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Chapter 1 Introduction & Specifications

Welcome to the I-Bus family of fault-tolerant computers. This manual provides information you will need to set up and maintain your IFTA+ (Integrated Fault Tolerant Architecture).

The IFTA+ provides fault tolerance in a conventional 19" rack-mounted, passive backplane, PC-compatible chassis.

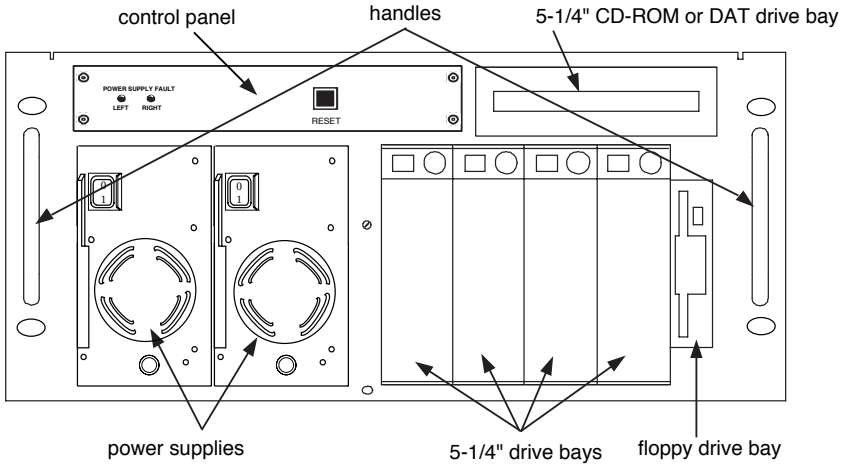


Figure 1-1: Front View of the IFTA+ (typical)

The standard **IFTA+** contains:

- two redundant AC hot-swappable power supplies,
- a 20-slot ISA passive backplane,
- fixed fans, non-tach output,
- six front-accessible drive bays for:
  four 5-1/4," half-height vertical drives,
  one 5-1/4," half-height horizontal drive,
  one 3-1/2," one-inch floppy drive.

Options include:

- two redundant DC hot-swappable power supplies,
- hot swappable card-cage fans, tach output fans,
- a variety of backplanes, including:
  - PCI/ISA 20-slot
  - PCI/ISA 19-slot power sequenced,
  - ISA 20-slot segmentable,
  - ISA 20-slot power sequenced,
  - XPCI 20-slot ISA, segmentable, and power-sequenced back planes,
- a variety of front control panel configurations,
- a system monitor add-in card and LED displays,
- up to five hot-swappable 5-1/4” shuttles for hard drives, SCSI, IDE, or CD-ROM drives
- RAID 0, 1, 3, 5

Because of the variety of available options, your system may not contain all of the features described in this manual.

This chapter is divided into four sections:

- About this manual

  explains how this manual is laid out and the contents of each chapter.

- Preparing the system

  defines the items included with your system and the procedure for unpacking and setting up your **IFTA+**.

- Features

  provides a brief overview of the major components of the **IFTA+**.

- Specifications

  provides technical and regulatory specifications.

About this Manual

This manual contains six chapters that pertain specifically to the **IFTA+**. The appendices contain technical reference material and a glossary of terms followed by an index.

- ### Chapter 1 Introduction & Specifications

  introduces you to this manual and to the **IFTA+**. It contains an illustration of the system, a brief description of system features and technical and regulatory specifications.

- ### Chapter 2 Chassis and Backplane

  discusses removal and installation of the hold-down bar, add-in boards, available chassis backplanes, chassis fans (fixed and hot-swappable), and chassis filters. It also includes a brief description of the rear-panel I/O knockouts and instructions for connecting DC power.

- ### Chapter 3 Control Panels

  discusses the **IFTA+'s** available control panel options and provides instructions for removing and installing the reset switch and the input circuit breaker.

- ### Chapter 4 Disk Drives

  discusses the hot-swappable shuttle drive option, and removal and installation of the SCSI or IDE hard drives, CD-ROM or DAT drives, and the floppy drives.

- ### Chapter 5 Power Supplies

  provides instructions for removing and installing the hot-swappable power supplies.

- ### Chapter 6 System Sentinel

  explains the optional System Sentinel Monitor and Alarm Board's basic functions, how to access and change system data, and describes minor, major and critical alarms.

- ## Appendix 1 Technical Reference

  contains ISA and PCI/ISA backplane connector pin assignments.

- ## Appendix 2 Glossary of Terms

  contains definitions of terms used in this manual.

- ## Index

  provides easy access to page numbers of items discussed in this manual.

Preparing the System

CAUTION!

Electrostatic Discharge (ESD) may damage memory chips, programmed devices, and other electronic components. Observe ESD safe practices when touching external connection pins, working with the cover off the unit, and handling or installing components in the unit.

- ## Unpacking your IFTA+

  - Unpack your system at an ESD safe workstation while observing proper Electrostatic Discharge (ESD) protection practices.
  - I-Bus reserves the right to refuse warranty service on units damaged by ESD due to improper handling.

  Included in your **IFTA+** is:

  - *IFTA+ Computer Platform User Manual*
  - *Shuttle Drive User Manual* (if equipped with hot-swappable drives)
  - *Passive Backplane User Manual* (for the specific backplane installed in your platform)
  - *CPU Board User Manual* (for the specific CPU board installed in your platform)
  - Power cord

If any of the items have been damaged in shipping, notify the transit company and initiate an insurance claim. If any items are missing, contact I-Bus. Refer to the *Limited Warranty* in the back of this manual for further instructions.

Specifications

- Backplane Options:
  - ISA 20-slot segmentable (standard). See the *Backplane User Manual* included with you system for information about your specific passive backplane)
  - PCI/ISA 20-slot dual-bus (15 ISA, 4 PCI, 1 CPU)
  - ISA 20-slot power-sequenced segmentable (with two segments, from 2 to 12 slots each)
  - PCI/ISA 19-slot power-sequenced split (with two segments: 5 ISA, 4 PCI, 1 CPU and 4 ISA, 4 PCI, 1 CPU)
  - XPCI 20-slot Extended PCI (9 ISA, 10 PCI and 1 CPU)
- Cooling:
  - (4) 35 CFM fans for chassis cardcage,
  - 2 additional fans (one in each power supply)
- Dimensions:
  - 8.75” H × 17” W × 26” D
- Weight:
  - 49.1lbs. with two 300W power supplies and one 19-slot PCI/ISA power sequenced split passive backplane
- Drive Bays:
  - (4) 5-1/4” half-height, vertical
  - (1) 5-1/4” half-height, horizontal
  - (1) 3-1/2” one-inch floppy, vertical

- ## Rear Panel & I/O Knockouts
  - (2) Keyboard ports (DIN)
  - (4) Serial ports (DB9)
  - (2) Parallel ports (DB25)
  - (2) Ports (DB15)
- ## Control Panel Options
  - Standard control panels, containing any one or all of the following:
    - main power switch,
    - reset switch,
    - keyboard connector,
    - power supply fault indicator LEDs.
  - System monitor control panels for the System Sentinel option, containing any one or all of the following:
    - main power switch,
    - reset switch,
    - keyboard connector,
    - various system monitor LEDs,
    - power supply fault indicator LEDs.
  - Segmentable backplane control panels, containing any one or all of the following:
    - main power switch,
    - left and right system reset switches,
    - keyboard connectors,
    - power supply fault indicator LEDs.

- Power-sequenced backplane control panels, containing any one or all of the following:
  - main power switch,
  - left and right system power switches,
  - left and right system reset switches,
  - keyboard connectors, power supply fault indicator LEDs.
- Customized panels available.

• Power Supplies:

POWER RATINGS

- 300 Watt AC Input
- 400 Watt AC Input
- 250 Watt DC input

INPUT VOLTAGE

AC Power Supplies:

- 47-63Hz, 100-132 VAC/200-265 VAC (auto-ranging)

DC Power Supplies:

- 44 VDC-56 VDC, single or dual input

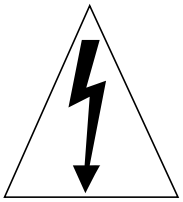
• Safety agency:

- UL 1950
- cUL 1950
- IEC 950/EN60950 pending
- FCC Class A
- FCC Class B upon request
- CE MARK for safety pending
- CE MARK EMC

• Warranty:

- All I-Bus product are under warranty for two full years unless otherwise specified. See the warranty page at the end of this manual for more details.

WARNING!



Any repair or maintenance that requires removal of the top cover must be made by a qualified technician.

This chapter discusses removal and installation of the chassis access cover, hold-down bar, add-in boards, available chassis backplanes, chassis fans (fixed and hot-swappable), and chassis filters. It also includes a description of the rear-panel I/O knockouts and instructions for connecting DC power.

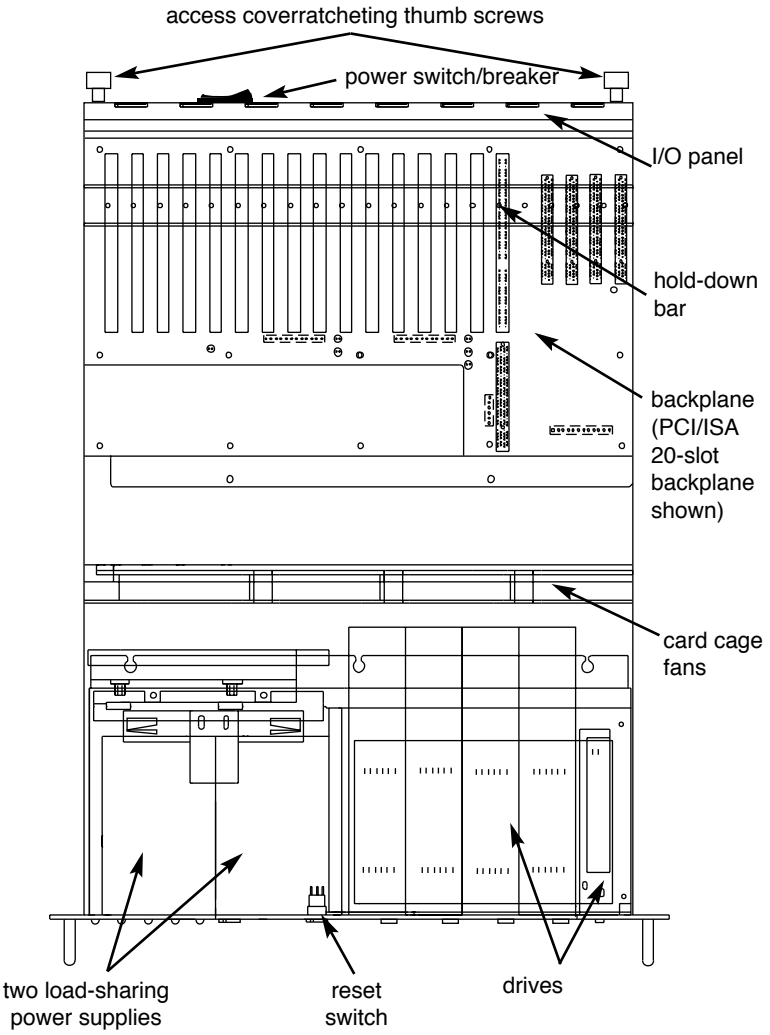


Figure 2-1: Top View of the IFTA+

CAUTION!

Unless replacing hot-swappable parts, always turn off all power and disconnect the power cords before working on the system.

• Removing the Chassis Access Cover

1. Place the chassis at an ESD safe workstation.
2. Using a screw driver, loosen the two ratcheting thumb screws located at the top rear corners of the chassis.
3. Lift the cover up and slide it backwards, off the chassis.

• Installing the Chassis Access Cover

1. Place the access cover onto the chassis and slide it forward until its front edge is flush with the front of the chassis.
2. By hand, tighten the two ratcheting thumb screws located at the rear of the chassis.

• Removing/Installing the hold-down bar

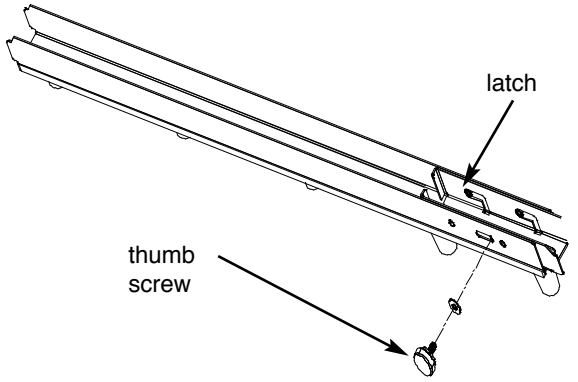


Figure 2-2: Hold-down Bar

The mechanical hold-down bar secures boards in their slots. The bar can be placed anywhere within the card cage in half-inch increments. However, unless changing the type of backplane, it is recommended that the hold-down bar should be kept at the factory-installed location.

The hold down bar comes equipped with three adjustable feet and three stationary feet to help keep boards in place. To change the height of the

adjustable feet, screw them up or down until the desired height is reached. The feet should touch the top edge of a board but not apply pressure to it when the board is in place.

To replace boards, the hold-down bar must be removed.

1. Place the chassis at an ESD safe workstation and remove the cover.
2. Loosen the thumb screw at the end of the hold-down bar and remove the hold-down bar.
3. Slide the hold-down bar latch to the left of the chassis to allow enough clearance to lift the bar our of the chassis.
4. Once board insertion/removal is completed, replace the bar in its proper location. Slide the latch toward the right side of the chassis and tighten the thumb screw.

Add-in boards

CAUTION!

Electrostatic Discharge (ESD) can damage add-in boards. Installation, removal, and set-up of add-in boards should only be performed by qualified personnel at an ESD safe workstation.

• Installing boards

1. Turn OFF the main system power (the main power switch is located on the rear panel). At an ESD safe work station, remove the access chassis cover, then remove the hold-down bar (see page 2-2).

   Note: If a power-sequenced, segmented backplane is installed, only the appropriate segment needs to be turned off.
2. Remove the slot cover if the board contains a retaining bracket. Insert the board into the card guide and seat it firmly into the backplane connector(s).
3. Secure the card's retaining bracket to the chassis using the slot cover screw. If necessary, refer to the installation instructions provided with the board.
4. Replace the hold-down bar and chassis cover.

• Removing boards

1. Turn OFF the main power (the main power switch is located on the rear of the chassis). Remove the chassis access cover, then remove the hold-down bar (see page 2-2).

   Note: If a power-sequenced, segmented backplane is installed, only the appropriate segment needs to be turned off.

2. Disconnect all cables from the board to be removed.
3. Remove the screw from the board's retaining bracket. Gently pull the board free of the backplane connector and slide it out of the card guide.
4. Cover the open slot with a blank slot cover if not replacing the board. Replace the hold-down bar and chassis cover.

• Removing the backplane

CAUTION!

If the backplane type is to be changed, it will be necessary to match the stand-off pattern of the new backplane to the appropriate mounting holes in the chassis. Only install stand-offs in the chassis holes that match the new backplane's mounting hole pattern.

Note: For specific backplane connector information, refer to the backplane user manual included with your system.

1. Turn OFF the main system power and disconnect the power source. At an ESD safe workstation, remove the chassis access cover, then remove the hold-down bar (see page 2-2).
2. Disconnect and remove all the boards from the backplane (see page 2-3).
3. Disconnect all cables attached to the backplane.
4. Remove the backplane mounting screws and lift the backplane out.

- ## Installing the backplane

Note: For specific backplane connector information, refer to the *Backplane User Manual* included with your system.

1. Turn OFF the main system power and disconnect the power source. At an ESD safe workstation, remove the chassis access cover, then remove the hold-down bar (see page 2-2).
2. Align the mounting holes in the backplane with the stand-offs in the chassis, then insert all mounting screws but do not tighten them.
3. Attach the appropriate cabling to the backplane.
4. Install the boards in the backplane card slots (see page 2-3). Re-attach the appropriate cabling to the boards. If necessary, adjust the position of the backplane to align the board slot covers with the slot panel, then tighten the backplane mounting screws.

   Some PCI/ISA dual-bus CPU boards can be placed in any ISA slot of an ISA-only backplane without the use of the PCI interface. To access both the PCI and ISA interfaces, the dual-bus CPU board must be installed in the PCI/ISA CPU slot of the PCI/ISA backplane.
5. Replace the hold-down bar and chassis cover.

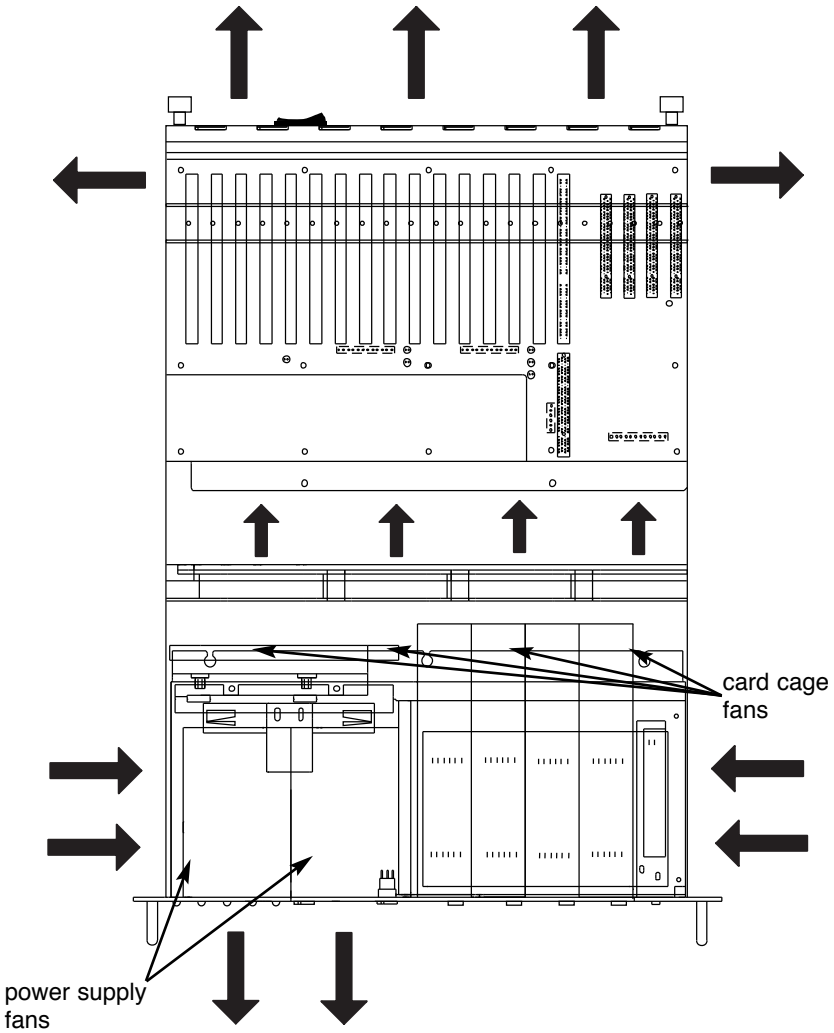


Figure 2-3: IFTA+ internal air flow diagram

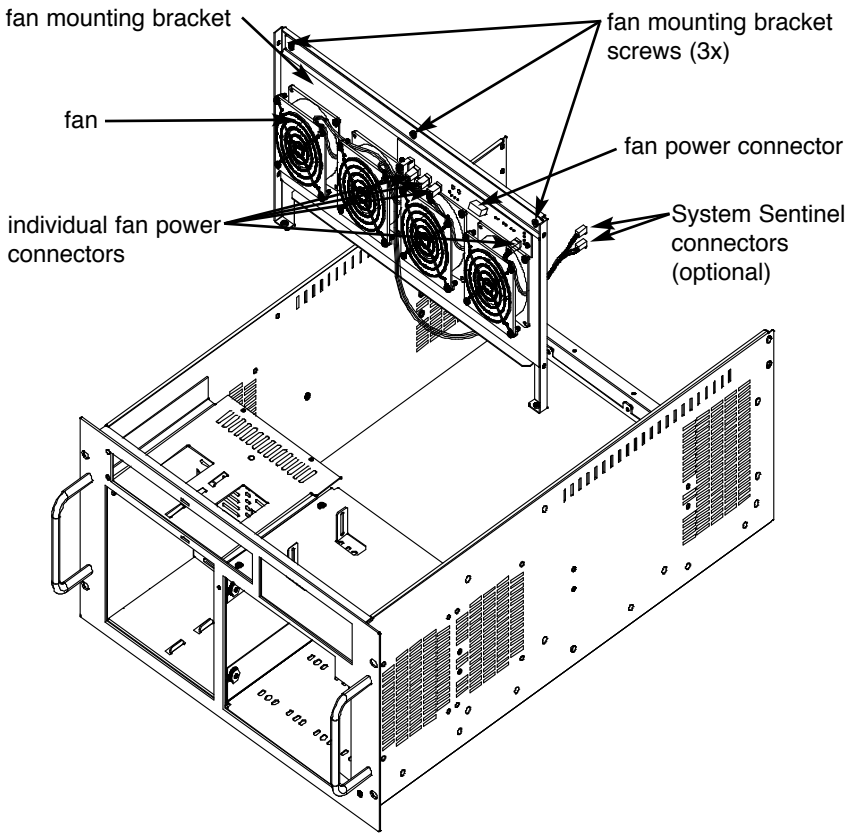


Figure 2-4: IFTA+ fixed fan installation/removal diagram

Note: Installation/removal of the fixed fans requires removal of the fan mounting bracket.

- ## Removing a fan from the chassis (fixed)

1. Turn OFF the main system power. At an ESD safe work station, remove the chassis access cover.
2. Remove the fan power connector (*Figure 2-4*).
3. Remove the three fan bracket mounting screws located at the top of the bracket.
4. Tilt the fan bracket toward the front of the chassis and carefully lift it from the unit.

5. Disconnect the fan to be removed from the appropriate individual fan power connector (*Figure 2-4*).
6. Remove the finger guard from the fan and save it for mounting on a new fan.
7. Remove the fan from the mounting bracket.
8. Reseat the fan mounting bracket in the chassis and secure it with the hardware that was removed in step 3.
9. Reconnect the fan power connector, J6.
10. Replace the chassis access cover.

- ## Installing a fan into the chassis (fixed)

1. Turn OFF the main system power. At an ESD safe work station, remove the chassis access cover.
2. Disconnect the fan power connector, J6 (*Figure 2-4*).
3. Remove the three fan bracket mounting screws located at the top of the fan mounting bracket.
4. Tilt the fan bracket toward the front of the chassis and carefully lift it from the unit.
5. If the finger guard is installed on the fan it will have to be removed before installing the fan on the mounting bracket.
6. Secure the fan to the mounting bracket with the two screws that were removed.
7. Secure the finger guard to the fan.
8. Connect the fan to the appropriate individual fan power connector (*Figure 2-4*).
9. Reseat the fan mounting bracket in the chassis and secure it with the hardware that was removed in Step 3.
10. Reconnect the fan power connector.
11. Replace the chassis access cover.

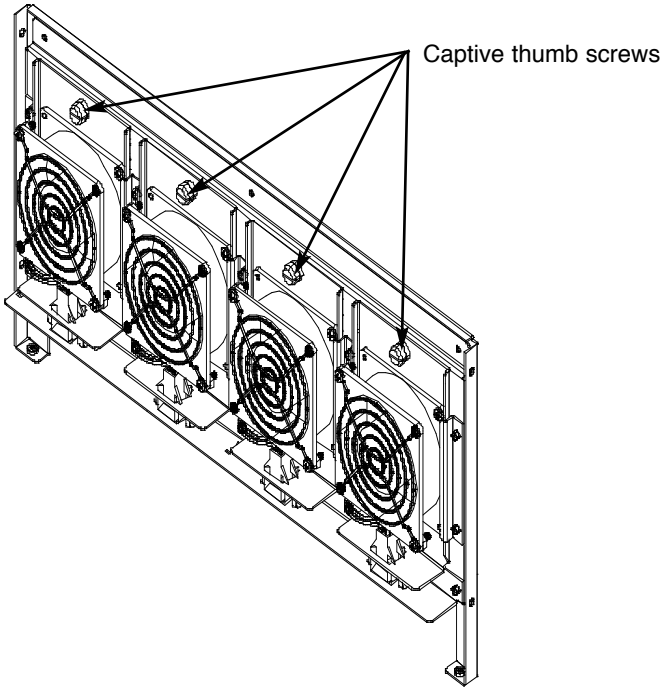


Figure 2-5: Hot-swap fan assembly

Note: Installation/removal of the hot-swap fans ***does not*** require removal of the fan mounting bracket. Each fan is individually removable.

- ## Removing/Installing a fan from the chassis (hot swap)

1. Remove the chassis cover at an ESD safe workstation.
2. Loosen the captive thumb screw from the fan plate mounting bracket and carefully lift the fan out of the chassis.
3. Slide the new fan into the appropriate slot in the hot-swap assembly.
3. Secure the fan to the fan mounting bracket using the captive thumb screw.
4. Replace the chassis cover.

Rear panel I/O

The rear of the chassis contains knockouts for two keyboard, two DB25, two DB15 and four DB9 connectors. These locations can be filled as needed with I/O cables for serial, parallel, and keyboard ports.

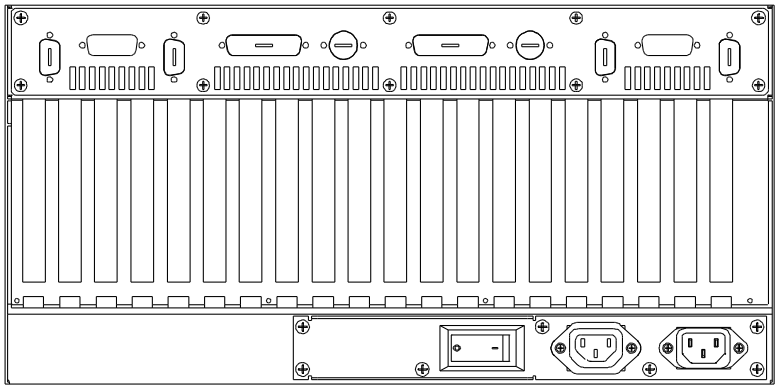


Figure 2-6: Rear View of the IFTA+ (showing AC input power panel)

• Connecting DC Power

Wire colors:

-48V	Black or Brown*
RET	White or Blue
FRM GND	Green with yellow stripe

*If -48V is Brown, RET is Blue

For units equipped with the WECO DC terminal block

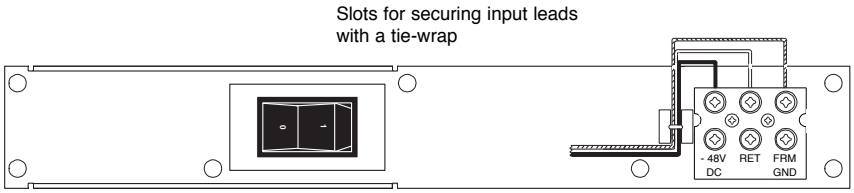


Figure 2-7: DC Power Connection - Single Input

Wire colors:

-48V	Black or Brown*
RET	White or Blue
FRM GND	Green with yellow stripe

*If -48V is Brown, RET is Blue

For units equipped with WECO DC terminal blocks

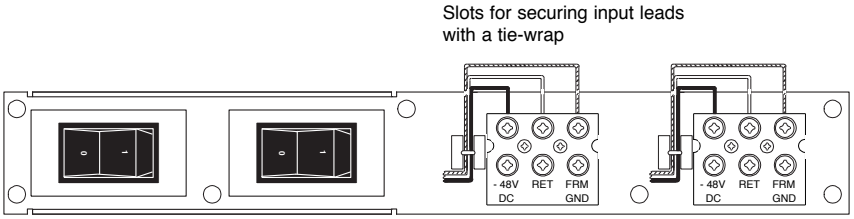


Figure 2-8: DC Power Connection - Dual Input

• To connect a DC powered unit

1. Strip the insulation 1/4 inch from the conductor. ***Do not*** tin the wire.
2. Insert each stripped wire into the appropriate terminal block position and tighten the screw.

• Securing the wire

It is advisable to physically secure the input leads near the terminal block to provide relief for connectors (refer to *Figures 2-7 and 2-8*).

Chassis Filters

Using a vacuum cleaner or compressed air, clean the chassis filters once per month or whenever dust accumulates on them.

- ### Removing the chassis filters

  1. Refer to *Figure 2-9* and remove the mounting screws securing the filters to the chassis.
  2. Remove the filters.

- ### Installing the chassis filters

  1. The four chassis filters (two for the left side of the chassis, two for the right) that come with the **IFTA+** are packed in a plastic bag along with their mounting screws. Locate the bag containing the filters and mounting screws and remove them from the bag.
  2. Refer to *Figure 2-9* and attach the filters

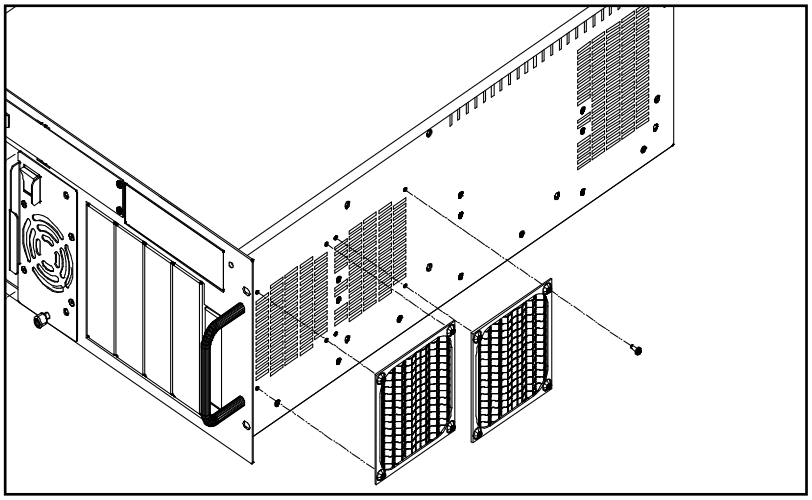


Figure 2-9: Chassis filters

This chapter describes the available control panel options and replacement of the reset switch and the input circuit breaker.

The IFTA+ can be ordered with any one of the following panels:

- Standard panels

  The standard panels come in four optional configurations (*Figure 3-1*) and are available with some or all of the following: power supply fault LEDs, reset button, keyboard connector, and main power switch.

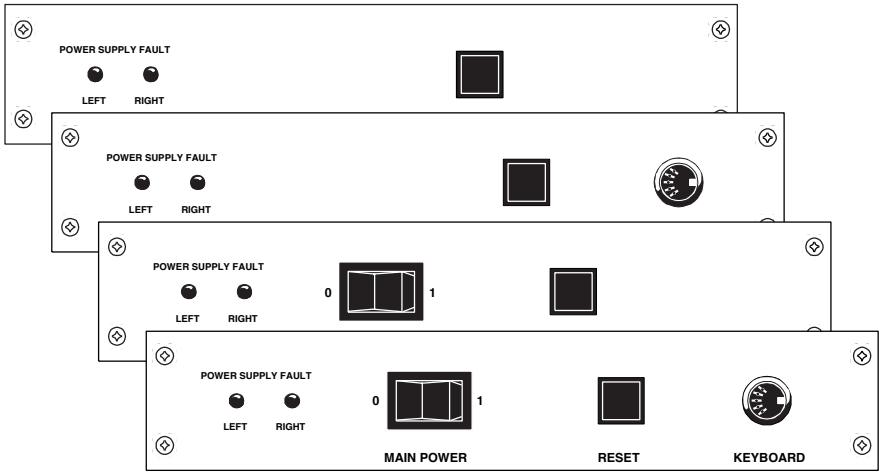


Figure 3-1: Standard Front Control Panel Configurations

- Panels with system monitor LEDs (optional)

These panels include the addition of an LED display used in conjunction with an ISA-based system monitor. These panels come in five optional configurations (*Figure 3-2*). Four of the optional configurations are available with some or all of the following: a main reset switch, a main power switch and a keyboard connector. The fifth configuration includes the power-sequenced backplane control panel options.

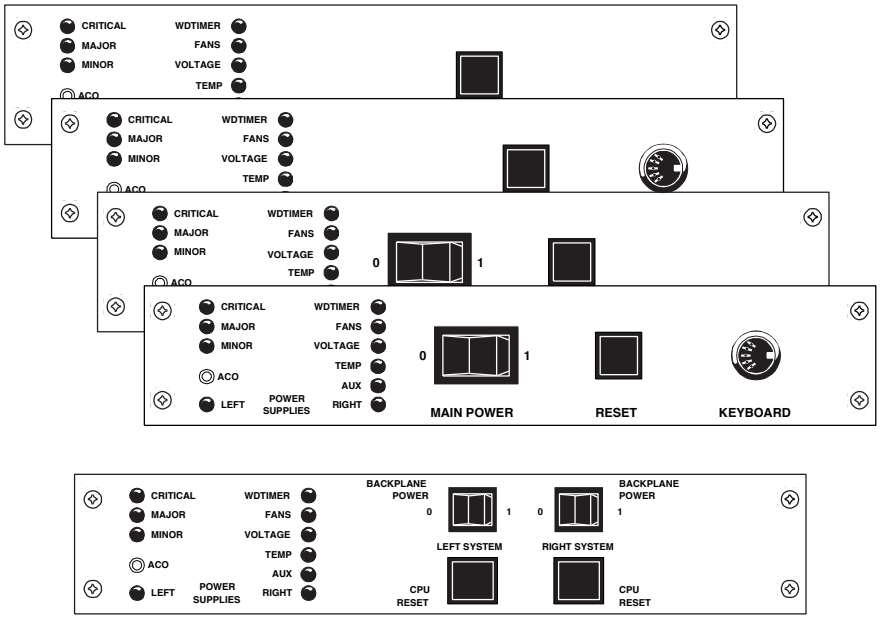


Figure 3-2: System Monitor Front Control Panel Configurations

- Segmentable backplane panels (optional)

These panels provide an extra reset switch for a signal-only segmentable backplane. In addition to the extra reset switch, a main power switch and two keyboard connectors are also available (*Figure 3-3*).

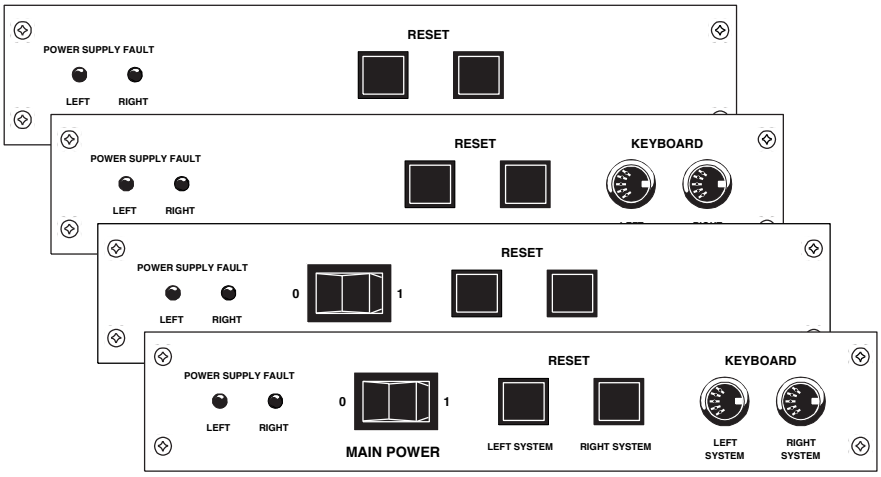


Figure 3-3: Segmentable Backplane Front Control Panel Configurations

- Power-sequenced backplane panels (optional)

These panels include two power switches and two reset switches for two backplane segments of an ISA or PCI/ISA power-sequenced backplane and can include two keyboard connectors, a main power switch, or both (*Figure 3-4*).

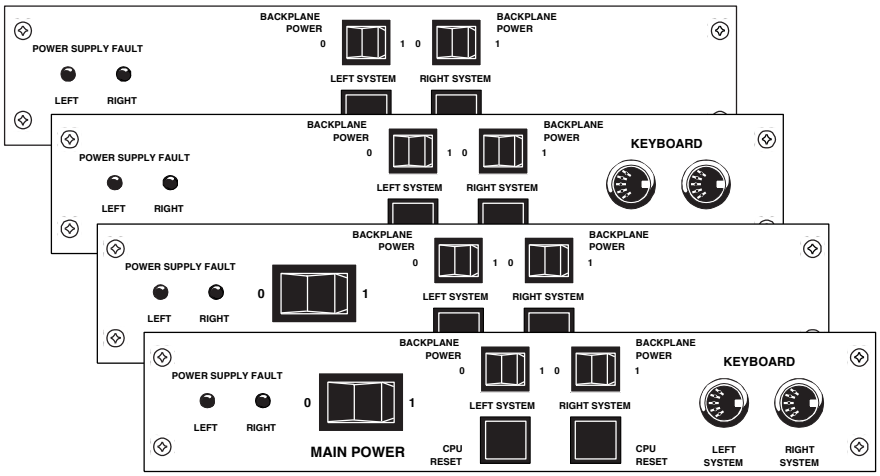


Figure 3-4: Power-sequenced backplane front control panel configurations

Reset Switch

CAUTION!

> ***Unless hot-swapping a fan, power supply, or shuttle drive, always turn off all power and disconnect the power cords before working on the system.***

- Removing/Replacing the reset switch

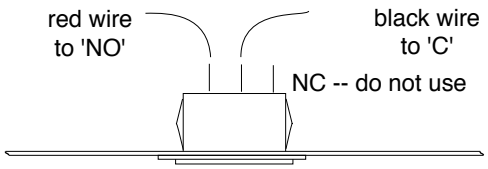


Figure 3-5: Reset Switch Wiring Connections (Top View)

The following instructions apply to all reset switches.

1. Remove the chassis access cover. Refer to *Figure 3-5* for the location of the reset switch wiring connections.
2. Remove the four screws that mount the control panel to the front panel.
3. Slide the control panel to the right to loosen its mounting tab and pull it away from the front panel
4. Gently pull the control panel away from the front panel until the reset switch and the quick-disconnect terminals can be easily accessed.
5. With the wires still connected, squeeze the spring clip sides of the reset switch, pushing it through the control panel until it pops out the front of the control panel.
6. Remove the wires, one by one, from the old reset switch and attach each one to the new reset switch as it is removed from the old reset switch, placing it on the correct terminal.
7. Push the new reset switch back into position in the control panel until the spring clips on the switch's side snap into place.
8. Insert the control panel's mounting tab in the front panel's mounting slot and slide the control panel to the left.

9. Re-install the control panel using the mounting screws.
10. Replace the chassis cover.

Input Circuit Breaker

The following instructions apply to all input circuit breakers.

The main power switch is typically the input circuit breaker located on the rear panel in the standard configuration. However, some optional configurations have an on/off switch mounted on the front control panel. This switch is connected in series with the rear-panel circuit breaker.

Sequential backplanes contain two backplane power switches and one main input circuit breaker. The backplane power switch is the same size and shape as the standard reset switch, but is a rocker switch rather than the momentary contact type.

• Removing/Replacing the input circuit breaker

1. Turn OFF the main system power and disconnect the power cord/cable. Remove the chassis access cover.
2. Remove the five screws that mount the breaker plate to the rear panel.
3. Gently pull the breaker plate away from the rear panel until the circuit breaker and the quick-disconnect terminals can be easily accessed.
4. With the wires still connected, squeeze the spring clips on the sides of the old circuit breaker, pushing it through the front of the breaker plate until it pops out the front of the plate.
5. Remove the wires, one by one from the old circuit breaker, and attach each one to the new circuit breaker as it is removed from the old breaker, placing it on the correct terminal.
6. Push the new circuit breaker back into position in the breaker plate until the spring clips on the breaker's side snap into place.
7. Re-install the plate.
8. Replace the chassis cover.
9. Plug in the power cord or reinstall the power cable. Turn the power on.

This chapter discusses the hot-swappable shuttle drive option, and removal and installation of the SCSI or IDE hard drives, CD-ROM or DAT drives, and the floppy drives.

The SCSI and IDE hard drives can be installed in a removable drive shuttle that allows hot-swapping. Hot-swapping is the ability to remove or install system parts without shutting down power to the system.

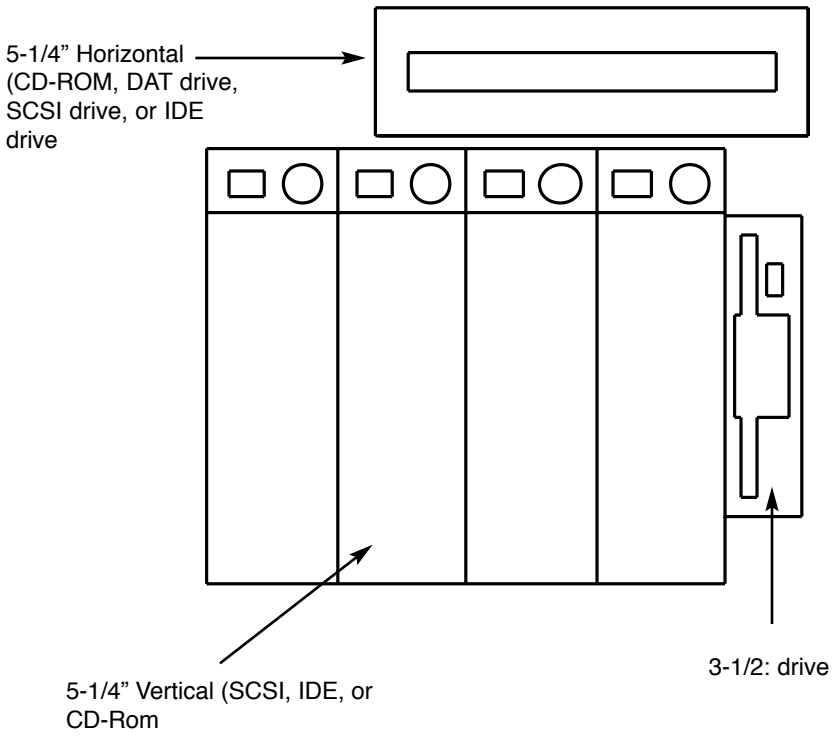


Figure 4-1: Drives (Front View)

CAUTION!

> ***Unless hot-swapping a fan, power supply, or shuttle drive, always turn off all power and disconnect the power cords before working on the system.***

If the **IFTA+** platform is equipped with an optional drive shuttle, the manufacturer's documentation for the drive shuttle will be included. For information specific to the removal and installation of the optional shuttle drive, refer to the manufacturer's documentation.

• Removing a hard drive from the vertical drive bay (non hot-swap)

1. Turn OFF the main power (the main power switch is located on the rear of the chassis). At an ESD safe workstation, remove the chassis access cover.
2. Refer to *Figure 4-2* and remove the horizontal drive mounting plate. If a drive is installed in the horizontal drive bay, disconnect the cable and power supply connector from the drive and remove it with the plate.
3. Carefully turn the chassis on its side to expose the bottom of the chassis. Locate the bottom drive access plate. The bottom drive access plate is secured with one screw. Remove the screw and remove the bottom drive access plate.
4. Disconnect all cables and power supply connectors from the hard drive(s) to be removed.
5. Remove the screws holding the drive to the chassis. The drive will be secured at both the top and bottom of the chassis. If necessary, support the drive with your hand while removing the screws.
6. Carefully slide the drive out the front of the chassis.
7. Install a filler plate over the vacant drive bay unless you are immediately replacing the drive.

   Note: All drive bay openings ***must be*** covered. If a filler plate is not available, temporarily cover the opening by whatever means are available. This ensures proper air flow for cooling inside the chassis.
8. Replace the bottom drive access plate.

9. Carefully turn the chassis back into the upright position and replace the horizontal drive plate. If necessary, reconnect the cables and connectors to the drive mounted in the horizontal drive bay.
10. Replace the chassis cover.

- ## Installing a hard drive into the vertical drive bay (non hot-swap)

1. Turn OFF the main power (the main power switch is located on the rear of the chassis). At an ESD safe workstation, remove the chassis access cover.
2. Refer to *Figure 4-2* and remove the horizontal drive mounting plate. If a drive is installed in the horizontal drive bay, disconnect the cable and power supply connector from the drive and remove it with the plate.
3. Remove the filler plate from the drive bay where the hard drive is to be installed.
4. Carefully turn the chassis on its side to expose the bottom of the chassis. Locate the bottom drive access plate. The bottom drive access plate will be secured with one screw. Remove the screw and remove the bottom drive access plate.
5. Carefully slide the drive into the front of the chassis and connect the cable and power supply connector to the hard drive.
6. Install the drive to both the top and bottom of the chassis using the mounting screws supplied with the hard drive. If necessary, support the drive with your hand during installation.
7. Replace the bottom drive access plate.
8. Carefully turn the chassis back into the upright position and replace the horizontal drive mounting plate. If necessary, reconnect the cable and power supply connector to the drive mounted in the horizontal drive bay.
9. Replace the chassis cover.

- ## Removing the drive in the horizontal drive bay

1. Turn OFF the main power (the main power switch is located on the rear of the chassis). At an ESD safe workstation, remove the chassis access cover.
2. Disconnect the drive's cabling and power supply connector.
3. Refer to *Figure 4-2* and remove the screws holding the horizontal drive mounting plate to the chassis.

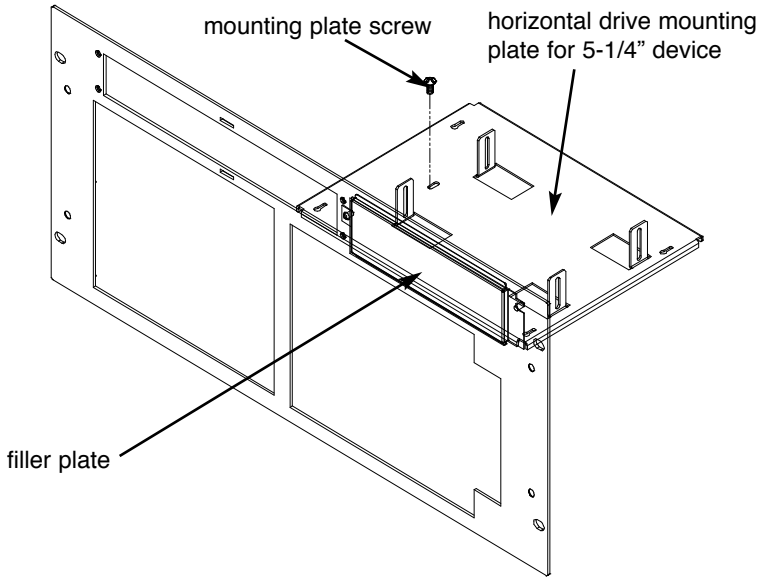


Figure 4-2: Horizontal Drive Mounting Bay

4. Remove the horizontal drive mounting plate with the drive still attached. Turn the drive and mounting plate over and remove the screws holding the drive to the mounting plate.
5. Re-install the filler plate with bracket (one piece) to the mounting plate.

   Note: All drive bay openings ***must be*** covered. If a filler plate is not available, temporarily cover the opening by whatever means are available. This ensures proper air flow and cooling inside the chassis.
6. Re-install the horizontal drive mounting plate.

- ## Installing the drive in the horizontal drive bay

1. Turn OFF the main power (the main power switch is located on the rear of the chassis). At an ESD safe workstation, remove the chassis access cover.
2. Refer to *Figure 4-2* and remove the screws holding the horizontal drive mounting plate to the chassis.
3. Remove the horizontal drive mounting plate with the filler plate attached. Turn the mounting plate over and remove the screws holding the filler plate to the mounting plate.
4. Align the drive with the holes on the mounting plate and secure with screws.
5. Carefully place the mounting plate with the attached drive into the chassis and re-install the mounting plate to the chassis.
6. Connect the cable and power supply connector to the hard drive.
7. Replace the chassis cover.

- ## Removing the floppy drive in the 3.5 inch bay

1. Turn OFF the main power (the main power switch is located on the rear of the chassis). At an ESD safe workstation, remove the chassis access cover.
2. Refer to *Figure 4-2* and remove the horizontal drive mounting plate. If a drive is installed in the horizontal drive bay, disconnect the cable and power supply connector from the drive and remove it with the plate.
3. Carefully turn the chassis on its side to expose the bottom of the chassis. Locate the bottom drive access plate. The bottom drive access plate is secured with one screw. Remove the screw and remove the bottom drive access plate.
4. Remove the filler plate from the 5-1/4” drive bay next to the floppy drive bay.

   Note: If there is a hard drive installed in the drive bay next to the floppy drive bay, it will have to be removed before continuing. Refer to “Removing a Hard Drive from the Vertical Drive Bay” in this chapter and remove the hard drive.
5. Disconnect the cable and power supply connector from the floppy drive.

6. Remove the screws holding the floppy drive mounting plate to the chassis. The mounting plate will be secured at both the top and bottom of the chassis. If necessary, support the drive and mounting plate with your hand while removing the screws.
7. Carefully slide the floppy drive and mounting plate over to the 5-1/4" drive bay opening and then slide it out the front of the chassis.
8. Install a filler plate over the vacant drive bay(s). If necessary, re-install the hard drive in the drive bay next to the floppy drive.

   Note: All drive bay openings ***must be*** covered. If a filler plate is not available, temporarily cover the opening by whatever means are available. This ensures proper air flow for cooling inside the chassis.
9. Replace the bottom drive access plate.
10. Carefully turn the chassis back into the upright position and replace the horizontal drive plate. If necessary, reconnect the cable and power supply connector to the drive mounted in the horizontal drive bay.
11. Replace the chassis cover.

• Installing the floppy drive in the 3.5 inch bay

1. Turn OFF the main power (the main power switch is located on the rear of the chassis). At an ESD safe workstation, remove the chassis access cover.
2. Refer to *Figure 4-2* and remove the horizontal drive mounting plate. If a drive is installed in the horizontal drive bay, disconnect the cable and power supply connector from the drive and remove it with the plate.
3. Carefully turn the chassis on its side to expose the bottom of the chassis. Locate the bottom drive access plate. The bottom drive access plate is secured with one screw. Remove the screw and remove the bottom drive access plate.
4. Remove the filler plate from the floppy drive mounting bay and the filler plate in the 5-1/4" drive bay next to it.

   Note: If there is a hard drive installed in the drive bay next to the floppy drive bay, it will have to be removed before continuing. Refer to "Removing a Hard Drive from the Vertical Drive Bay" in this chapter and remove the hard drive.

5. Remove the screws holding the floppy drive mounting plate to the chassis. The drive will be secured at both the top and bottom of the chassis. If necessary, support the drive with your hand while removing the screws.
6. Carefully slide the mounting plate over to the 5-1/4" drive bay opening and then slide it out the front of the chassis.
7. Attach the floppy drive to the mounting plate.
8. Carefully slide the mounting plate and drive through the 5-1/4" drive bay opening and then slide the floppy drive into the vertical floppy drive bay and connect the drive's cabling (refer to *Figure 4-1*).
9. Loosely screw the floppy mount into the top and bottom of the chassis. Position the floppy drive so it is flush with the IFTA's front panel, then tighten the screws.
10. Install a filler plate over the vacant drive bay(s). If necessary, re-install the hard drive in the drive bay next to the floppy drive.

    Note: All drive bay openings ***must be*** covered. If a filler plate is not available, temporarily cover the opening by whatever means are available. This ensures proper air flow for cooling inside the chassis.
11. Re-install the drive in the horizontal drive bay (if present).
12. Replace the chassis cover and secure with screws.

This chapter describes the removal and installation of the hot-swappable power supplies.

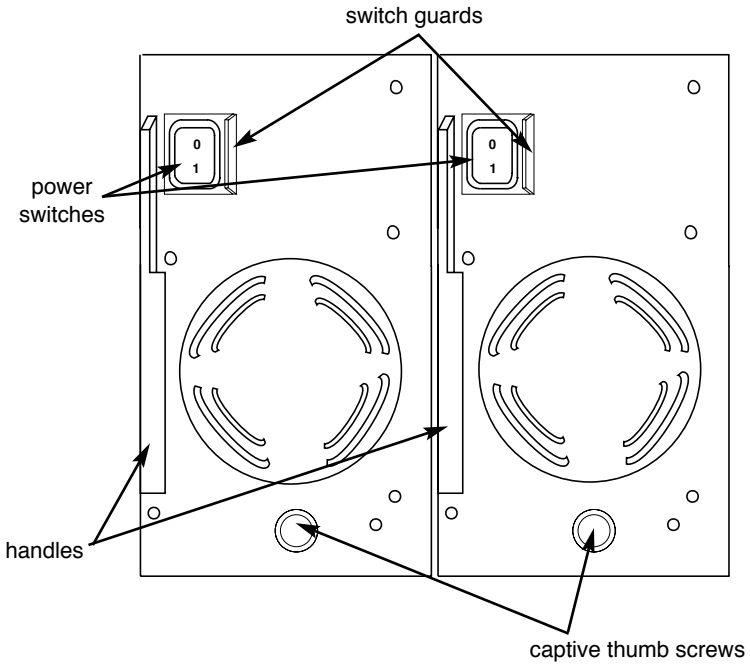


Figure 5-1: Power Supplies (Front View)

- Input voltage

  Refer to the ***Power Supplies*** specifications in Chapter 1.

CAUTION!

Unless working on hot-swappable parts, always turn off all power and disconnect the power cords before working on the system.

CAUTION!

Do not remove both power supplies at the same time unless the input power to the unit is already turned off.

If a hot-swap is being performed, double-check the indicator LEDs and make sure the failing supply is the one being removed.

• Removing a power supply

1. Turn off the power switch on the power supply to be removed.
2. Unscrew the captive-thumb screw on the bottom of the power supply's front panel until it springs to its retracted position.
3 Slide the power supply out of its bay.

• Installing a power supply

1. Place the power switch on the power supply into the OFF position.
2. Slide the power supply into its bay until it stops and is flush with the **IFTA+'s** front panel. Because the **IFTA+** uses self-aligning power supplies, the connector should be automatically engaged as the power supply is pushed into the unit.
3. Tighten the captive thumb screw on the front panel of the power supply.
4. Turn the power supply switch ON.

This chapter describes the System Sentinel Monitor and Alarm Board's basic functions, how to access and change system data, and describes minor, major and critical alarms.

The System Sentinel oversees basic system functions, and monitors the various components that comprise the **IFTA+**. The monitor can be programmed remotely via a serial connection.

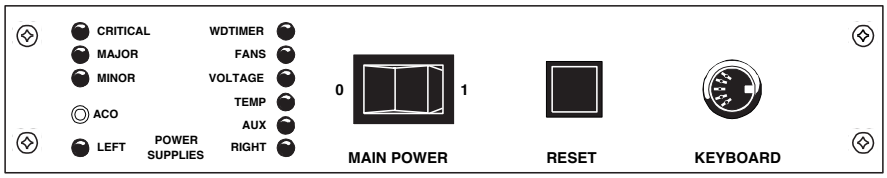


Figure 6-1: System Sentinel Front Control Panel (typical)

The System Sentinel monitors:

- CPU activity (1 or 2 CPUs),
- fan rotation,
- backplane voltages,
- temperatures,
- power supply failure,
- TTL digital inputs,
- Opto-isolator digital inputs.

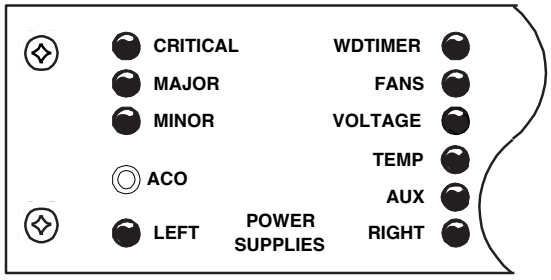


Figure 6-2: System Sentinel LEDs & Pushbutton (typical)

There are three alarm states registered by the System Sentinel: minor, major and critical. All alarm triggers are set up by users.

- ## Minor alarm

  The system continues running and **requires timely rather than immediate action.**

  ### Typical causes of minor alarms:

  - the internal battery is not present or has failed, and/or
  - insufficient battery charge.

  ### Results of minor alarms:

  - the minor alarm yellow LED glows,
  - a minor alarm beep (intermittent tone) repeatedly sounds,
  - remote indication of the alarm is given via relay output.

- ## Major alarm

  The system is in danger of shutting down and **requires immediate action to restore full functionality.**

  ### Typical causes of major alarms:

  - over-temperature conditions occur,
  - fan rotation is faulty.

  ### Results of major alarms:

  - the major alarm orange LED glows,
  - a major alarm beep (constant tone) repeatedly sounds,
  - remote indication of the alarm is given via relay output.

- ## Critical alarm

  The system is in danger of shutting down and suffering permanent damage and **requires immediate action to restore full functionality.**

  ### Typical causes of critical alarms:

  - a power supply goes out of tolerance,
  - the backplane loses power,
  - CPU failure is detected,
  - a power supply module is faulty.

  ### Result of critical alarms:

  - the critical alarm red LED glows,
  - a critical alarm beep repeatedly sounds,
  - remote indication of the alarm is given via relay output.

  If more than one alarm state occurs, the highest priority alarm sounds, but all relevant LEDs light.

• Voltage Sensing

+5V, -5V, +12V and -12V are measured at the backplane with 10-bit resolution and a long-term accuracy of ± 1.5%.

• Temperature

One on-board and two remote sensors measure temperature with a long-term accuracy of ± 4º F.

• Fan Sensing

Three fan assemblies with open-collector tachometer outputs can be sensed. Fan speed is reported in RPM.

• Digital Inputs

There are four inputs for TTL or open-collector drive. Two are used for monitoring “power OK” signals from the **IFTA+** power supplies. Two opto-isolator inputs for current loop drive of 10 mA to 20 mA.

• Watchdogs

There are two independent watchdogs, one monitors specific activity via the backplane (internal), and the other monitors specific activity via the serial interface (external).

Programming the System Sentinel

• Getting started

The board's software is written in C language and resides as firmware in ROM. The firmware is customizable and additional ROM can be added as needed. Communication with the firmware is accomplished using simple commands via the RS232 port or backplane.

Programming the CPU to communicate with the System Sentinel must be accomplished by the user. A floppy disk containing a sample software interface, written in C language, is provided as an example.

Connection between the CPU board and the System Sentinel board is made using the RS232 port. This can be accomplished by connecting one of the CPU board's COM ports to the System Sentinel RS232 port as follows:

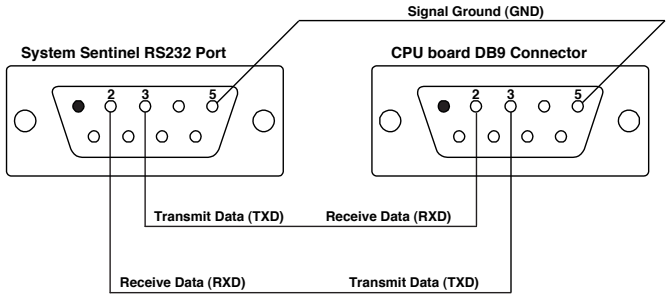
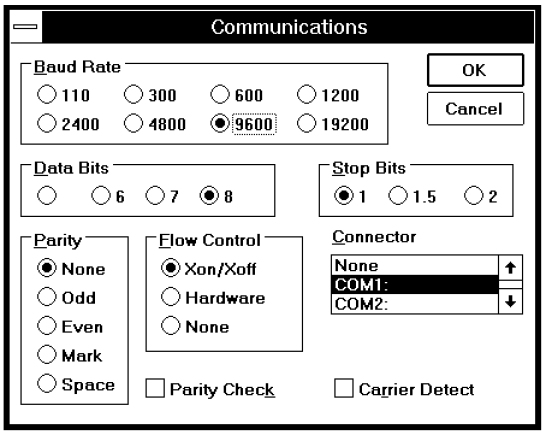


Figure 6-3: System Sentinel/CPU Board Interconnect

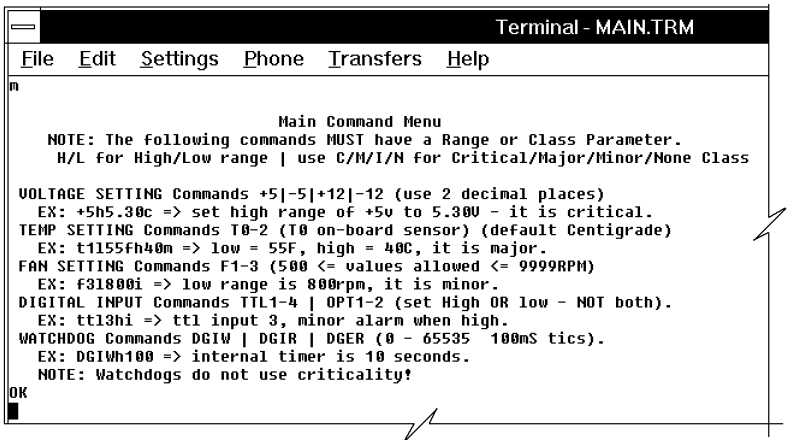
Example (for use with Windows):

1. Launch Windows.
2. From the Accessories Program Group, double click on the Terminal icon.
3. The Terminal window will be displayed.
4. Select the Settings pull-down menu and select Communications.

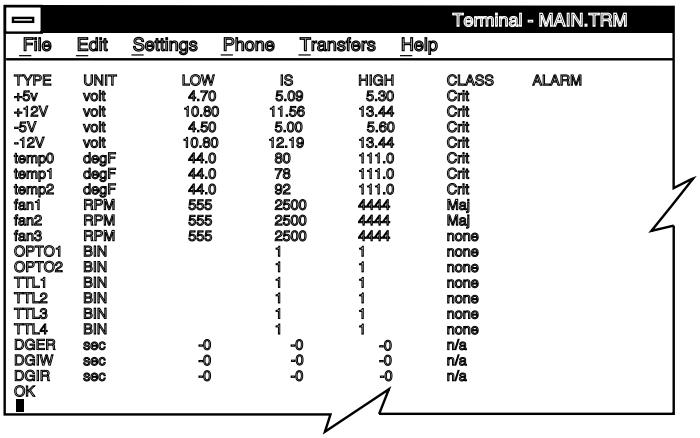
5. The following entry field will be displayed:



6. Select a Baud Rate of 9600, 8 Data Bits, 1 Stop Bit, no Parity, Xon/Xoff and COM1. Click “OK.”
7. From the File pull-down menu, select Save as and save the terminal as main.trm.
8. Type “m” and press <enter>. The Main Command Menu will be displayed as follows:



9. Type “s” and press <enter>. A current status table similar to the following example will be displayed:



Backplane signalling:

A sample software interface, written in C, named “io_test.exe” is available at the ftp.ibus.com web site. Running this program allows communication with the board using the same commands as the serial interface. See the sections that follow for a list of commands.

• Default Settings

In the above figure, all of the values in the low column, high column, and class column are default values delivered from the factory.

Commands

• Limit Setting Commands

The following is an example of a voltage configuration procedure:

+5L4.75H5.25C

This entry sets the **L**ower limit to 4.75V, the **H**igh limit to 5.25V and alarm class to **C**ritical.

Entering:

+5L4.75H5.25CS

causes immediate output of the +5V status line. For example:

+5 volt 4.75 5.01 5.25 Crit

Entering:

+5L4.75H5.25CR

will respond with just a reading of the present voltage.
For example:

5.01

Note: All values in the Low, High and Class columns are stored in non-volatile memory. The process of writing to this memory takes approximately 30 ms, during which time the board cannot respond to any commands.

The following are command set alarm limits:

+5, +12, -5, -12, T0, T1, T2, F1, F2, F3, TTL1, TTL2, TTL3, TTL4, OPTO1, OPTO2, DGER, DGIW and **DGIR**.

Note: All entry is case insensitive. Examples are shown in bold, upper case for purposes of clarity only.

The parameters (op-codes) are as follows:

H, L - High/Low limit settings.
C, M, I, N - for **C**ritical, **M**ajor, m**I**nor or **N**o criticality, except watchdogs.

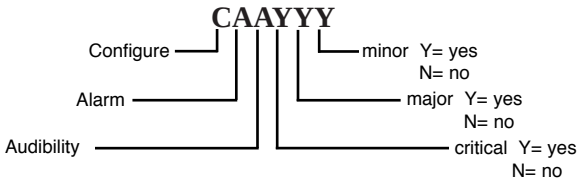
S - returns the current status line for a specific point.
R - returns the current reading for a specific point.

The valid high/low limits are as follows:

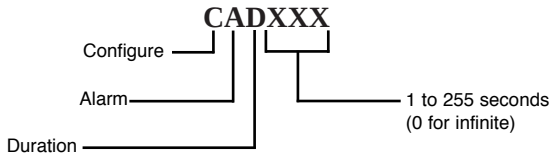
+/-5	0.00 to 5.99 Two decimal places must be entered.
+/-12	0.00 to 14.99 Two decimal places must be entered.
T0 to **T2**	5 to 90 degrees C - Celsius is the default. Do not use the letter 'C' since 'C' means critical. 40 to 195 degrees F - In this case the letter 'F' must follow the value.
F1 to **F3**	500 to 9999 rpm.
TTL1 - 4 & OPTO1/2	These commands should only have an H or L parameter, not both. This will identify the state the input should have in order to not generate an alarm.
DGER, DGIW, DGIR	0 to 65535 tics of 100 ms each. A zero in the low limit means to ignore the lower watchdog. Criticality is meaningless for watchdog. When the timer expires, the reset will be carried out. When the internal or external reset is active, the watchdog front-panel LED will light.

- ## Configure Commands

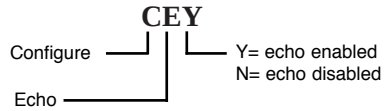
CAA - Configure **A**larm **A**udibility assigns audibility separately to Critical, Major and mInor alarms. Default is that all alarms are audible. For example:



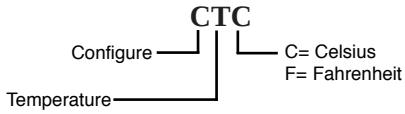
CAD - The **C**onfigure **A**larm **D**uration command sets the duration 'x' for how long the alarm is silent after the ACO button is pressed. Default is zero which means that only a new alarm will, again, set the audible alarm. For example:



CE - The **C**onfigure **E**cho command makes it possible to check that data has been properly received. The default state is echo enabled (CEY). For example:



CT - The **C**onfigure **T**emperature command is for reporting in degrees C or degrees F. For example:



- Calibration Commands

+5, +12, -5, -12, T0, T1, T2
These commands work the same as the point setting commands except they recognize a special Display Calibration Offsets Command, **'X'**. The voltage and temperature parameters must meet the same requirements for range and number of decimal points as the point commands. The board will accept these values and compare them with measured values and compute a calibration offset to be added to future readings. This command can be used in conjunction with the other point setting values. For example:

+5L4.66H5.30X5.02
-12X12.10

Display Calibration Offsets Command, X

Entering an 'X' by itself will make the board dump the calibration offset as follows:

svvv svvv svvv svvv sttt sttt sttt

svvv is the sign and offset that is being added to +5V, +12V, -5V, -12V in that order. The values are in tens of millivolts.

sttt is the sign and offset that is being added to T0, T1, and T2 in that order. The values are in tens of degrees Fahrenheit.

GAS - Get **A**larm **S**tatus. If an alarm condition exists, this command will send a string of data (delimited with blanks) indicating the points in an alarm condition and the alarm class. If there are no alarms, it will return 'OK.' For example:

+5CFAN1IOPTO3I

• Watchdog Commands

DGER - Watch**D**o**G** **E**xternal **R**eset

DGIW - Watch**D**o**G** **I**nternal **W**arning

DGIR - Watch**D**o**G** **I**nternal **R**eset

The watchdog timer can be assigned values from 0 to 65535, where each unit is 0.1 seconds. For example, type the following command:

DGERH100

and then press Enter. This command indicates a High limit setting of 10 seconds and will cause the Critical Alarm LED and the WDTimer LED to light 10 seconds after the Enter key is pressed. The WDTimer LED will go out approximately 4 seconds later.

Again, type the following command:

DGERH100

ant then press Enter. Within 8 seconds of entering the previous command, type the following command:

WDR

and then press Enter. The Critical Alarm LED will go out.

A zero in the low limit means to ignore the lower watchdog. Criticality is meaningless for watchdog. When the timer expires, the reset will be carried out. When the internal or external reset is active, the WDTimer LED will light.

WDR - **W**atch**D**og **R**etrigger will reset the watchdog time-out that was previously configured.

If this command is received from the serial port, it will restart the external watchdog timer. If it is received at the ISA bus, it will restart the internal watchdog. If the lower watchdog limit is not equal to zero, the board will perform a reset (internal or external) if the watchdog command arrives too quickly. Otherwise the board will respond with ‘OK’ unless an alarm condition exists, then it will respond with ‘ALARM.’

When the board is powered up, watchdog will clear all timers and High/Low values.

When a value is input to the High location, the watchdog will arm and begin counting.

When the watchdog times out, the front-panel **WDTIMER** LED will light and the alarm status will be set to **TRIPPED**.

After being **TRIPPED**, the watchdog will clear all counters and wait to be re-initialized after reboot.

When the watchdog receives a re-initialize sequence, the front-panel **WDTIMER** LED will be cleared (unless the other watchdog was **TRIPPED**) and the **TRIPPED** status will also be cleared.

RES - A perform **RES**et command received through the serial port will activate the internal reset circuitry. A perform **RES**et command received through the backplane will activate the external reset relay.

BOOT - The **BOOT** command reboots the board as if it had just been powered on.

- ISA connector pin assignments

Pin #	Assign.	Pin #	Assign.	Pin #	Assign.	Pin #	Assign.
A01	IOCHCHK#	B01	GND	C01	SBHE#	D01	EMCS16#
A02	SD7	B02	RESETDRV	C02	LA23	D02	IOCS16#
A03	SD6	B03	+5 V	C03	LA22	D03	IRQ10
A04	SD5	B04	IRQ9	C04	LA21	D04	IRQ11
A05	SD4	B05	+5 V	C05	LA20	D05	IRQ12
A06	SD3	B06	DRQ2	C06	LA19	D06	IRQ15
A07	SD2	B07	-12 V	C07	LA18	D07	IRQ14
A08	SD1	B08	ENDXFR#	C08	LA17	D08	DACK0#
A09	SD0	B09	+12 V	C09	MEMR#	D09	DRQ0
A10	IOCHRDY	B10	GND	C10	MEMW#	D10	DACK5#
A11	AEN	B11	SMEMW#	C11	SD8	D11	DRQ5
A12	SA19	B12	SMEMR#	C12	SD9	D12	DACK6#
A13	SA18	B13	IOW#	C13	SD10	D13	DRQ6
A14	SA17	B14	IOR#	C14	SD11	D14	DACK7#
A15	SA16	B15	DACK3#	C15	SD12	D15	DRQ7
A16	SA15	B16	DRQ3	C16	SD13	D16	+5 V
A17	SA14	B17	DACK1#	C17	SD14	D17	MASTER#
A18	SA13	B18	DRQ1	C18	SD15	D18	GND
A19	SA12	B19	REFRSH#				
A20	SA11	B20	SYSCLK				
A21	SA10	B21	IRQ7				
A22	SA9	B22	IRQ6				
A23	SA8	B23	IRQ5				
A24	SA7	B24	IRQ4				
A25	SA6	B25	IRQ3				
A26	SA5	B26	DACK2#				
A27	SA4	B27	TC				
A28	SA3	B28	BALE				
A29	SA2	B29	+5 V				
A30	SA1	B30	OSC				
A31	SA0	B31	GND				

Table A1-1: ISA Connector Pin Assignments

Pin #	Assign.	Pin #	Assign.	Pin #	Assign.	Pin #	Assign.
A01	TRST#	A32	AD16	B01	-12 V	B32	AD17
A02	+12 V	A33	+3.3 V	B02	TCK	B33	C/BE2#
A03	TMS	A34	FRAME#	B03	GND	B34	GND
A04	TDI	A35	GND	B04	TDO	B35	IRDY#
A05	+5 V	A36	TRDY#	B05	+5 V	B36	+3.3 V
A06	INTA#	A37	GND	B06	+5 V	B37	DEVSEL#
A07	INTC#	A38	STOP#	B07	INTB#	B38	GND
A08	+5 V	A39	+3.3 V	B08	INTD#	B39	LOCK#
A09	CLKC	A40	SDONE	B09	REQ3#	B40	PERR#
A10	+5 V (I/O)	A41	SB0#	B10	REQ1#1	B41	+3.3 V
A11	CLKD	A42	GND	B11	GNT3#	B42	SERR#
A12	GND	A43	PAR	B12	GND	B43	+3.3 V
A13	GND	A44	AD15	B13	GND	B44	C/BE1#
A14	GNT1#	A45	+3.3 V	B14	CLKA	B45	AD14
A15	RST#	A46	AD13	B15	GND	B46	GND
A16	+5 V (I/O)	A47	AD11	B16	CLKB	B47	AD12
A17	GNT0#	A48	GND	B17	GND	B48	AD10
A18	GND	A49	AD09	B18	REQ0#	B49	GND
A19	REQ2#	A50	KEY	B19	+5 V (I/O)	B50	KEY
A20	AD30	A51	KEY	B20	AD31	B51	KEY
A21	+3.3 V	A52	C/BE0#	B21	AD29	B52	AD08
A22	AD28	A53	+3.3 V	B22	GND	B53	AD07
A23	AD26	A54	AD06	B23	AD27	B54	+3.3 V
A24	GND	A55	AD04	B24	AD25	B55	AD05
A25	AD24	A56	GND	B25	+3.3 V	B56	AD03
A26	GNT2#	A57	AD02	B26	C/BE3#	B57	GND
A27	+3.3 V	A58	AD00	B27	AD23	B58	AD01
A28	AD22	A59	+5 V (I/O)	B28	GND	B59	+5 V (I/O)
A29	AD20	A60	REQ64#	B29	AD21	B60	ACK64#
A30	GND	A61	+5 V	B30	AD19	B61	+5 V
A31	AD18	A62	+5 V	B31	+3.3 V	B62	+5 V

Table A1-2: PCI Connector Pin Assignments (CPU Board)

- PCI Connector Pin Assignments (Expansion Slot)

Pin #	Assign.	Pin #	Assign.	Pin #	Assign.	Pin #	Assign.
A01	TRST#	A32	AD16	B01	-12 V	B32	AD17
A02	+12 V	A33	+3.3 V	B02	TCK	B33	C/BE2#
A03	TMS	A34	FRAME#	B03	GND	B34	GND
A04	TDI	A35	GND	B04	TDO	B35	IRDY#
A05	+5 V	A36	TRDY#	B05	+5 V	B36	+3.3 V
A06	INTA#	A37	GND	B06	+5 V	B37	DEVSEL#
A07	INTC#	A38	STOP#	B07	INTB#	B38	GND
A08	+5 V	A39	+3.3 V	B08	INTD#	B39	LOCK#
A09	Reserved	A40	SDONE	B09	PRSNT1#	B40	PERR#
A10	+5 V	A41	SB0#	B10	Reserved	B41	+3.3 V
A11	Reserved	A42	GND	B11	PRSNT2#	B42	SERR#
A12	GND	A43	PAR	B12	GND	B43	+3.3 V
A13	GND	A44	AD15	B13	GND	B44	C/BE1#
A14	Reserved	A45	+3.3 V	B14	Reserved	B45	AD14
A15	RST#	A46	AD13	B15	GND	B46	GND
A16	+5 V	A47	AD11	B16	CLK	B47	AD12
A17	GNT#	A48	GND	B17	GND	B48	AD10
A18	GND	A49	AD09	B18	REQ#	B49	GND
A19	Reserved	A50	KEYWAY	B19	+5 V	B50	KEYWAY
A20	AD30	A51	KEYWAY	B20	AD31	B51	KEYWAY
A21	+3.3 V	A52	C/BE0#	B21	AD29	B52	AD08
A22	AD28	A53	+3.3 V	B22	GND	B53	AD07
A23	AD26	A54	AD06	B23	AD27	B54	+3.3 V
A24	GND	A55	AD04	B24	AD25	B55	AD05
A25	AD24	A56	GND	B25	+3.3 V	B56	AD03
A26	IDSEL	A57	AD02	B26	C/BE3#	B57	GND
A27	+3.3 V	A58	AD00	B27	AD23	B58	AD01
A28	AD22	A59	+5 V	B28	GND	B59	+5 V
A29	AD20	A60	REQ64#	B29	AD21	B60	ACK64#
A30	GND	A61	+5 V	B30	AD19	B61	+5 V
A31	AD18	A62	+5 V	B31	+3.3 V	B62	+5 V

Table A1-3: PCI Connector Pin Assignments (Expansion Slot)

B

backplane: A device inside the chassis that contains slots, or sockets, for plugging in I/O cards or cables.

bus: One or more electrical conductors that transmit power or binary data to the various sections of a computer or any common pathway between hardware devices. A computer bus connects the CPU to its main memory and the memory banks that reside on the control units of the peripheral devices. It is made up of two parts. Addresses are sent over the address bus to signal a memory location, and the data is transferred over the data bus to that location.

C

card cage: A cabinet or metal frame that holds printed circuit cards.

control panel: The panel on the front of the computer that usually contains the power switch, reset switch, LEDs and the keyboard connector.

D

DAT: Digital Audio Tape. Storage medium.

disk access LED: The LED located on the front control panel that indicates when the hard disk drive is active.

drive bay: Area in the chassis where drives are mounted.

E

electrostatic discharge (ESD): High voltage, low current discharges caused by static electricity buildup on a surface or object. ESD can be prevented by wearing a wrist strap attached to a ground post on a static mat.

EMI (ElectroMagnetic Interference): Noise generated by the switching action of the power supply and other system components. Conducted EMI is interference generally conducted into the power line, and is normally controlled with a line filter. Radiated EMI is that portion that radiates into free space, one way to suppress it is by enclosing circuitry in a metal case.

expansion card: (I/O add-in card.) A printed circuit board that plugs into an expansion slot.

F

floppy drive: A device for reading the information contained on external, portable computer disks called floppy disks.

H

hard drive: Data storage devices. Hard drives magnetically store computer data on spinning internal disks.

hold-down bar: A metal bar located in the I/O bay of the chassis. It is used to keep I/O cards firmly seated in their slots.

I

IDE (Integrated Drive Electronics): A standard of signalling and communicating with a device.

I/O slot: A slot for plugging in additional I/O cards to expand the capability of a computer.

ISA (Industry Standard Architecture): A 16-bit expansion bus commonly used in PCs.

K

keyboard connector: Located on the front control or I/O panel.

kilobyte (KB): 1,024 bytes.

L

LED: Light Emitting Diode. Long-lasting light emitters usually used as indicators.

load board: A board having specific resistance to current flow.

P

parallel port: I/O connector used to hook up a printer or other parallel interface device. The parallel port is usually a 25-pin female DB25 connector.

PCI (**Peripheral Component Interconnect):** An optional slot standard for plug-in boards

port: Ports are used to connect peripheral devices such as external drives and printers to your computer.

power good: Signal used to prevent the computer from starting until the power has stabilized. The power good line switches from 0 to +5 volts within one tenth to one half second after the power supply reaches normal voltage levels. Whenever low input voltage causes the output voltage to fall below operating levels, the power good signal goes back to zero.

power ON/diagnostic LED: The LED located on the front control panel that indicates that power is present in the computer.

power supply: Electrical system that converts AC current from the wall outlet into the DC currents required by the computer circuitry. In a personal computer, +5, -5, +12 and -12 voltages are generated.

power switch: Located on the front control panel, the power switch turns power ON to the computer.

R

RAID (Redundant Arrays of Independent Disks): A storage technology using an array of two or more disks to redundantly store information. If one disk fails in a RAID array, the unit continues to function without loss of data.

real-time clock (RTC): A periodic interrupt used to derive local time.

reset switch: Button or key that reboots the computer. All current activities are stopped cold and any data in memory is lost.

retaining bracket: The bracket on the back of the chassis that holds connectors from the board, usually a DB9 for serial port, a DB25 for parallel port, and mini-DIN connectors for keyboard and mouse.

S

SCSI (Small Computer System Interface): A high speed, general purpose interface to storage devices.

serial port: A two-channel port, one channel used for "In" transmissions and one for "Out" transmissions.

P

R

S

T

W