Now kill **syslogd** and restart it with the `-i` option.

Run **grwrite** to save changes made to the `/etc` files.

```
# grwrite
```

Note that the **grconslog** command does not differentiate among multiple log files sent to a
single remote syslog server from multiple GRF systems.

This completes the network logging configuration. A copy of the `/etc/syslog.conf` file is in
the *GRF Reference Guide*.

Using an NFS-mounted file system

On the GRF 400 and GRF 1600, the maintenance Ethernet interface (usually `de0`) must be used for NFS-mounted file systems.

Note: NFS mounting CANNOT be done through a media card interface (for example, `gf0yz`). The maintenance interface is specified in the `/etc/netstart` file as the value assigned to the variable "`iface`". This variable defines the external connection to the GRF and is set when the GRF is initially installed.

Note: Programs writing to an NFS-mounted file system will block while the NFS connection to the remote file system is dropped.

Setting up NFS on the GRF

You must add the appropriate host and IP information for any NFS server you are using into the `/etc/host` file if either of the following conditions apply:

– The name server(s) in `/etc/resolv.conf` point out one of the media card interfaces and are thus unavailable when the mount occurs.

– The name server(s) in `/etc/resolv.conf` point to a network that is reachable only through a route off the administrative Ethernet and only when GateD is being run. That is, if GateD is not active and a route entry exists in `grroute.conf`, the `/etc/host` entries are not needed.

Attaching the administrative Ethernet

The control board supports a maintenance/administrative connection to the GRF from a site's local Ethernet. This is the recommended mode of access for GRF system management and administration.

In the first-time configuration script, you entered the IP address and netmask for the maintenance interface. This section describes connecting that interface to your local Ethernet LAN.

Ethernet connection to control board

The control board faceplate has an RJ-45 modular connector. It supports 10 or 100 megabit connections and autosenses the line rate. As indicated in Figure 4-1, the Ethernet connector is prohibited from telco lines.
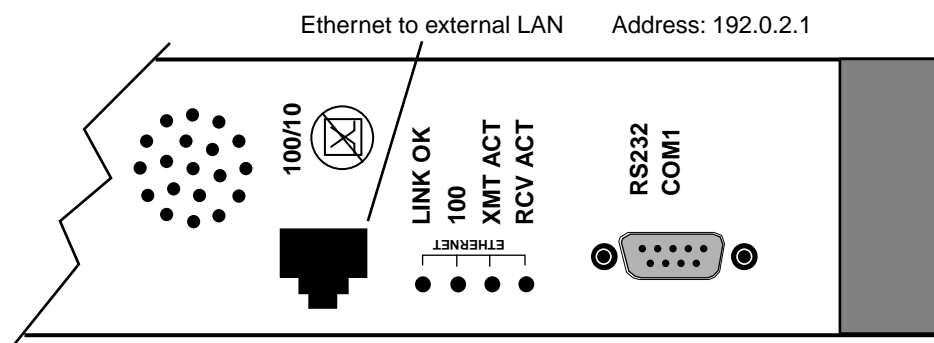
Figure 4-1. Point-to-point Ethernet connector on the control board

The maintenance Ethernet connector site is labeled "100/10," its network interface is `de0,` and it is shipped with a temporary network address set to `192.0.2.1`.

To connect to an external Ethernet LAN, insert the LAN cable into the receptacle marked "100/10." Its address is already configured in the first-time configuration script.

Using telnet

When you telnet to the GRF from a workstation on the maintenance LAN, you must use the administrative account "`netstar`" to log into the GRF router.

After you log in, test your network access and administrative account on the router after configuring it on your LAN. Administrative log on is described in the *GRF Configuration and Management* manual.

Option: Attaching a modem to the GRF

Although you must connect a VT-100 terminal to do the initial configuration, after that you can install a modem connection.

The GRF supports two modem options. One option is to attach a terminal server to the control board serial port (RS-232) and then attach a modem to the terminal server. Another option is to attach a PCMCIA modem directly into one of the control board PCMCIA (PC-CARD) slots. The modem connection is lost at reboot and you must dial up again to re-establish it.

Instructions for installing the PCMCIA modem are included here. Perform the configuration procedure after the GRF is powered on and the system has booted.

Installing a PCMCIA modem

Two types of PCMCIA modems have been tested and found to work reliably with the GRF and to be compatible with the modem configuration commands specified here.

The tested modems are:

– MegaHertz Model CC3288 (28.8Kbps)

– US Robotics Model 1626 (28.8Kbps, some with 33.6Kbps upgrade)

Although other PCMCIA modems have not been tested, some 28.8K models may work and be configurable with the GRF.

Unpack the PCMCIA modem and insert the modem card into an open PCMCIA slot on the GRF control board. Attach the phone cable to the modem card and then connect the RJ-11 connector to your phone line (using the RJ-11 female adaptor provided, if needed).

Configuration procedure

To enable the PCMCIA modem to accept calls, configure it from the VT-100 terminal using the following procedure:

1 Turn off **getty** on the modem line. Enter:

```
# vi /etc/ttys
```
Find this line:

```
tty02  "/usr/libexec/getty t9600-hf"   vt100   on  secure
```

Change the "on" to "off" so the line reads:
```
tty02  "/usr/libexec/getty t9600-hf"   vt100   off secure
```

Save the file and then enter:

```
# kill -HUP 1
```

2   Configure the modem – this procedure assumes you are connecting a USR 28.8K PCMCIA modem.

You will enter a series of standard modem **at** commands. After you enter an **at** command, you get a response, usually "OK". If you get an error message, please refer to the user documentation that comes with your modem.

To begin the configuration, enter:

```
# uucp.dialer /dev/tty02   <--- changes owner to uucp with group dialer,
# tip tty02                        this allows tip program to open modem device.

at
at&f          <--- resets modem to factory settings
OK
ats0=1        <--- sets answer after one ring
OK
at&w          <--- stores modem configuration to NVRAM
OK
atz           <--- resets modem
OK
~.            <--- disconnects from tip
```

3   Now turn **getty** on for the modem line, this is basically the reverse of step 1. Enter:

```
# vi /etc/ttys
```

Find the line that looks like:
```
tty02  "/usr/libexec/getty t9600-hf"   vt100    off secure
```

Change the "off" to "on":
```
tty02   "/usr/libexec/getty t9600-hf"   vt100    on  secure
```

Save the file and then enter:
```
# kill -HUP 1
Save your changes. Enter:

# grwrite -v
```
This command saves your changes to the `/etc/ttys` file to system RAM. The **-v** option displays the names of files as they change.

4   Verify that the PCMCIA interface and device are up, information about the **csconfig** command is in the *GRF Reference Guide*:

```
# csconfig -a
```

You should now be able to dial in to your GRF system using the PCMCIA modem.

Powering off a GRF

The GRF does not have an on/off switch. To power down a GRF system, first use the **shutdown** command to cleanly shut down the operating system:

```
# shutdown -r now
```

Systems with AC power supplies

After you execute the **shutdown -r now** command, unplug the the AC power cord from the receptacle or other power source.

If the GRF is equipped with redundant AC power supplies, please note the following when powering off the unit:

Caution: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords. Care must be taken to correctly connect each power supply to separate AC power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollstandig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

Systems with DC power supplies

GRF 400

After you execute the **shutdown -r now** command, use the disconnect device in the site's fixed wiring to shut off current from the DC source.

GRF 1600

After you execute the **shutdown -r now** command, push the DC power supply switch to the off position. If you are going to remove the supply wiring, you must use the disconnect device in the site's fixed wiring to shut off current from the DC source.

Fan unit replacements

GRF 1600

If the FAN LED comes on, there is a problem with one or both fans and you need to replace the unit without delay. The fan tray is field replaceable, contact Ascend to order a replacement. When you have the replacement, exchange the fan trays. Use the packaging from the new unit to return the old unit to Ascend. You can replace the tray while the GRF is running:

– Unloosen the two captive screws on the front of the tray.

– Slide the old tray out, the tray sits on guide rails and weighs 13 pounds (5.85kg).

– Make sure you have it on the guide rails, carefully slide the new tray in —when the tray is fully inserted, you will hear the fans start up.

– Tighten the captured screws.

GRF 400

GRF 400 fans are integral to the chassis and are not field replaceable. A service call is required.

What to do next

At this point the GRF is running, the administrative LAN is connected, and you have completed initial system IP configuration using the first-time configuration script. You should also have configured system logging.

The next chapter describes media card cabling requirements and ways to check out and verify those connections. After attaching media card cables, use the *GRF Configuration and Management* manual to complete system and media card configuration.

Cabling and Verifying Media Cards

5

Chapter 5 discusses cabling requirements for each type of media card and describes the information provided by each card's LEDs.

Software release 1.4 does not support the first versions of the ATM OC-3c or FDDI media cards. These cards are informally called ATM Classic and FDDI Classic. Only the hardware-enhanced versions of these cards are supported, ATM/Q and FDDI/Q.

Chapter 5 covers the following topics:

ESD requirements

Wear a grounded, conductive wrist strap when removing, replacing, and/or handling individual GRF electronic components.

Note: Please read the first section, "Returning a media card to Ascend", before you handle any GRF media card or other board.

Returning a media card to Ascend

If you are upgrading a media card or have a hardware problem with a media card, please use the following procedure to return the media card to Ascend.

1 Obtain a Return Material Authorization (RMA) number from Customer Service to track your board.
RMA numbers are important, they help us improve board quality and design.

2 Correctly package your board.

3 Ship the board to Ascend Alameda.

Here are the details for each step:

RMA number

Call Customer Support and ask for an RMA number.

We will assign your board a number and ticket, usually by FAX.
(You can also request an ESD box !)

– - In the U.S., call: 800-ASCEND-4 (800-272-3634)

– - From elsewhere, call: 510-769-8027

– - Customer Support FAX number: 510-814-2300

– - Customer Support E-mail: `support@ascend.com`

Packaging your board

Media cards and boards are easily damaged.

These are the requirements for packaging your media card or board you are returning to Ascend:

ALWAYS: Always put a media card or board into an antistatic bag.

• In fact, any time a board is not installed in a GRF chassis, it should immediately be put into an antistatic bag.

BEST packaging:

Use the same ESD box/foam liner in which this or a similar board was shipped to you. It is always good to keep a few of these ESD boxes on hand.

• Please call Customer Support, we will ship you an ESD box OVERNIGHT.

• If you don't have an ESD box from Ascend, you can ship an Ascend board back in another vendor's box as long as the board is in its antistatic bag.

ACCEPTABLE:

Sturdy cardboard box and foam wrapping.

• Tape the antistatic bag closed so no part of the GRF board can slide out

- Wrap the bag and pad the box with foam
- – **NEVER USE PAPER OR PEANUTS** –
  tape the foam around the antistatic bag so the board doesn't slide between gaps.
- Use a heavy-duty cardboard box, tape securely shut.

## Ship via FedEx

Enclose the RMA number and ship via FedEx to:

Ascend Communications, Inc.
RMA Department
1701 Harbor Bay Parkway
Alameda, CA 94502

Inserting a media card into the GRF

ESD requirements

⚠️ **Caution:** Media cards are hot swappable and can be installed when the GRF is running. However, media cards are highly susceptible to damage from electrostatic discharge. You must wear a grounded, conductive wrist strap any time you handle a media card. Make sure the metallic elements in the band directly touch your exposed skin.
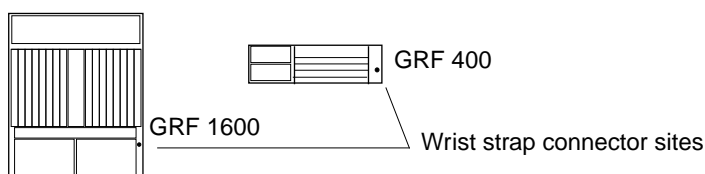
Minimum load requirement

To operate properly, the GRF 1600 requires that at least two media cards be installed. Also, a face plate cover must be installed in any unused slot to maintain cooling flows.

On-card connectors

Media cards are actually two logic boards joined to make a single component. As shown in Figure 5-1, the smaller board on the right is the serial interface, also called the serial daughter card. The larger one on the left is the media board and has the network ports. Together they comprise a GRF media card.

Cards install vertically for 16-card GRF 1600:
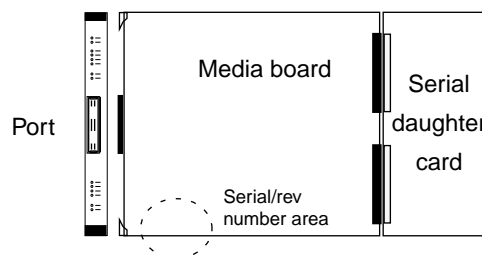
Cards install horizontally level for 4-card GRF 400:

Figure 5-1. Media card components

The two logic boards are joined by a pair of 100-pin connectors and reinforcing plates. Even so, this joint retains some flex and must be carefully supported, especially when inserting the media card into the chassis.

⚠️ **Warning:** The backplane of the GRF contains hazardous energy levels. When replacing a media card, remove only one card at a time. Removing more than one card will expose the operator to this energy hazard.

Warnung: An den Rückwandplatinen der GRF liegen gefährliche Hochspannungen ab. Zum Auswechseln der Medienkarte jeweils nur eine Karte entfernen. Bei zwei gleichzeitig entfernten Karten ist der Bediener gefährlichen Spannungen ausgesetzt.

Chassis insertion procedure

1   When you are properly grounded, remove the media card from its anti-static container.

2   Hold the media card with the network ports facing you.

4-card router

Turn the card horizontal, the top of the media card should be on the left, the bottom of the card should be on the right. As you start, make sure you visually identify the left and right guide pair for this particular slot.

Keeping the media card horizontally level, insert the card fully into the slot, you will feel the card joining with the 100-pin connector on the backplane.

16-card router

As you start, make sure you visually identify the top and bottom guide pair for this particular slot. Have one hand under the card, lightly supporting its weight. Rest just the edge of the bottom corner of the card in the bottom guide. Then, bring the top edge of the card into the top guide. This will help you keep the card level as you slide it in.

Keeping the media card vertically upright, insert the card fully into the slot.

You will feel the card joining with the 100-pin connector on the backplane.

3   When fully inserted, the card's face plate should be flush against the chassis back panel.

Note: Do not force the card into the slot. Doing so can damage the card or slot connector.

4   Tighten the screws at each end of the face plate.

Hot swapping media cards

GRF media cards are hot-swappable per media type. That is, you can swap out a HSSI card and replace it with another HSSI card. When the new HSSI card starts up and boots, it is identified to the system and is ready to be configured. Any IP addresses assigned to the HSSI card removed from slot 5, for example, are automatically assigned to the new HSSI card inserted into slot 5.

If you plan to change the type of media card that will replace the HSSI card, then you must reset the system to re-identify the new card.

After you insert the new type of media card but before you reset the GRF, output from the **grcard** command displays the actual media type but also indicates the previous media. This is the **grcard** output after a FDDI card has been inserted into the newly-vacated slot but before the GRF is reset:

```
# grcard
0   HSSI   running
1   HSSI   running
2   FDDI   held-reset (ERROR: must be HSSI)
3   HSSI   running
```

Q cards

A /Q card has dedicated hardware support for expanded route table lookup.

For FDDI and ATM cards, the _v2 after in **grcard** output indicates the card is a /Q version of that type of card. All Ethernet, HSSI, ATM OC-12c, and SONET cards have the /Q hardware although they appear in **grcard** output as _v1. There is one version of HIPPI, these cards do not have /Q hardware.

Burning in media card flash memory

grflash provides the ability to upgrade flash code at customer sites. The **grflash** command reprograms (reburns) the code in internal flash (the boot loader). This is different than updating the system software with a new release. Typically, new software releases are loaded into the system and then downloaded into the specific type of media card, they do not require burning into internal flash. The reburn procedure is done only under direction of Customer Support.

Please work with Customer Support to schedule a session with them in the rare instance that the **grflash** command is needed. If not carefully and correctly done, the reburn process could disable the memory component and the GRF. A **grflash** man page is available, and the command is also described in the *GRF Reference Guide*.

Cabling the media cards

The GRF chassis is shipped with all media cards and the control board installed.

Other than making sure face plate screws are tight, media cards need no attention prior to attaching the media interface cables.

The GRF chassis enclosure must have all access panels in place and secured. All available slots must be filled with media cards or blank face platess.

ESD requirements

Note: Wear a grounded, conductive wrist strap when removing, replacing, and/or handling individual GRF electronic components.

Blank face plates

Note: Blank face plates are installed in all unused slots to maintain correct airflow for cabinet cooling. They must remain in place during system operation.

Cable specifications

All data, signal, and control cables connected to the equipment must be of the shielded type with metallic connector hoods, except for Ethernet cables, fiber optic cables, and power cables, which are unshielded. Connectors with jackscrews should be securely tightened.

GRF media cards use the following industry-standard cables:

Table 5-1. Media card cable specifications

Cables/Card	Description
HSSI	25 twisted-pair shielded coax cables
ATM OC-3c multimode	62.5/125 micron fiber optic cables
ATM OC-3c single mode	9/125 micron fiber optic cables
ATM OC-12c multimode	62.5/125 micron fiber optic cables
ATM OC-12c single mode	9/125 micron fiber optic cables
4-port 10/100Base-T	Category 5 UTP cables
8-port 10/100Base-T	Category 5 UTP cables
FDDI multi-mode	62.5/125 micron multi-mode optic cables
HIPPI	Twisted-pair copper cables in 5-, 25-, or 51-meter lengths. Ascend certifies the viability of GRF-to-GRF connections using 51-meter cables, and sells HIPPI cables directly.

Table 5-1. Media card cable specifications   (continued)

Cables/Card	Description
SONET OC-3c multimode	62.5/125 micron fiber optic cables
SONET OC-3c single mode	9/125 micron fiber optic cables

Differences in media card loading

The same GRF system does not always come up the same way each time— cards can load in a different order each time the system is brought up.

This is normal and happens because the boot and load signals can catch different points on the communications bus clock cycle. Moving media cards to different slots can also cause variations. Media cards have different boot and diagnostic programs. For example, HIPPI media cards take significantly less time to load and come up than do FDDI.

Reset GRF when all cables are attached

When all cables are in place, reboot the system. This will also reset all media cards.

Use the **shutdown -r now** or **grms** command described at the end of the chapter. That last section describes ways to verify that your media cards are viable even though the system is not yet fully configured.

ATM OC-3c (ATM/Q) media card

The ATM OC-3c (also called ATM/Q) media card provides two full-duplex interfaces. ATM OC-3c cards are available in single and multimode versions. The ATM/Q media card has hardware support for large route table look-up.

Note: The ATM OC-3c **maint 80** command toggles the single mode laser component on or off. See the "ATM OC-3c Configuration" chapter in the *GRF Configuration and Management* manual for usage information.

Figure 5-2 shows a single mode ATM OC-3c faceplate, single and multimode faceplates are the same except that the single mode interfaces have a "LASER ON" LED.

(g0008)
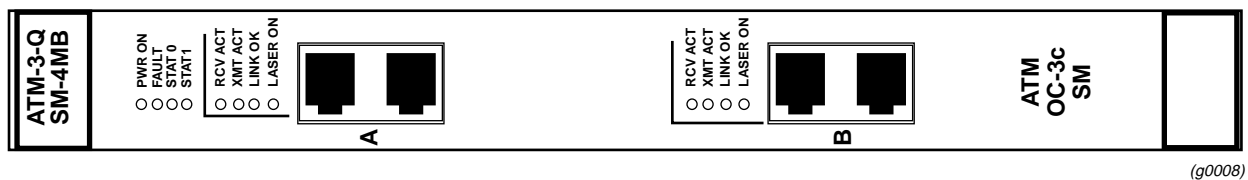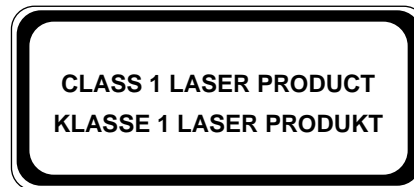
Figure 5-2. ATM OC-3c single mode media card faceplate

LEDs

The top four LEDs on the faceplate indicate card status. The duplex interfaces A and B each have a set of LEDs. Refer to Table 5-2 for a description of each LED.

Table 5-2. ATM OC-3c LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Fault	This amber LED turns on and remains on if an error condition is detected.
STAT 0 STAT 1	These green LEDs blink during self-test. When self-test completes, STAT 0 blinks ten times a second and STAT 1 blinks once a second. STAT 0 and STAT 1 indicate the activity of normal system interrupts. If the media card hangs, they either turn off and remain off, or they turn on and remain on.
RCV ACT	This amber LED blinks as ATM cells are received at the interface.
XMIT ACT	This amber LED blinks as ATM cells are transmitted out of the interface.
LINK OK	This green LED goes on when an optic cable is plugged into an interface and remains on while connection is good at both cable ends.
LASER ON	This green LED provides a safety warning on single mode ATM cards. One should not look into a laser-active interface component if a cable is not plugged in.

Laser safety

The ATM OC-3c single mode media card contains a Class 1 laser product. The Class 1 laser diode is an integral part of the transceiver module.

CLASS 1 LASER PRODUCT

KLASSE 1 LASER PRODUKT

(g0079)

Warning: Only authorized service personnel should attempt to repair this equipment. All problem discovery and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

Warnung: **Lebenensgefahr** Achtung, nur authorisiertes Kundendiestpersonal darf dieses Geraet reparieren. Alle Fehler- und Reparaturvorschriften sehen nur den Austausch von Baugruppen oder Module vor. Wegen der Komplexitaet der einzelnen Platinen und Baugruppen soll niemand versuchen Reparaturen auf der Bauteilebene oder Modifikationen an den Platinen vorzunehmen. Falsche Reparaturen koennen lebensgefaehrlich sein.

Table 5-3 provides technical information about the laser diode on the ATM OC-3c single mode media cards:

Table 5-3. ATM OC-3c single mode laser information

Manufacturer	Amp Inc.
Part number	269085-1
Laser type	InGaAsP diode
Wave length	1310 nm (+/- 50 nm)
Output power	Single-mode, -14dBm min., -8dBm max
	Multi-mode, -19dBm min., -14dBm max

Agency approvals	TUV Rheinland - EN 60950
	                         - EN 60825-1
	                         - EN 60825-2
	Complies with 21 CFR 1040.10 and 1040.11

ATM OC-12c media card

The ATM OC-12c media card provides a single full-duplex interface and has hardware support for large route table look-up. ATM OC-12c cards are available in single and multimode versions.

Figure 5-3 shows a single mode ATM OC-12c faceplate, single and multimode faceplates are the same except that the single mode interface has a "LASER ON" LED.
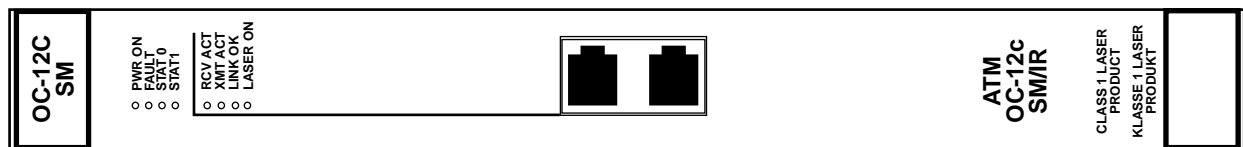
(g0008)

Figure 5-3. ATM OC-12c single mode media card faceplate

LEDs

The top four LEDs indicate card status. The duplex interface has a set of LEDs. Table 5-4 describes the ATM card LEDs.

Table 5-4. ATM OC-12c LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Fault	This amber LED turns on and remains on if an error condition is detected.
STAT 0 STAT 1	These green LEDs blink during self-test. When self-test completes, STAT 0 blinks ten times a second and STAT 1 blinks once a second. STAT 0 and STAT 1 indicate the activity of normal system interrupts. If the media card hangs, they either turn off and remain off, or they turn on and remain on.
RCV ACT	This amber LED blinks as ATM cells are received at the interface.
XMT ACT	This amber LED blinks as ATM cells are transmitted out of the interface.
LINK OK	This green LED goes on when an optic cable is plugged into an interface and remains on while connection is good at both cable ends.
LASER ON	This green LED provides a safety warning on single mode ATM cards. One should not look into a laser-active interface component if a cable is not plugged in.

Laser safety

The ATM OC-12c single mode media card contains a Class 1 laser product. The Class 1 laser diode is an integral part of the transceiver module.

```
CLASS 1 LASER PRODUCT
KLASSE 1 LASER PRODUKT
```

(g0079)

Warning: Only authorized service personnel should attempt to repair this equipment. All problem discovery and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

Warnung: **Lebenensgefahr** Achtung, nur authorisiertes Kundendiestpersonal darf dieses Geraet reparieren. Alle Fehler- und Reparaturvorschriften sehen nur den Austausch von Baugruppen oder Module vor. Wegen der Komplexitaet der einzelnen Platinen und Baugruppen soll niemand versuchen Reparaturen auf der Bauteilebene oder Modifikationen an den Platinen vorzunehmen. Falsche Reparaturen koennen lebensgefaehrlich sein.

Table 5-5 provides technical information about the laser diode on the ATM OC-12c single mode media card:

Table 5-5. ATM OC-12c csingle mode laser information

Manufacturer	Hewlett Packard
Part number	CDX2622
Laser type	Fabry Perot
Wave length	1274 nm minimum, 1356 nm maximum
Output power	Single-mode, -15dBm min., -8dBm max
	Multi-mode, -20dBm min., -14dBm max

Agency approvals	TUV Rheinland - EN 60950
	                             - EN 60825-1
	                             - EN 60825-2
	Complies with 21 CFR 1040.10 and 1040.11

Attaching ATM media cables

GRF ATM media cards are available in both multimode and single mode.

A multimode card requires duplex SC fiber optic cable and has a distance limitation of approximately two kilometers. A single mode card requires simplex SC fiber optic cable and has a distance limitation of approximately 15 kilometers. Figure 5-4 shows both types of cables.

Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils.

Single mode pair

Multimode pair

Dust caps
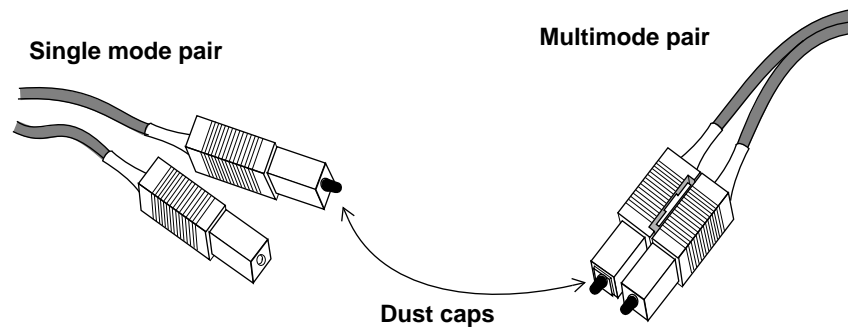
Figure 5-4. Single and multi-mode ATM cable ends

Not only are fiber cables easier to damage than coax and other types of cables, but the damage is harder to detect.

Keep cables off the floor

Cables left on the floor can get damaged. The resulting broken fiber might work fine temporarily but begin to cause problems when the cable is moved or bent the other way.

Keep the connectors clean

A broken cable or dirty connector can deliver data, but with errors. Attaching a dirty connector can soil the optical component on the media card. Leave the dust caps on until you are ready to insert the cable ends.

⚠ **Caution:** Although there may be no hazard with multimode fiber, it is not a wise practice to look into the end of any fiber optic cable.

Vorsicht: Obwohl Multimodenfasern voraussichtlich keine Gefahr darstellen, empfiehlt es sich, nicht in das Ende eines Glasfaserkabels hineinzuschauen.

FDDI/Q media cards

The FDDI/Q media card provides four full-duplex interfaces. Figure 5-5 shows a FDDI/Q faceplate.

(g0005)
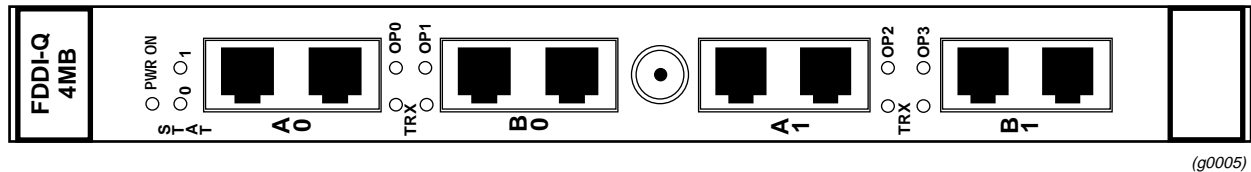
Figure 5-5. FDDI/Q media card faceplate

LEDs

Each interface has a pair of LEDs that show the type of connection (OP) and traffic activity (TRX) at that interface. Refer to Figure 5-6.
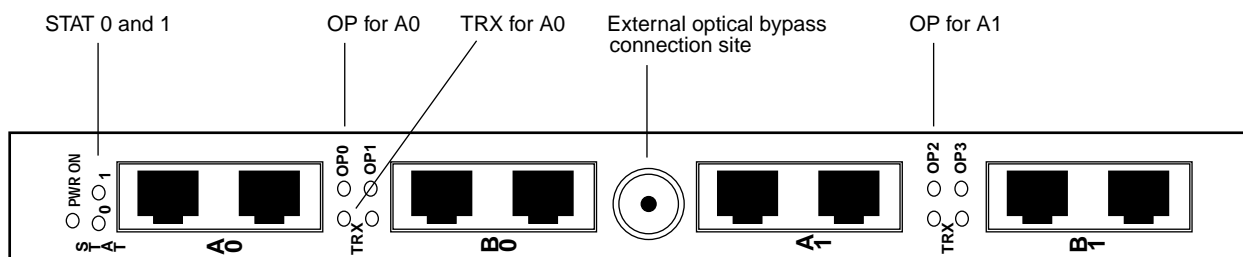
Figure 5-6. FDDI/Q media card faceplate and LEDs

Certain LEDs on the FDDI/Q media card can be either amber or green depending upon the type of information they convey at the time. Table 5-6 describes FDDI/Q card LEDs.

Table 5-6. FDDI/Q media card LEDs

LED	Description
PWR ON	This green LED is on when GRF power is on.
STAT 0 STAT 1	The amber / green Status LEDs at the top of each FDDI/Q media card are amber during self-test. When self test completes, the LEDs turn green. The Status LEDs alternate amber during power-on/dumping, and alternate green during power-on/loading. When status is normal: - the green 0 LED on the left blinks ten times a second - the green 1 LED on the right blinks once a second FDDI/Q Status LEDs do not blink error codes.

Table 5-6. FDDI/Q media card LEDs   (continued)

LED	Description
OP0, OP1, OP2, OP3	The amber / green OP LEDs indicate the type of ring connection made at the particular interface: When OP is off, no viable connection is enabled. When OP is green, a SAS connection is configured. When OP is amber, a DAS connection is configured.
TRX	These green LEDs blink when FDDI/Q traffic is active in either direction at a particular interface (updated each 100 ms).

Attaching FDDI/Q media cables

Not only are fiber cables easier to damage than coax and other types of cables, but the damage is harder to detect.

Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils.

Keep cables off the floor

Cables left on the floor can get damaged. The resulting broken fiber might work temporarily, but begin to cause problems when the cable is moved or bent the other way.

Keep the connectors clean

A broken cable or dirty connector can still deliver data, but with errors. Attaching a dirty connector can soil the optical component on the media card.

Leave the dust caps on until you are ready to insert the cable ends.

⚠ **Caution:** Although there may be no hazard with multimedia fiber, it is not a wise practice to look into the end of any fiber optic cable.

Vorsicht: Obwohl Multimodenfasern voraussichtlich keine Gefahr darstellen, empfiehlt es sich, nicht in das Ende eines Glasfaserkabels hineinzuschauen.

FDDI connector keys

Connector keys are small plastic fittings that physically prevent the wrong type of FDDI connector from being inserted into a media card interface. Ascend ships a set of keys with each FDDI media card. Figure 5-7 shows a set of "B" keys installed on a FDDI connector and a set of "A" keys as they are shipped with a FDDI card.

FDDI multimode
connector end

"B" connector key

"A" connector key set
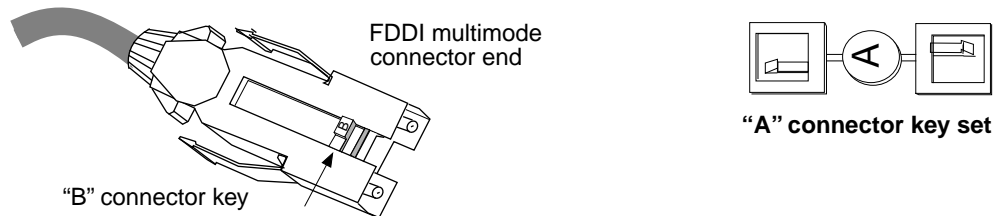
Figure 5-7. FDDI optic cable connector and keys

A set of keys physically installs in both the card interface and the cable connector. Installing keys in FDDI media card interfaces is easy even though installation requires removing the FDDI media card from the chassis. The key "snaps" into a slot within the interface.

Different cables are required for single and dual attached interfaces. Dual attach FDDI cables have an "A" connector on one end and a "B" connector on the other. Single attach FDDI cables have an "M" connector on one end and an "S" connector on the other. Connector keys are site-installed according to site practice. Not every site uses them.

It is not necessary that connector keys be used. The GRF FDDI card already has "A" and "B" labels on its faceplate that provide visual "keys" for dual attachments. As a single attachment, the interface accepts both master and slave cable connectors without affecting configuration.

Connector key types

Once installed, a key limits the type of FDDI cable that can be inserted into that interface. Different cables are matched to single and dual attached interfaces. Cables and interface ports are labeled or "keyed" so they will connect only to a compatible interface type.

Figure 5-8 illustrates different types of receptacle and connector keys:

Receptacle keying   Connector keying

Key type "A":

Key type "B":

Key type "M":

Key type "S":

Key type "AM":

Key type "BM":
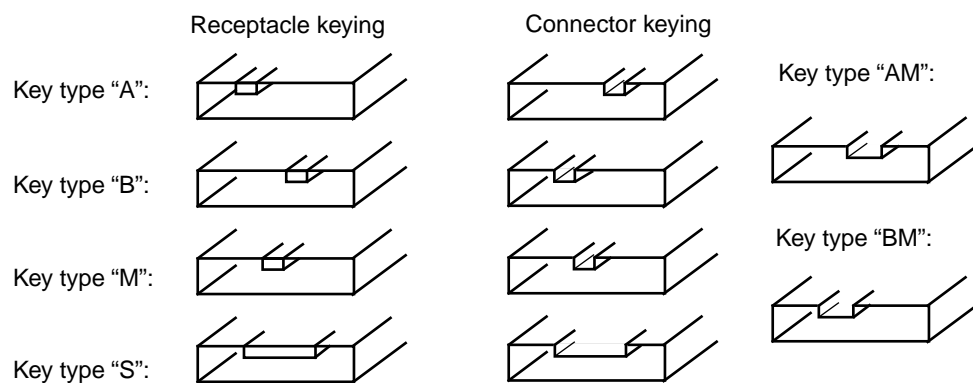
Figure 5-8. Types of FDDI connector keys

FDDI attachment options

Attachment summary

A variety of attachment options are supported on GRF FDDI cards. Figure 5-9 summarizes all possible options:

4 single attach:	2 dual attach:	1 dual, 2 single (or unused) attach:	2 single (or unused), 1 dual attach:
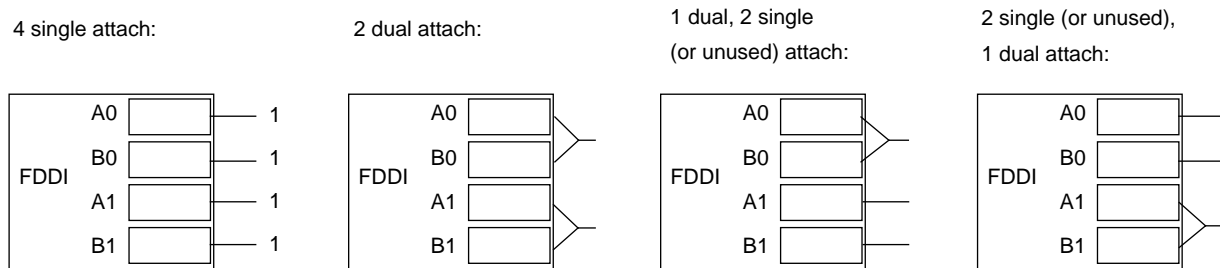
Figure 5-9. DAS and SAS connection options

Refer to the *GRF Configuration and Management* manual for FDDI configuration information and copies of configuration files.

SAS and DAS attachments

Single attach station (SAS) refers to a device connected to FDDI media via a single connector.

In comparison, a dual attach station (DAS) device has independent connections to each of two FDDI rings, for redundancy. Figure 5-10 shows an example of each type of attachment.
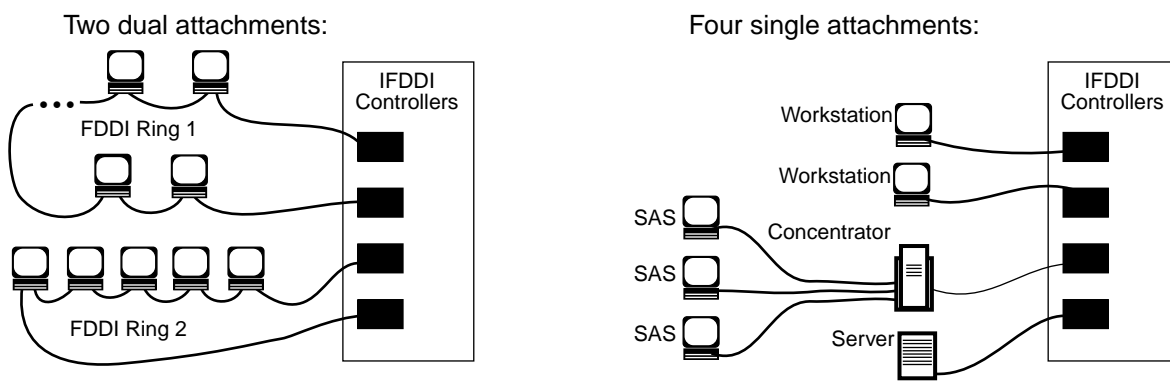
Figure 5-10. FDDI media cards used as single and dual attachment nodes

Single attach - M and S interfaces

Single attach FDDI interfaces can be either master (M) or slave (S) interfaces.

They require a cable with a corresponding master or slave connector. Single attach cables have an "M" connector at one end and an "S" connector on the other. With no key installed, "M" and "S" connectors both fit the FDDI interface.

Figure 5-11 show the relationship between master and slave interfaces.
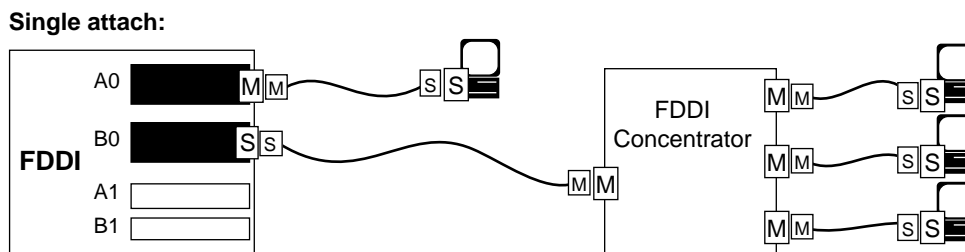
Figure 5-11. Single attach FDDI interface using master / slave keys

A single attach FDDI interface on the GRF is a master interface when it directly connects to a workstation. It is a slave interface when connected to the master interface of a FDDI concentrator. Such concentrators connect, in turn, to the slave interfaces of single-attach workstations.

Dual attach - A and B interfaces

Dual attach interfaces connect to form two unbroken counter-rotating rings, one being a redundant backup. Each interface, or station, has both an "A" and a "B" interface. Dual attach cables have an "A" connector on one end and a "B" connector on the other.

The "A" interface connects a station to its downstream neighbor; the "B" interface connects a station to its upstream neighbor. To create a logical ring, "A" must connect to "B", "B" must connect to "A". Otherwise, the network does not operate as a logical ring and segments into unconnected suborns. Figure 5-12 illustrates a logical ring.
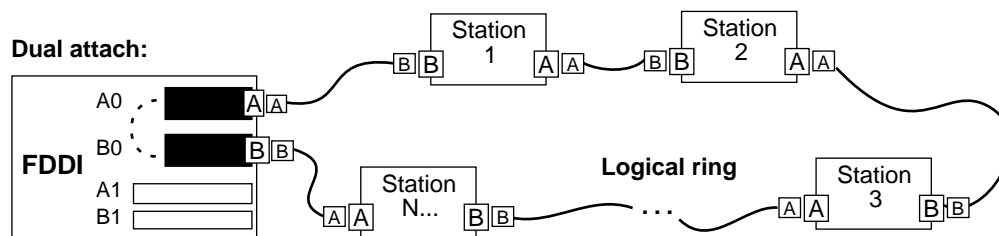
Figure 5-12. Dual attach FDDI interface using A / B keys

Installing a FDDI optical bypass

Optical bypass capability is provided externally to the FDDI media card.

A miniature six-pin DIN connector is provided on the FDDI face plate for controlling two external optical bypass switches, one for each dual attachment transceiver pair.

An external converter cable is required to split out two optical bypass connectors from the single face plate connector.   Control and status bits for the optical bypass switches are provided in the main processor's status and control registers.

As shown in Figure 5-13, two bypass switches can be attached with the Ascend-supplied Y-cable adapter. The Y-cable is required to reconcile control pin assignments between the GRF and the external switch module.

Through the Y-cable, an optical bypass switch module attaches to a pair of media interface connectors on the FDDI card.
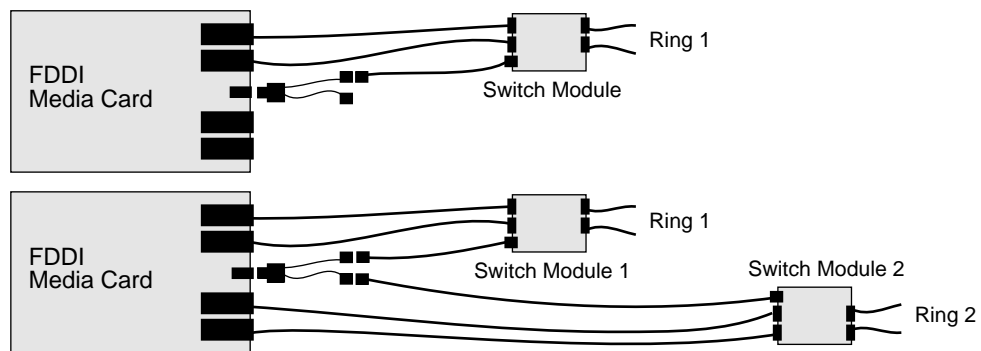
Figure 5-13. Optical bypass switch attachments

A bypass switch allows the GRF to remove itself from the dual ring during a failure or maintenance without causing the ring to wrap at upstream and downstream neighbors. If a GRF failure occurs, the bypass switch connects upstream and downstream neighbors on both the primary and secondary rings, and allows the GRF node to remove itself from the ring while still retaining ring continuity.

A node failure without a bypass switch causes the dual ring to "wrap." A wrapped ring absorbs the secondary ring into the primary ring and no longer has a backup ring.

Manual enable/disable

With the bypass physically installed, you can enable or disable the function in the Card profile for the specific FDDI card. Refer to the FDDI configuration chapter in the *GRF Configuration and Management* manual.

HIPPI media card

The HIPPI media card provides a single full-duplex interface. Figure 5-14 shows a HIPPI faceplate.
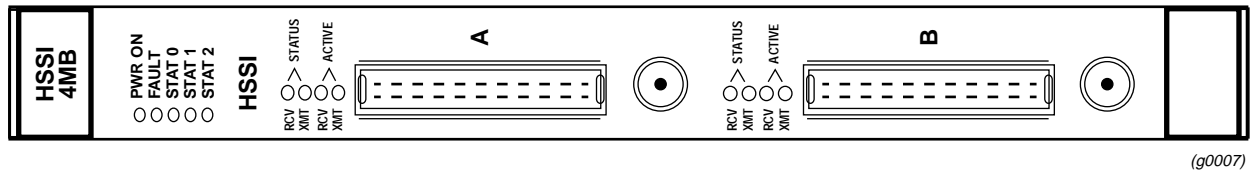

(g0006)
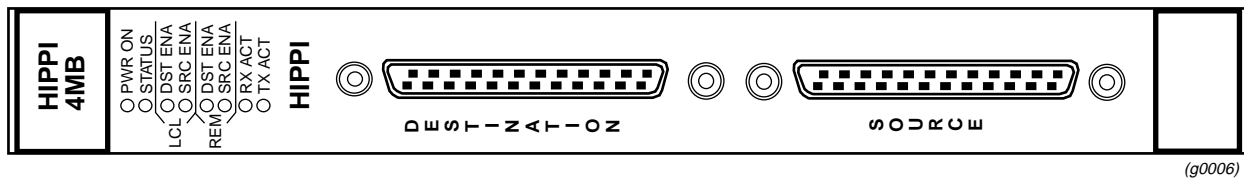
Figure 5-14. HIPPI media card faceplate

Attaching HIPPI media cables

The HIPPI media card provides a single duplex attachment and requires a pair of copper cables/connector ends as described in the standard *HIPPI-PH*, ANSI x3.183-1991.

Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils. HIPPI cables are specified in the standard to a length of 25 meters. Ascend certifies the viability of GRF-to-GRF connections using cables 51 meters long.

As shown in Figure 5-15, the upper HIPPI interface (RCV or destination interface) receives data from the host. The lower interface (XMT or source interface) transmits data to a host.
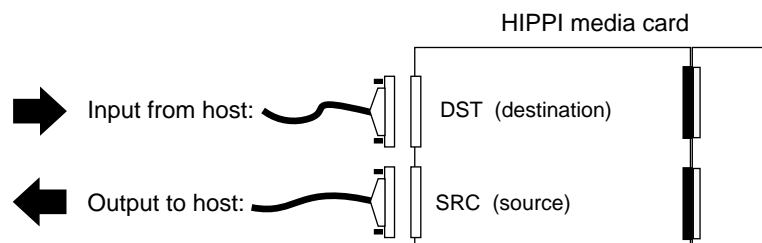
Figure 5-15. Cabling a HIPPI media card

Do not damage the connector ends

Each connector end has 100 fragile pins. Figure 5-16 illustrates a HIPPI cable connector end.

Pins can become bent while making the connection to the media card if alignment is wrong. If a HIPPI link does not work after cabling, check both ends of the cable for bent pins.

**HIPPI 100-pin
connector end**
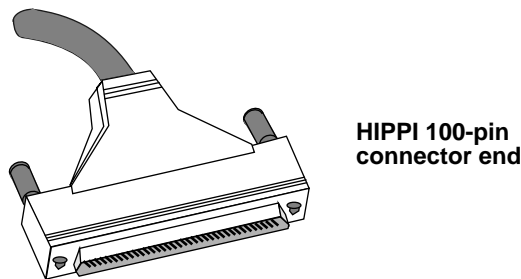
Figure 5-16. HIPPI 100-pin connector

Keep the bubble wrap on

Ascend ships cables with the connector ends enclosed in bubble wrap. Keep this bubble wrap on while you lay out the cabling. Remove the bubble wrap when you are ready to plug in the connector.

Warning: A connector can build up enough charge to disable the media card. One way to discharge a cable is to run your finger gently over the tips of the pins, touching pins and the connector shell at the same time.

Warnung: Es kann sich genug Ladung in einem Stecker ansammeln, daß die Datenträgerkarte deaktiviert wird. So wird das Kabel entladen: Fahren Sie mit dem Finger vorsichtig über die Spitzen der Stifte; berühren Sie dabei gleichzeitig die Stifte und das Steckergehäuse.

Insert the connector perpendicular to the media card

The EMI shielding fitted inside the connector end can make insertion difficult. Insert the connector end very nearly perpendicular. Pins can be damaged when the connector is inserted at too much of an angle.

Tighten the jackscrews all the way down

Connector ends are heavy and tend to resist being completely seated. Tighten the jackscrews to make a firm attachment. Jackscrews should turn easily and stop abruptly when they hit bottom. If the connector is not fully seated, it may not operate properly.

HIPPI card LEDs

The HIPPI media card has one receive (from destination) interface and one transmit (to source) interface. The upper interface, A, is the RCV or destination interface. The lower interface, B, is the SRC or source interface. Figure 5-17 shows the set of eight LEDs at the top of the faceplate.
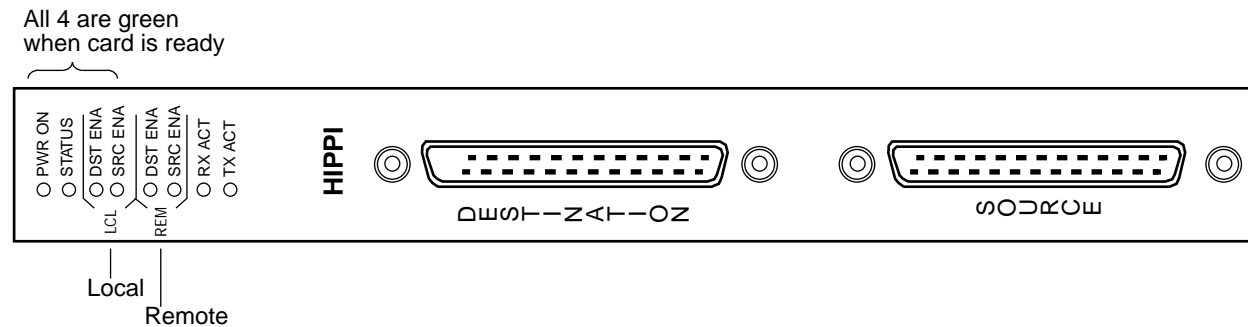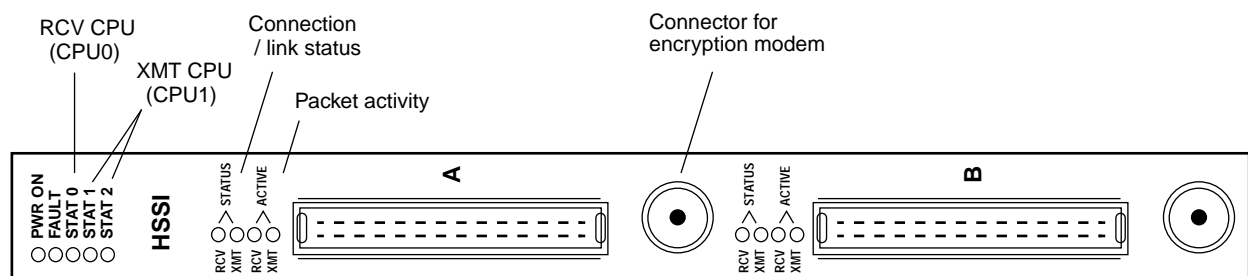

Figure 5-17. HIPPI media card faceplate and LEDs

Refer to Table 5-7 for a description of HIPPI card LEDs.

Table 5-7. HIPPI media card LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Status	When self-test completes, this green LED turns on and remains steadily on during normal operations. The Status LED blinks when an error condition is detected.
DST ENA (local)	This green LED is on when the input destination interface is asserting the interconnect signal and is ready for operation.
SRC ENA (local)	This green LED is on when the output source interface is asserting the interconnect signal and is ready for operation.
DST ENA (remote)	HIPPI directly connects to a HIPPI host or to a network device. This green LED is on when the remote destination interface is asserting the interconnect signal and is ready for operation.
SRC ENA (remote)	HIPPI directly connects to a HIPPI host or to a network device. This green LED is on when the remote source interface is asserting the interconnect signal and is ready for operation.
RX ACT	This green LED indicates data is being received at the input interface, the blink rate depends on the traffic load.
TX ACT	This green LED indicates data is being sent from at the output interface, the blink rate depends on the traffic load.

HSSI media card

A HSSI media card provides two full-duplex interfaces. Figure 5-18 shows a HSSI faceplate.

(g0007)

Figure 5-18. HSSI media card faceplate

Attaching HSSI media cables

The GRF HSSI media card provides two full-duplex attachments and requires a pair of copper cables/connector ends as described in the *HSSI High Speed Serial Interface Design Specification* (March 1990). Figure 5-19 illustrates a HSSI cable connector.

HSSI cables are specified to a length of 15 meters (50 feet). Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils.

**HSSI 50-pin
connector end**
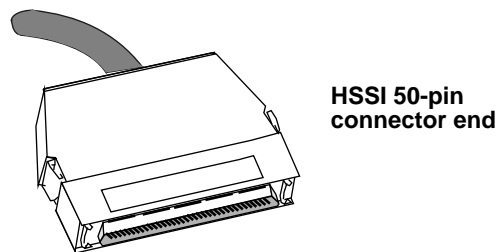
Figure 5-19. HSSI 50-pin connector end

Do not damage the connector ends

Each connector end has 50 fragile pins. Pins can become bent while making the connection to the media card if alignment is wrong. If a HSSI link does not work, check both ends of the cable for bent pins.

Warning: A connector can build up enough charge to disable the media card.
One way to discharge a cable is to run your finger gently over the tips of the pins, touching pins and the connector shell at the same time.

Warnung: Es kann sich genug Ladung in einem Stecker ansammeln, daß die Datenträgerkarte deaktiviert wird. So wird das Kabel entladen: Fahren Sie mit dem Finger vorsichtig über die Spitzen der Stifte; berühren Sie dabei gleichzeitig die Stifte und das Steckergehäuse.

Insert the connector perpendicular to the media card

The EMI shielding fitted inside the connector end can make insertion difficult. Insert the connector end very nearly perpendicular. Pins can be damaged when the connector is inserted at too much of an angle. Seat the connector firmly so the spring clips are engaged.

Problems with bad HSSI cables

Messages similar to the following may show up in the gr.conslog log if a HSSI cable is bad:

```
# grconslog -pf
   [6] [RX] Received with errors.  Desc: 0x642C8002
   [6] [RX]        (Abort.)
   [6] [RX] Received with errors.  Desc: 0x642CC002
   [6] [RX]        (Abort.)
   [6] [RX] Received with errors.  Desc: 0x642D0002
   [6] [RX]        (Abort.)
   [6] [RX] Received with errors.  Desc: 0x642D4002
   [6] [RX]        (Abort.)
```

HSSI card LEDs

Figure 5-20 shows the HSSI faceplate and LEDs. At the top of the HSSI face plate are five LEDs that indicate card status. Each HSSI interface has two sets of LEDs that indicate link and packet information. Each interface has a connector for attaching an encryption modem.

Figure 5-20. HSSI media card faceplate and LEDs

Refer to Table 5-8 for a description of HSSI card LEDs.

Table 5-8. HSSI media card LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Fault	This amber LED turns on and remains on if an error condition is detected.
	The Fault and STAT 0 LEDs alternate during self-test and while the HSSI card is loading. If the HSSI card is dumping, these two flash in unison.
STAT 0 STAT 1	During normal running time, these green LEDs blink together in a heartbeat pattern, one for each CPU on the card.
STAT 2	This green LED is inactive during normal running time.
RCV / XMT Status	These green LEDs indicate the status or viability of the HSSI connection for interface A or interface B.
RCV / XMT Active	These green LEDs indicate the frequency of packet traffic across an interface.

Ethernet media cards

The 8-port Ethernet media card provides eight full-duplex interfaces. Figure 5-21 shows an 8-port faceplate.
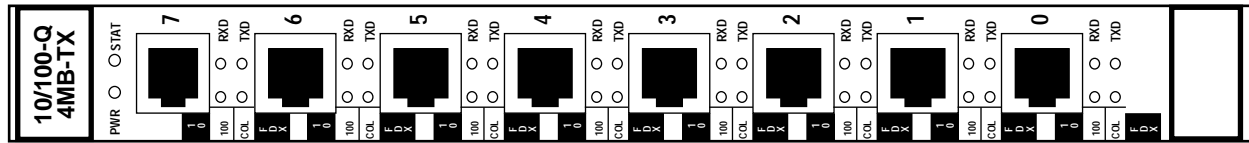
(g0003)

Figure 5-21. Ethernet 8-port media card faceplate

The 4-port Ethernet medis card provides four full-duplex interfaces. Figure 5-22 shows a 4-port faceplate.
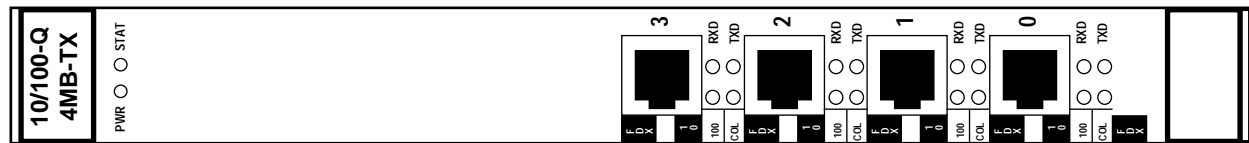
(g0141)

Figure 5-22. Ethernet 4-port media card faceplate

Attaching 10/100Base-T media cables

There are two types of Ethernet 10/100Base-T media cards, one provides four physical interfaces, one provides eight physical interfaces. The cards run the same code, have the same LEDs, and are otherwise the same. Each physical interface is capable of full and half-duplex operation, and can run at either 100 Mb/s or 10 Mb/s rates.

Ethernet cables are specified to a length of 100 meters.

As shown in Figure 5-23, the Ethernet interface requires RJ-45 connectors and Category 5 UTP cables.
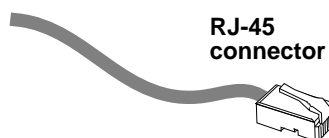
RJ-45 connector

Figure 5-23. Cable connector for a 10/100Base-T interface.

Ethernet card LEDs

Each Ethernet port has a set of four LEDs that describe the presence of a link and its type, the type of duplex or collision interface implemented, and port transfer activity.

An 8-port Ethernet faceplate and LEDs are shown in Figure 5-24.
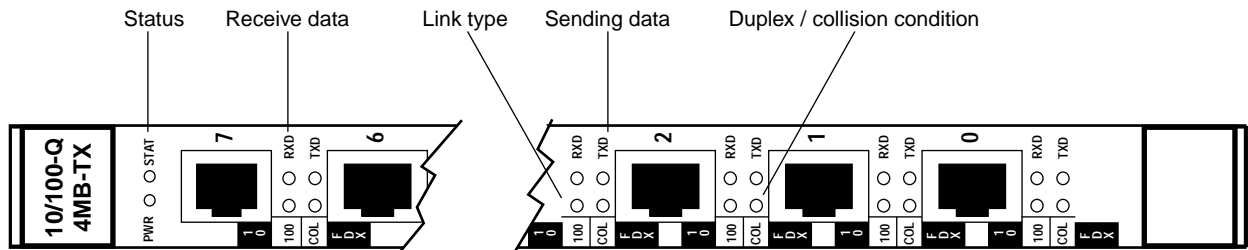
Figure 5-24. Ethernet media card faceplate and LEDs

LEDs for both types of Ethernet cards are described in Table 5-9.

Table 5-9. Ethernet media card LEDs

LED	Description
PWR	This green LED is on when GRF power is on.
STAT	During normal operations, this LED is green.
	If an error condition is detected, this LED turns amber and remains on.
100	This LED is green for a 10 megabit link.
	This LED is amber for a 100 megabit link.
	This LED remains off (dark) when there is no viable link.
COL	This LED reads black (dark) for a half-duplex interface.
	This LED is amber for a half-duplex interface when encountering a transmission collision condition.
	This LED is green for a full-duplex interface.
RXD	This green LED indicates this port is receiving data.
TXD	This green LED indicates this port is transmitting data.

SONET OC-3c media card

The SONET OC-3c media card provides a single redundant full-duplex interface and has hardware-enhanced route table lookup. The SONET card is available in single and multimode versions. Figure 5-25 shows a SONET OC-3c faceplate.

The SONET card provides redundant link connections across two physical interfaces. Only one logical interface is supported. By default, the upper link (A) is active. Use this interface if you are not setting up redundant links. If the active link is terminated, the redundant interface automatically becomes active.

(g0137)
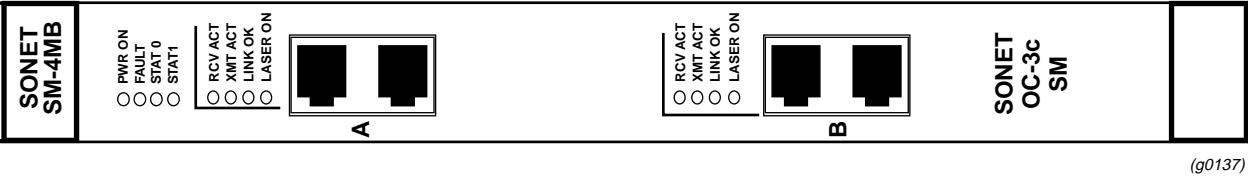
Figure 5-25. SONET OC-3c single mode media card faceplate

Laser safety

The SONET OC-3c single mode media cards contain a Class 1 laser product. The Class 1 laser diode is an integral part of the transceiver module.

CLASS 1 LASER PRODUCT

KLASSE 1 LASER PRODUKT

(g0079)

Warning: Only authorized service personnel should attempt to repair this equipment. All problem discovery and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

Warnung: **Lebenensgefahr** Achtung, nur authorisiertes Kundendiestpersonal darf dieses Geraet reparieren. Alle Fehler- und Reparaturvorschriften sehen nur den Austausch von Baugruppen oder Module vor. Wegen der Komplexitaet der einzelnen Platinen und Baugruppen soll niemand versuchen Reparaturen auf der Bauteilebene oder Modifikationen an den Platinen vorzunehmen. Falsche Reparaturen koennen lebensgefaehrlich sein.

Table 5-10 provides technical information about the laser diode on the SONET OC-3c single mode media card:

Table 5-10. SONET OC-3c single mode laser information

Manufacturer	Amp Inc.
Part number	269085-1
Laser type	InGaAsP diode
Wave length	1310 nm (+/- 50 nm)
Output power	-14dBm min., -8dBm max
Agency approvals	TUV Rheinland - EN 60950 - EN 60825-1 - EN 60825-2 Complies with 21 CFR 1040.10 and 1040.11

Attaching SONET media cables

GRF SONET OC-3c media cards are available in both multimode and single mode.

A multimode card requires duplex SC fiber optic cable and has a distance limitation of approximately two kilometers. A single mode card requires simplex SC fiber optic cable and has a distance limitation of approximately 15 kilometers. Figure 5-26 shows both types of cables. Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils. Not only are fiber cables easier to damage than coax and other types of cables, but the damage is harder to detect.
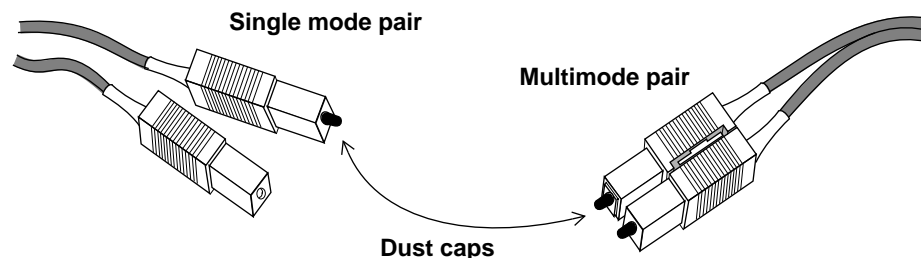
Figure 5-26. Single and multi-mode SONET cable ends

Keep cables off the floor

Cables left on the floor can get damaged. The resulting broken fiber might work fine temporarily but begin to cause problems when the cable is moved or bent the other way.

Keep the connectors clean

A broken cable or dirty connector can deliver data, but with errors. Attaching a dirty connector can soil the optical component on the media card. Leave the dust caps on until you are ready to insert the cable ends.

⚠ **Caution:** Although there may be no hazard with multimode fiber, it is not a wise practice to look into the end of any fiber optic cable.

Vorsicht: Obwohl Multimodenfasern voraussichtlich keine Gefahr darstellen, empfiehlt es sich, nicht in das Ende eines Glasfaserkabels hineinzuschauen.

SONET card LEDs

The top four LEDs indicate card status. The SONET media card has two duplex interfaces, A and B, and each interface has its own set of three LEDs. Refer to Figure 5-27.

(g0140)
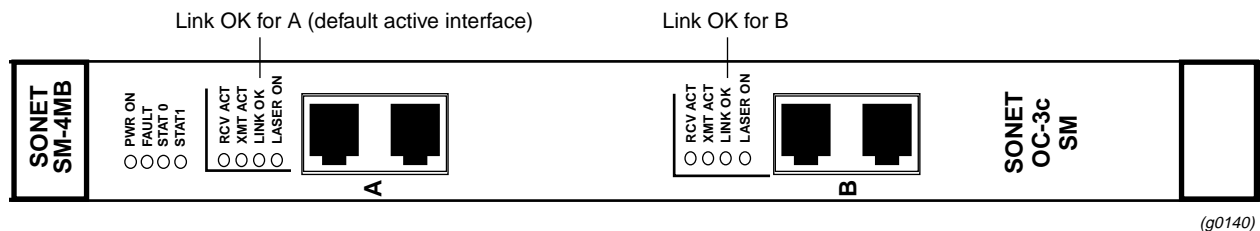
Figure 5-27. SONET OC-3c single mode media card faceplate and LEDs

Table 5-11 describes the SONET card LEDs.

Table 5-11.SONET OC-3c LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Fault	This amber LED turns on and remains on if an error condition is detected.
STAT 0 STAT 1	These green LEDs blink during self-test. When self-test completes, STAT 0 blinks ten times a second and STAT 1 blinks once a second. STAT 0 and STAT 1 indicate the activity of normal system interrupts. If the media card hangs, they either turn off and remain off, or they turn on and remain on.
RCV ACT	This amber LED blinks as data is received at the interface.
XMIT ACT	This amber LED blinks as data is transmitted out of the interface.
LINK OK	This green LED is on steadily to indicate which of the interfaces is active. The LED for the non-active interface blinks on and off.
LASER ON	This green LED provides a safety warning on single mode SONET cards. One should not look into a laser-active interface component if a cable is not plugged in.

Media card reset and checkout

This section describes tools available from the system software to check out newly-installed media cards. These tools are to be used on the GRF router

- The **ping** command tests whether a media card can process and return a message.

- The **grcard** command tells you the operating state of an installed media card.

- The **grreset** command allows you to reset all or an individual media card.

Verify media card operation using ping

Check media card viability using the **ping** command. This UNIX command is modified to support GRF board components. This use of **ping** only tests internal communication between the GRF control board and the specified media card. It does not test message routing between media cards or communication between media cards and external devices.

Note: The **ping** command can be used without disturbing normal GRF operations.

The **ping -P grid** *<slot number>* command sends a message to a specified media card asking the media card to respond back with another message.

1 Log in as `root`.

2 Enter a **ping** command. Specify the appropriate media card by its chassis slot number.

For example, to act on the media card in slot 3, enter:
```
# ping -P grid 3
```

This is what you see when the media card responds:

```
68 bytes from 0:0x3:0:  time=0.293 ms
68 bytes from 0:0x3:0:  time=0.251 ms
68 bytes from 0:0x3:0:  time=0.288 ms
                    •
                    •
                    •
```

Do a Control+C to stop the ping and view ping statistics:

```
-- 2 GRID ECHO Statistics --
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max = 0.969/1.060/1.172 ms
```

To act on the control board, enter:
```
# ping -P grid 66
```

Refer to the *GRF Reference Guide* for a description of the **ping** command.

Check media card status using grcard

The **grcard** command returns information about the status of all installed media cards.

Enter:

```
# grcard -v
```

Here is a sample of the slot, media, and state information returned from the **grcard** command:

```
# grcard -v
Slot    HWtype     State
0       HSSI_V1    running
1       ATM_OC3_V1      running
2       FDDI_V1    running
3       FDDI_V2    running
```

Refer to the command descriptions in the *GRF Reference Guide* for a description of **grcard**.

Media card states

The following states are reported:

POWER-UP   - initial state of a card at system power on
BOOT-REQUESTED   - card has requested its run-time code
DUMPING   - card is being dumped
LOADING   - card is receiving run-time code
CONFIGURING   - card has requested its configuration tables
RUNNING   - card is configured and operating
NOT-RESPONDING   - card does not respond to requests from the management software
PANIC   - card has encountered a system fault
HELD-RESET   - card is being held in reset state
STATE UNKNOWN   - state cannot be determined

The Power-up state is the normal condition as power is being applied to the media card.

The Boot-requested state is one step in the progress of a card during initial power-up, while a card is coming up, or while a card is being reset due to user or software direction.

Dumping is the resulting state when a card is directed to dump at reset, at a panic, or as user-specified in the Dump or Card profile.

Loading is a state during which the card receives its run-time image.

Configuring is a waiting state for the media card after it issues a request for configuration parameters. The card stays in the configuring state after being loaded until it has all necessary configuration information, is initialized, and the kernel recognizes that the card is up.

Running is the normal operating state, the card is able to receive and send packets.

Not-responding is a state in which the card does not answer requests from the operating software. The card could be hung. If it decides a card is hung, the kernel begins an automatic reset.

A system fault can cause a card to go into the Panic state. After a card panics, it needs operator or kernel intervention to start up. The kernel either reboots the card, or dumps and then reboots, depending upon how variables are set in the Dump or Card profile.

An operator can use the **grreset -h** command to put a card into the Held_reset state to keep it up but not transferring packets.

When the kernel cannot determine what a media card is doing, it places the card into State unknown, and either reboots the card, or dumps and then reboots the card, depending upon how variables are set in the Dump or Card profile.

Reset media card using grreset

Use the **grreset** command to reset a media card from the UNIX prompt.

1 Log in as root.

2 Enter the **grreset** command.
Specify the appropriate media card by its chassis slot number.

To reset all the media cards, enter:
    # grreset all

To reset the media cards in slots 0 and 1, enter:
    # grreset 0 1

To reset the card in slot 4 and dump its memory, enter:
    # grreset -D 4

To reset the card in slot 4 and return debug information, enter:
    # grreset -d 4

Note: The **grreset** command can be used on a media card without disturbing normal GRF system operations.

Refer to the command descriptions in the *GRF Configuration and Management* manual for a description of **grreset**.

Rebooting the system

You shut down the system depending upon how you connect to the GRF. When you are using the VT 100 terminal (or laptop), use the **grms** command. When you are have logged into the GRF from a remote workstation on the administrative Ethernet, use the **shutdown** command.

Rebooting from the VT 100 terminal - grms

Use the **grms** command to halt, reboot, or shut down the system from the UNIX prompt.

grms performs the same function as **shutdown** but does not require the user to be logged in as root. However, it can only be used from the control board VT-100 terminal. Use **shutdown -r now** if you manage the GRF from a remote terminal.

The **grms** command performs an orderly shutdown, saving memory and allowing any transfers to complete. When the reboot option is specified, the system is rebooted and all media cards are reset.

1   Attach a keyboard to the VT-100 terminal and log in. You do not have to be root.

2   Enter the **grms** command with one of its options:
   With the **-h** option, **grms** halts the system (like **shutdown -h now**).
   With the **-r** option, **grms** performs an orderly reboot of the system (like **shutdown -r now**).
   With the **-s** option, **grms** performs an orderly shutdown of the system. To restart, enter the **reboot** command.

Rebooting from a remote workstation - shutdown

If you manage the GRF from a remote station, use the **shutdown** command to reset the system from a UNIX prompt.

The **shutdown** command performs an orderly shutdown, saving memory and allowing any transfers to complete. With the **-r** and **now** options, the command performs an orderly reset of the system. It also issues a special command to the control board to restart the GRF immediately.

1   Log in as root.

2   Enter the **shutdown -r now** command.

After the shutdown completes, the prompt appears and you can log in again.

Running media card hardware diagnostics

You can run a basic diagnostic command that will tell you if a media card has a hardware problem. The **grdiag** command performs internal BIST-level diagnostics. A media card that fails this **grdiag** must be replaced and returned to Ascend. You can run **grdiag** on one or more cards without interrupting other media cards or system operation. Only HIPPI media cards do not support the **grdiag** command

The **grdiag** script puts the selected media card(s) into diagnostic mode and runs the diagnostics. After the diagnostics complete, **grdiag** reloads the media card's software and configuration currently saved in flash memory, then reboots the card. For this reason, it is very important that you save any configuration changes before you run **grdiag**. Unsaved media card changes will be lost.

For **grdiag** to run, a card must be able to boot. If the **grcard** display does not include the slot in which the problem card resides, **grdiag** cannot operate on that card.

More information is available in the "Management Tools" chapter of the *GRF Configuration and Management* manual.

Special login

Do not log in directly as root to use the **grdiag** command. To use **grdiag**, you must log in as a user and then **su** to root.

This example uses the netstar login (password = Ascend) that a GRF is shipped with:

```
User: netstar
Password: ......
erase ^H, kill ^U, intr ^C status ^T
$
```

If you changed the default password Ascend as recommended, use the new password.

At the next prompt, enter **su** and use the root password at the prompt. You will see the UNIX prompt appear:

```
$ su
Password:
#
```

Now you can run **grdiag**.

Running grdiag

The **grdiag** command starts a script. The script is simple to run. Here are the choices you make:

– choose to save unsaved changes – y / n ?

– enter slot number(s) of media card(s) to test

Enter the **grdiag** command:

```
# grdiag
```

```
                       Portcard Field Diagnostic
     ####################################################################
     # WARNING: Make sure your current Configuration is Saved to FLASH!! #
     ####################################################################

     If Not Would you Like to Save it Now  y/n? [y]:
```

You see this warning whether or not there are unsaved configuration changes. If you enter yes, save changes, the activity on internal flash is reported back:

```
     If Not Would you Like to Save it Now  y/n? [y]: y
     Device /dev/wd0a mounted on /flash.
     Device /dev/wd0a unmounted.
```

If you enter No and you do have unsaved changes, the last-saved configuration will be reloaded after the diagnostic sequence runs. A reply is not made to a No entry.

The first **grdiag** display is an inventory of the current media card status
 "N/A" indicates that these diagnostics do not run on the HIPPI card):

```
     ------------------------------------------------------------------------
     -                      Media Card Inventory                            -
     ------------------------------------------------------------------------
     Slot     Card Type       Card Status    Test Status
     ----     ---------------  ------------   ------------
     0        atm-oc3-v2       running
     1        atm-oc3-v2       running
     2        hssi             running
     3        hippi-v1         running        N/A
```

After the inventory display, you enter the slot numbers of the card(s) you want to test:

```
     Enter the media card slot numbers to test
        Use "all" or a space separated list (0 1 2 etc.): 1 2
```

The list of cards queued to be tested is displayed:

```
     ------------------------------------------------------------------------
     -                      Cards Queued for Test                           -
     ------------------------------------------------------------------------
     Slot     Card Type       Card Status    Test Status
     ----     ---------------  ------------   -----------
     0        atm-oc3-v2       running
     1        atm-oc3-v2       running        Queued
     2        hssi             running        Queued
     3        hippi-v1         running        N/A

     Are you absolutely sure you want to proceed?  y/n? [No]:
```

After the queue list is displayed, you are asked to verify that you want to start the diagnostic, the default is No. If you answer No, you are given a chance to change the parameters you have already specified. If you answer No again to changing parameters, the **grdiag** script ends and you are back at the shell prompt.

```
Are you absolutely sure you want to proceed?  y/n? [No]: n
  Re-enter test parameters?  y/n? [No]: n
#
```

If you enter Yes, continue with the diagnostic, **grdiag** automatically accesses the CLI and reads the target card(s) Card profile(s).

Activity during testing

grdiag saves the card's last-saved configuration to a file, and then changes Card profile load parameters so that the diagnostic code is loaded and run as you specified. The new settings are saved just as they are when you change parameter settings.

You may see some of this activity on the screen, most of it speeds by too quickly to read.

During the test you see **grdiag** reports that show loading and testing events:

```
************************************************************************
*              Waiting 114 sec. for Queued Cards to Load              *
************************************************************************
Slot      Card Type         Card Status    Test Status
----      ---------------   -------------  ------------
0         atm-oc3-v2        running
1         atm-oc3-v2        loading        Queued
2         hssi              loading        Queued
3         hippi-v1          running        N/A

Test started: Mon Apr 20 13:24:44 CDT 1998; Tested by: netstar
Test time: 0 hrs; 0 min; 1 sec.

************************************************************************
*                 Field Diagnostic Test in Progress                  *
************************************************************************
Slot      Card Type         Card Status    Test Status
----      ---------------   -------------  ------------
0         atm-oc3-v2        running
1         atm-oc3-v2        diagnostic     Testing
2         hssi              diagnostic     Testing
3         hippi-v1          running        N/A
```

The testing report is updated five or six times a minute:

Testing completes

As the diagnostics complete, **grdiag** again accesses the Card profiles and writes the parameters back to the original settings. A tested card is rebooted even if it failed the diagnostic. Again, the display speeds by too quickly to read:

After the cards reboot, you see the final report. This report is also sent to /var/log/grdiag.log:

```
Test time: 0 hrs; 2 min.  End date: Mon Apr 20 13:27:49 CDT 1998
************************************************************************
```

```
*            Field Diagnostic Test Ended. 2 Passed 0 Failed.          *
**********************************************************************
Slot      Card Type        Card Status    Test Status
----      ---------------- -------------  ------------
0    atm-oc3-v2          running
1    atm-oc3-v2          Idle           Passed
2    hssi                Idle           Passed
3    hippi-v1            running        N/A
```

Though the Card Status is reported as idle, the cards are actually up. Use **grcard** to verify card status:

```
# grcard
 0       ATM_OC3_V2      running
 1       ATM_OC3_V2      running
 2       HSSI_V1         running
 3       HIPPI_V1        running
#
```

If a card fails...

This is the report you see when a media card fails the diagnostic. It is the same information sent to /var/log/grdiag.log:

```
Start date: Mon Apr 20 19:40:12 CDT 1998;  Tested by: netstar
Test time: 0 hrs; 10 min.  End date: Mon Apr 20 19:51:18 CDT 1998
**********************************************************************
*            Field Diagnostic Test Ended. 3 Passed 1 Failed.         *
**********************************************************************

Slot     Card Type       Card Status    Test Status
----     --------------- -------------  ------------
0    ethernet-v1         BIST monitor   Failed
1    hssi                Idle           Passed
2    fddi-v2             Idle           Passed
3    fddi-v2             Idle           Passed


!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!                 Possible Additional Error Information             !
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!


Filtered contents of /var/log/gr.console:

Apr 20 19:51:05> [RMS] rmb0: Resetting Media Card 0
Apr 20 19:51:18> [1] UNEXPECTED Router Manager Interrupt
Apr 20 19:51:18> [2] UNEXPECTED Router Manager Interrupt
Apr 20 19:51:18> [3] UNEXPECTED Router Manager Interrupt
```

Remember that the error code is sent to the /var/log/gr.console log.

Error reporting

grdiag reports to `/var/log/grdiag.log` and to the `/var/log/gr.console` log. If you are logging remotely, check that location for **grdiag** reports.

Pass-fail status reports from the diagnostic tests are sent to `/var/log/grdiag.log`. This is the same information that is displayed to you after **grdiag** completes:

```
# vi /var/log/grdiag.log

Start date: Mon Apr 20 19:40:12 CDT 1998;  Tested by: netstar
Test time: 0 hrs; 10 min.  End date: Mon Apr 20 19:51:18 CDT 1998
*************************************************************************
*          Field Diagnostic Test Ended. 3 Passed 1 Failed.            *
*************************************************************************
Slot     Card Type       Card Status   Test Status
----     ---------------  ------------  -----------
0        ethernet-v1     BIST monitor   Failed
1        hssi            Idle           Passed
2        fddi-v2         Idle           Passed
3        fddi-v2         Idle           Passed
```

Event and error code reporting is done in the `gr.console` log. The diagnostic start and stop events are reported:

```
# vi gr.console
!! Start of Diagnostic Test !!
    .
    .
    .
!! End of Diagnostic Test !!
```

If a media card fails, an error code is reported to `gr.console` log. The first two digits are the slot number of the failed media card. The next number is the major error descriptor, the last number is the minor descriptor. Record the error code and send it to your support staff.

In this example, the card in slot 1 has failed:

```
                                 Slot   Major   Minor
!! End of Diagnostic Test !!      |      /      /
Built-In Self-Test Error Code = 01-3333-44
```

Stopping or halting grdiag

You can use Control+C to stop the diagnostic sequence at any time. After you enter Control+C, **grdiag** reloads the card's run-time binary and last-saved configuration, and then reboots the card.

What to do next...

You have verified that the system and media card hardware is operating. Go to the *GRF Configuration and Management* manual to learn more about using the CLI and completing media card configuration.

GRF Specifications

A

Appendix A contains the following specifications for the GRF 400 and 1600 routers:

General specifications

Configuration information is stored in non-volatile memory. When the GRF is turned off, configuration data is not lost.

Note: Use a protected AC power source, or add surge protection between the power source and the GRF chassis.

Environmental requirements

Operating temperatures:	32°–104°F (0°–40°C)
Operating humidity level:	10% – 90%, non-condensing
Altitude:	0 to 10,000 feet (0 to 3048 meters)

GRF 400 chassis specifications

Table A-1 lists the general characteristics of the GRF 400 chassis.

Table A-1. GRF 400 chassis characteristics

Element	Value
Weight	26.5 pounds, chassis and one power supply (11.9 kg)
Dimensions	5.25 in (H) x 19 in (W) x 19 in(L) (13.34 cm x 48.26 cm x 48.26 cm)
Media cards	1–4 per chassis, multiple media types supported simultaneously
	Card dimensions: 9 in high x 16 in long (22.9 cm x 40.6 cm)
	Card weight: approximately 2 pounds each (0.9 kg)
	Hot-swap capability: all media cards are hot-swappable
AC power supply	400W, with an option for a redundant load-sharing unit - double-pole/neutral fusing - weighs 6 pounds (2.7 kg)
AC receptacle	Standard US 3-prong plug, 115 V grounded receptacle (international options available)
AC cord	- North America: UL listed, CSA certified, type SJT or SVT, 3-conductor, 18AWG minimum
	- outside of North America: Agency-approved for the country of use, cord type H05VVF3G1.0, 3-conductor, 1.0mm^2, rated 250V, 10A, plug type suitable for country of use.
AC voltage	100–240 VAC, 6.0–3.0 Amp maximum
	Phase: single
	Frequency: 60/50 Hz
	Power usage: 400W (nominal)
DC power supply	400W, with an option for a redundant load-sharing unit - weighs 6 pounds (2.7 kg)

GRF 1600 chassis specifications

Table A-2 lists the general characteristics of the GRF 1600 chassis.

Table A-2. GRF 1600 chassis characteristics

Element	Value
Weight	103.5 pounds, chassis and one power supply (46.6 kg)
Dimensions	23.0 in (H) x 19 in (W) x 21 in (L) (58.4 cm x 48.26 cm x 53.3 cm)
Media cards	1–16 per chassis, multiple media types supported simultaneously
	Card dimensions: 9 in high x 16 in long (22.9 cm x 40.6 cm)
	Card weight: approximately 2 pounds each (0.9 kg)
	Hot-swap capability: all media cards are hot-swappable
Fan tray	Single 48V unit with 2 motorized impeller fans - field replaceable module - weighs 13 pounds (5.85 kg)
AC power supply	1100W, with an option for a redundant load-sharing unit - double-pole/neutral fusing - weighs 21 pounds (9.45 kg)
AC receptacle	IEC320-C19 to NEMA 5-15P power cord (international options available)
AC power cord	- North America: UL listed, CSA certified, type SJT or SVT, 3-conductor, 18AWG minimum
	- outside of North America: Agency-approved for the country of use, cord type H05VVF3G1.0, 3-conductor, 1.0mm^2, rated 250V, 16A, plug type suitable for country of use.
AC voltage	100–240 VAC, 85–264 VAC maximum
	Phase: single
	Frequency: 60/50 Hz
	Power usage: 1100W (nominal)
DC power supply	1100W, with an option for a redundant load-sharing unit - weighs 13 pounds (5.9 kg)

DC power requirements

Power requirements for individual GRF components are as follows:

Table A-3. DC power requirement per individual components

Component	Max Amps/+5.0 V	Max Amps/-5.2 V	Watts/unit
HIPPI media card	8.8	0	44.0
FDDI/Q media card	9.4	0	47.0
ATM OC-3c/Q media card	9.0	0	45.0
ATM OC-12c media card	9.0	0	45.0
HSSI media card	10.0	0	50.0
4-port 10/100Base-T card	5.6	0	28.0
8-port 10/100Base-T card	8.0	0	40.0
SONET OC-3c media card	10.0	0	50.0
GRF 400 control board	5.0	0	25.0
GRF 1600 control board	3.0	0	15.0

GRF 400 control board specifications

The GRF 400 control board has the following characteristics:

Table A-4. Characteristics of the GRF 400 control board

Element	Value
Processor	Intel Pentium 166 MHz
RAM	64MB basic, 256MB maximum (upgrade in 64MB increments) (8 SIMM sockets for 32MB SIMMs)
Flash memory, internal	85MB ATA flask device
Serial adapter	1 UART
100/10Base-T connector	1 autosensing, connects to PCI local bus
Temperature sensor	Senses system warning and shutdown temps, enables actual IC temperature to be read, reported on by **temp** command
Ethernet address PROM	System IP address memory (32 bytes)
Switch component	16 Gb TriQuint component
PCMCIA host adapter	2, one 85- or 175MB ATA flash device can be installed, PCMCIA modem card is another option

GRF 1600 control board specifications

The GRF 1600 control board has the following characteristics:

Table A-5. Characteristics of the GRF 1600 control board

Element	Value
Processor	Intel Pentium 166 MHz
RAM	64MB basic, 256MB maximum (upgrade in 64MB increments) (8 SIMM sockets for 32MB SIMMs)
Flash memory, internal	85MB ATA flask device
Serial adapter	1 UART
100/10Base-T connector	1 autosensing, connects to PCI local bus
Temperature sensor	Senses system warning and shutdown temps, enables actual IC temperature to be read, reported on by **temp** command
Ethernet address PROM	System IP address memory (32 bytes)
PCMCIA host adapter	2, one 85- or 175MB ATA flash device can be installed, PCMCIA modem card is another option

Cable types

GRF media cards use the following industry-standard cables:

Table A-6. Media card cable specifications

Cables/Card	Description
HSSI	25 twisted-pair shielded coax cables
ATM OC-3c multimode	62.5/125 micron fiber optic cables
ATM OC-3c single mode	9/125 micron fiber optic cables
ATM OC-12c multimode	62.5/125 micron fiber optic cables
ATM OC-12c single mode	9/125 micron fiber optic cables
4-port 10/100Base-T	Category 5 UTP cables
8-port 10/100Base-T	Category 5 UTP cables
SONET OC-3c multimode	62.5/125 micron fiber optic cables
SONET OC-3c single mode	9/125 micron fiber optic cables
FDDI multimode	62.5/125 micron fiber optic cables
HIPPI	Twisted-pair copper cables in 5-, 25-, or 51-meter lengths. Ascend certifies the viability of GRF-to-GRF connections using 51-meter cables and sells HIPPI cables directly.

Media card specifications

FDDI specifications

The FDDI media card has the following characteristics:

Table A-7. FDDI media card specifications

Element	Value
Interfaces per card	Four bi-directional interfaces, multimode All has unique IP and MAC addresses, are configurable as: - two dual-attach interfaces - one dual-attach interface and two single-attach interfaces - four single-attach interfaces
Media transfer rate	100 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB input, 4 MB output
Route table support	150K entries, with hardware-assisted route table lookup
Max transmission unit	4352 bytes
Connectors	MIC tranceivers
Connector requirements	Must meet ANSI X3.166 standards
Cables	Multi-mode cables: 62.5/125micron optical fibre
Optic components	Internally-produced 1,300 nm surface-emitting LEDs and photodiodes
Optical output	19 dBm minimum, 14 dBm minimum (avg.) (62.5/125 um)
Optical input sensitivity	33.5 dBm minimum, 14 dBm maximum
Optical wavelength	1,270 nm minimum, 1,330 nm typical, 1,380 nm maximum
Spectral width	130 nm maximum

ATM OC-3c specifications

The ATM OC-3c media card has the following characteristics:

Table A-8. ATM OC-3c media card specifications

Element	Value
Interfaces per card	Two bi-directional interfaces - single mode card - multimode card
Media transfer rate	155 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries, with hardware-assisted route table lookup
SDH (STM-1)	Complies with Synchronous Digital Hierarchy standards
Max transmission unit	9180 bytes
Cables	Single-mode cables: 9/125 micron optical fibre Multi-mode cables: 62.5/125micron optical fibre
Connectors	Duplex SC transceivers
Connector requirements	Must meet JIS C 5973 standards
LASER components	Class 1, 1310 nm LASER diodes
Optical input	Single-mode: 32.5 dBm minimum, 8 dBm maximum Multi-mode: 32.5 dBm minimum, 14 dBm maximum
Optical output (avg.)	Single-mode: 14 dBm minimum, 8 dBm maximum Multi-mode: 19 dBm minimum, 14 dBm maximum
Optical wavelength	Single-mode: 1,261 nm min, 1,310 nm typical, 1,360 nm max Multi-mode: 1,270 nm min, 1,310 nm typical, 1,380 nm max
Spectral width	Single-mode: 7.7 nm maximum Multi-mode: 120 nm typical, 200 nm maximum

ATM OC-12c specifications

The ATM OC-12c media card has the following characteristics:

Table A-9. ATM OC-12c media card specifications

Element	Value
Interfaces per card	Two bi-directional interfaces - single mode card - multimode card
Media transfer rate	622 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries, with hardware-assisted route table lookup
SDH (STM-1)	Complies with Synchronous Digital Hierarchy standards
Max transmission unit	9180 bytes
Cables	Single-mode cables: 9/125 micron optical fibre Multi-mode cables: 62.5/125micron optical fibre
Connectors	Duplex SC transceivers
Connector requirements	Must meet JIS C 5973 standards
LASER components	Class 1, 1310 nm LASER diodes
Optical input	Single-mode: 28 dBm minimum, 7 dBm maximum Multi-mode: 26 dBm minimum, 14 dBm maximum
Optical output (avg.)	Single-mode: 15 dBm minimum, 8 dBm maximum Multi-mode: 20 dBm minimum, 14 dBm maximum
Optical wavelength	Single-mode: 1,261 nm min, 1,310 nm typical, 1,360 nm max Multi-mode: 1,270 nm min, 1,310 nm typical, 1,380 nm max
Spectral width	Single-mode: 7.7 nm maximum Multi-mode: 120 nm typical, 200 nm maximum

10/100Base-T specifications

The 10/100Base-T media card has the following characteristics:

Table A-10.10/100Base-T media card specifications

Element	Value
Interfaces per card:	4-port - four auto-sensing bi-directional interfaces 8-port - eight auto-sensing bi-directional interfaces
Media transfer rate	10 or 100 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries, with hardware-assisted route table lookup
Max transmission unit	1500 bytes
Connectors	RJ-45
Cables	STP and UTP Category 5
Transmission distance	100 meters

HSSI specifications

The HSSI media card has the following characteristics:

Table A-11.HSSI media card specifications

Element	Value
Interfaces per card	Two bi-directional interfaces
Media transfer rate	52 Mbps (OC-1), 45 Mbps (DS3), 34 Mbps (E3)
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries
Framing protocols	Frame Relay, PPP, HDLC
Max transmission units	Frame Relay-4352 bytes, PPP-1496 bytes, HDLC-4352 bytes
Connectors	2-row, 50-pin shielded tab connectors
Cables	Two 25 twisted-pair shielded coax cables
Cable receptacles	2-row, 50-pin receptacle heads

HIPPI specifications

The HIPPI media card has the following characteristics:

Table A-12.HIPPI media card specifications

Element	Value
Interfaces per card	One dual-simplex interface
Media transfer rate	800 Mbps
Processor	40-MHz TI C31
Data buffers	4 MB input, 4 MB output
Route table support	70K entries
Max transmission unit	65280 bytes
Transmission distance	Point-to-point and LAN, up to 25 meters (82 feet) Ascend certifies viability of GRF-to-GRF connections using 51-meter cables
Card connectors	2-row, 100-pin panel-mount receptacle as specified in HIPPI-PH
Cable connectors	2-row, 100-pin shielded tab connectors as specified in HIPPI-PH
Cables	Twisted-pair copper: 5, 25, and 51 meters, available from Ascend

SONET OC-3c specifications

The SONET OC-3c media card has the following characteristics:

Table A-13. SONET OC-3c media card specifications

Element	Value
Interfaces per card	One full duplex OC-3c SONET/STM-1 SDH - supports an APS 1+1 Architecture Switching - single mode, multimode
Media transfer rate	155 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries, with hardware-assisted route table lookup
SDH (STM-1)	Complies with Synchronous Digital Hierarchy standards
Max transmission unit	9180 bytes
Transmission distance	LAN, WAN distances with use of repeaters
Cables	Single-mode cables: 9/125 micron optical fibre Multi-mode cables: 62.5/125micron optical fibre
Physical connectors	Duplex SC transceivers
Connector requirements	Must meet JIS C 5973 standards
LASER components	Class 1, 1310 nm LASER diodes
Optical input	Single-mode: 32.5 dBm minimum, 8 dBm maximum Multi-mode: 32.5 dBm minimum, 14 dBm maximum
Optical output (avg.)	Single-mode: 14 dBm minimum, 8 dBm maximum Multi-mode: 19 dBm minimum, 14 dBm maximum
Optical wavelength	Single-mode: 1,261 nm min, 1,310 nm typical, 1,360 nm max Multi-mode: 1,270 nm min, 1,310 nm typical, 1,380 nm max
Spectral width	Single-mode: 7.7 nm maximum Multi-mode: 120 nm typical, 200 nm maximum

Warranty

B

Appendix B contains warranty information for the following Ascend products:

- GRF 400 (GRF-4-AC)
- GRF 400 (GRF-4-DC)
- GRF 1600 (GRF-16-AC)
- GRF 1600 (GRF-16-DC)

Product warranty

1   Ascend Communications, Inc. warrants that the GRF 400, GRF 1600, and GR-II will be free from defects in material and workmanship for a period of twelve (12) months from date of shipment.

2   Ascend Communications, Inc. shall incur no liability under this warranty if

- the allegedly defective goods are not returned prepaid to Ascend Communications, Inc. within thirty (30) days of the discovery of the alleged defect and in accordance with Ascend Communications, Inc.'s repair procedures; or

- Ascend Communications, Inc.'s tests disclose that the alleged defect is not due to defects in material or workmanship.

3   Ascend Communications, Inc.'s liability shall be limited to either repair or replacement of the defective goods, at Ascend Communications, Inc.'s option.

4   Ascend Communications, Inc. MAKES NO EXPRESS OR IMPLIED WARRANTIES REGARDING THE QUALITY, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE BEYOND THOSE THAT APPEAR IN THE APPLICABLE Ascend Communications, Inc. USER'S DOCUMENTATION. Ascend Communications, Inc. SHALL NOT BE RESPONSIBLE FOR CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGE, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR DAMAGES TO BUSINESS OR BUSINESS RELATIONS. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES.

Warranty repair

1   During the first three (3) months of ownership, Ascend Communications, Inc. will repair or replace a defective product covered under warranty within twenty-four (24) hours of receipt of the product. During the fourth (4th) through twelfth (12th) months of ownership, Ascend Communications, Inc. will repair or replace a defective product covered under warranty within ten (10) days of receipt of the product. The warranty period for the replaced product shall be ninety (90) days or the remainder of the warranty period of the

original unit, whichever is greater. Ascend Communications, Inc. will ship surface freight. Expedited freight is at customer's expense.

2 The customer must return the defective product to Ascend Communications, Inc. within fourteen (14) days after the request for replacement. If the defective product is not returned within this time period, Ascend Communications, Inc. will bill the customer for the product at list price.

Out-of warranty repair

Ascend Communications, Inc. will either repair or, at its option, replace a defective product not covered under warranty within ten (10) working days of its receipt. Repair charges are available from the Repair Facility upon request. The warranty on a serviced product is thirty (30) days measured from date of service. Out-of-warranty repair charges are based upon the prices in effect at the time of return.

GRF 400 Agency Notices

C

This appendix contains Agency information for the GRF-4-AC and GRF-4-DC models.

GRF 400 agency regulatory notices

Agency status

Safety

UL	- ANSI/UL 1950
CUL	- CAN/CSA-C22.2 No. 950
TUV GS	- EN 60950

EMC

FCC Class A	(commercial or industrial environments)
CE Mark	EN 55022 (Class A emissions)
	EN 50082-2 (heavy industry immunity)
Canadian DOC Radio Interference Regulation, Class A	
VCCI Class 1	(commercial or industrial environments)

Installation conditions and limitations

1 Enclosure must have all access panels in place and secured. All available slots must be filled with media cards or filler cards.

2 Substitution of unapproved or modified components, subassemblies, or modules may result in increased radiated emissions and/or increased susceptibility to radiated fields from other equipment.

3 All data, signal, and control cables connected to the equipment must be of the shielded type with metallic connector hoods, except for ethernet cables, fiber optic cables, and power cords, which are unshielded. Connectors with jackscrews should be securely tightened.

4 Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils.

Canadian notice

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

European Union notice

Warning:
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Federal Communications Commission notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

VCCI Class 1 notice

The GRF-4-AC and GRF-4-DC conform to Class 1 standards of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). Acceptance number: 44143

注意
　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づく第一種情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Caution:
This is a Class 1 product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Non-telecommunication port

(g0100)

HERGESTELLT-VON: Ascend Communications, Inc.
High Performance Networking Division
10250 Valley View Road
Eden Prairie, MN 55344

MODELL: GRF-4-AC   GRF-4-DC

STROMAUFNAHME:

Voltage:	100–240 VAC	48VDC–60VDC
Frequency:	50–60 Hz	N/A
Current:	6.0–3.0 A	7.0A

The Manufacturer / Supplier: Ascend Communications, Inc.
High Performance Networking Division
10250 Valley View Road
Eden Prairie, MN 55344

Declares that: GRF-4-AC and GRF-4-DC
are not intended to be connected to a public telecommunications network.

The connection of such equipment to a public telecommunications network in a European Community Member State will be in violation of the national law implementing Directive 91/263/EEC on the approximation of the laws of the Member States concerning telecommunication terminal equipment, including mutual recognition of their conformity.

Der Hersteller / Lieferant: Ascend Communications, Inc.
High Performance Networking Division
10250 Valley View Road
Eden Prairie, MN 55344

erklärt daß: GRF-4-AC and GRF-4-DC
nicht zum Anschluß an ein öffentliches Telekommunikationsnetz bestimmen sind.

Der Anschluß dieses Gerätes an ein öffentliches Telekommunikationsnetz in den EG-Mitgliedstaaten verstößt gegen die jeweiligen einzeistaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angeichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einshließlich der gegenseitigen Anerkennung ihrer Konformität.

EC declaration: GRF-4-AC

EC Declaration of Conformity

(g0101)

We   Ascend Communications, Inc.
High Performance Networking Division
10250 Valley View Road
Eden Prairie, MN 55344

declare under the sole responsibility that the

GRF-4-AC

to which this declaration relates, meets the essential health, safety, and EMC requirements and is in conformity with the relative EC Directives and standards listed below:

EU EMC Directive 89/336/EEC
Essential health and safety requirements relating to electromagnetic compatibility

EN 55022 Class A
Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

EN 50082-2
Electromagnetic compatibility - Generic immunity standard Part 2: Industrial environment

EC Low Voltage Directive 73/23/EEC
Essential health and safety requirements relating to electrical equipment

EN 60950
Safety requirements of information technology equipment including electrical machines

The GRF-4-AC complies with all safety relevant provisions referring to

- Protection against electrical hazards
- Protection against mechanical and fire hazards

The safety issues of this information technology equipment type have been evaluated by a government accredited European third party organization.

The CE marking has been affixed on the device according to article 10 of the EC Directive 89/336/EEC.

CE

(g0102)

Mark Garver
V.P.& General Manager

EC declaration: GRF-4-DC

EC Declaration of Conformity

(g0101)

We   Ascend Communications, Inc.
High Performance Networking Division
10250 Valley View Road
Eden Prairie, MN 55344

declare under the sole responsibility that the

GRF-4-DC

to which this declaration relates, meets the essential health, safety, and EMC requirements and is in conformity with the relative EC Directives and standards listed below:

EU EMC Directive 89/336/EEC
Essential health and safety requirements relating to electromagnetic compatibility

EN 55022 Class A
Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

EN 50082-2
Electromagnetic compatibility - Generic immunity standard Part 2: Industrial environment

EC Low Voltage Directive 73/23/EEC
Essential health and safety requirements relating to electrical equipment

EN 60950
Safety requirements of information technology equipment including electrical machines

The GRF-4-DC complies with all safety relevant provisions referring to

- Protection against electrical hazards
- Protection against mechanical and fire hazards

The safety issues of this information technology equipment type have been evaluated by a government accredited European third party organization.

The CE marking has been affixed on the device according to article 10 of the EC Directive 89/336/EEC.

CE

(g0102)

Mark Garver
V.P.& General Manager

GRF 1600 Agency Notices

D

This appendix contains Agency information for the GRF-16-AC and GRF-16-DC models.

GRF 1600 agency regulatory notices

Agency status

Safety

UL	- ANSI/UL 1950
CUL	- CAN/CSA-C22.2 No. 950
TUV GS	- EN 60950

EMC

FCC Class A   (commercial or industrial environments)

CE Mark   EN 55022   (Class A emissions)

                    EN 50082-2 (heavy industry immunity)

Canadian DOC Radio Interference Regulation, Class A

VCCI Class 1   (commercial or industrial environments)

Installation conditions and limitations

1   Enclosure must have all access panels in place and secured. All available slots must be filled with media cards or filler cards.

2   Substitution of unapproved or modified components, subassemblies, or modules may result in increased radiated emissions and/or increased susceptibility to radiated fields from other equipment.

3   All data, signal, and control cables connected to the equipment must be of the shielded type with metallic connector hoods, except for ethernet cables, fiber optic cables, and power cords, which are unshielded. Connectors with jackscrews should be securely tightened.

4   Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils.

Canadian notice

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

European Union notice

Warning:
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Federal Communications Commission notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

VCCI Class 1 notice

The GRF-16-AC and GRF-16-DC conform to Class 1 standards of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). Acceptance number: 46264

注意
　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づく第一種情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Caution:
This is a Class 1 product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Non-telecommunication port

(g0100)

HERGESTELLT-VON: Ascend Communications, Inc.
                        High Performance Networking Division
                        10250 Valley View Road
                        Eden Prairie, MN 55344

MODELL: GRF-16-AC   GRF-16-DC

STROMAUFNAHME:
    Voltage: 100–240 VAC   48VDC–60VDC
    Frequency: 50–60 Hz   N/A
    Current: 12.0–6.0 A   25A

The Manufacturer / Supplier: Ascend Communications, Inc.
                        High Performance Networking Division
                        10250 Valley View Road
                        Eden Prairie, MN 55344

Declares that: GRF-16-AC and GRF-16-DC
are not intended to be connected to a public telecommunications network.

The connection of such equipment to a public telecommunications network in a European
Community Member State will be in violation of the national law implementing Directive
91/263/EEC on the approximation of the laws of the Member States concerning
telecommunication terminal equipment, including mutual recognition of their conformity.

Der Hersteller / Lieferant: Ascend Communications, Inc.
                        High Performance Networking Division
                        10250 Valley View Road
                        Eden Prairie, MN 55344

erklärt daß: GRF-16-AC and GRF-16-DC
nicht zum Anschluß an ein öffentliches Telekommunikationsnetz bestimmen sind.

Der Anschluß dieses Gerätes an ein öffentliches Telekommunikationsnetz in den
EG-Mitgliedstaaten verstößt gegen die jeweiligen einzeistaatlichen Gesetze zur Anwendung
der Richtlinie 91/263/EWG zur Angieichung der Rechtsvorschriften der Mitgliedstaaten über
Telekommunikationsendeinrichtungen einshließlich der gegenseitigen Anerkennung ihrer
Konformität.

EC declaration: GRF-16-AC

EC Declaration of Conformity

We   Ascend Communications, Inc.
High Performance Networking Division
10250 Valley View Road
Eden Prairie, MN 55344

declare under the sole responsibility that the

GRF-16-AC

to which this declaration relates, meets the essential health, safety, and EMC requirements and is in conformity with the relative EC Directives and standards listed below:

EU EMC Directive 89/336/EEC
Essential health and safety requirements relating to electromagnetic compatibility

EN 55022 Class A
Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

EN 50082-2
Electromagnetic compatibility - Generic immunity standard Part 2: Industrial environment

EC Low Voltage Directive 73/23/EEC
Essential health and safety requirements relating to electrical equipment

EN 60950
Safety requirements of information technology equipment including electrical machines

The GRF-16-AC complies with all safety relevant provisions referring to

- Protection against electrical hazards
- Protection against mechanical and fire hazards

The safety issues of this information technology equipment type have been evaluated by a government accredited European third party organization.

The CE marking has been affixed on the device according to article 10 of the EC Directive 89/336/EEC.

CE

Mark Garver
V.P.& General Manager

EC declaration: GRF-16-DC

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EC Declaration of Conformity

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(g0101)

We   Ascend Communications, Inc.
            High Performance Networking Division
            10250 Valley View Road
            Eden Prairie, MN 55344

declare under the sole responsibility that the

      GRF-16-DC

to which this declaration relates, meets the essential health, safety, and EMC requirements and is in conformity with the relative EC Directives and standards listed below:

EU EMC Directive 89/336/EEC
Essential health and safety requirements relating to electromagnetic compatibility

      EN 55022 Class A
            Limits and methods of measurement of radio disturbance
            characteristics of information technology equipment.

      EN 50082-2
            Electromagnetic compatibility - Generic immunity standard
            Part 2: Industrial environment

EC Low Voltage Directive 73/23/EEC
Essential health and safety requirements relating to electrical equipment

      EN 60950
            Safety requirements of information technology equipment
            including electrical machines

The GRF-16-DC complies with all safety relevant provisions referring to

      - Protection against electrical hazards
      - Protection against mechanical and fire hazards

The safety issues of this information technology equipment type have been evaluated by a government accredited European third party organization.

The CE marking has been affixed on the device according to article 10 of the EC Directive 89/336/EEC.

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CE

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(g0102)

Mark Garver
V.P.& General Manager

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