Model 7520-34H Series
Product Manual

MANUAL NUMBER : 00431-116-19B

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FOREWARD

This product manual provides information to install, operate and or program the referenced product(s) manufactured or distributed by Industrial Computer Source. The following pages contain information regarding the warranty and repair policies.

Technical assistance is available at: **1-800-480-0044**.

Manual Errors, Omissions and Bugs: A "Bug Sheet" is included as the last page of this manual. Please use the "Bug Sheet" if you experience any problems with the manual that requires correction.

Guarantee

A thirty day money-back guarantee is provided on all **standard** products sold. **Special order products** are covered by our Limited Warranty, *however they may not be returned for refund or credit. EPROMs, RAM, Flash EPROMs or other forms of solid electronic media are not returnable for credit - but for replacement only. Extended Warranty available. Consult factory.*

Refunds

In order to receive refund on a product purchase price, the product must not have been damaged by the customer or by the common carrier chosen by the customer to return the goods, and the product must be returned complete (meaning all manuals, software, cables, etc.) within 30 days of receipt and in as-new and resalable condition. The **Return Procedure** must be followed to assure prompt refund.

Restocking Charges

Product returned *after* 30 days, and *before* 90 days, of the purchase will be subject to a **minimum** 20% restocking charge and any charges for damaged or missing parts.

Products not returned within 90 days of purchase, or products which are not in as-new and re-saleable condition, are not eligible for credit return and will be returned to the customer.

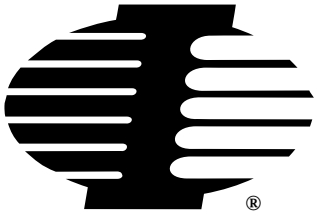
Limited Warranty

One-year limited warranty on all products sold with the exception of the "Performance Series" I/O products, which are warranted to the original purchaser for as long as they own the product, subject to all other conditions below, including those regarding neglect, misuse and acts of God. Within one year of purchase, Industrial Computer Source will repair or replace, at our option, any defective product. At any time after one year, we will repair or replace, at our option, any defective "Performance Series" I/O product sold. This does not include products damaged in shipment, or damaged through customer neglect or misuse. Industrial Computer Source will service the warranty for all standard catalog products for the first year from the date of shipment. After the first year, for products not manufactured by Industrial Computer Source, the remainder of the manufacturer's warranty, if any, will be serviced by the manufacturer directly.

The **Return Procedure** must be followed to assure repair or replacement. Industrial Computer Source will normally return your replacement or repaired item via UPS Blue. *Overnight delivery or delivery via other carriers is available at additional charge.*

The limited warranty is void if the product has been subjected to alteration, neglect, misuse, or abuse; if any repairs have been attempted by anyone other than Industrial Computer Source or its authorized agent; or if the failure is caused by accident, acts of God, or other causes beyond the control of Industrial Computer Source or the manufacturer. Neglect, misuse, and abuse shall include any installation, operation, or maintenance of the product other than in accordance with the owners' manual.

No agent, dealer, distributor, service company, or other party is authorized to change, modify, or extend the terms of this Limited Warranty in any manner whatsoever. Industrial Computer Source reserves the right to make changes or improvements in any product without incurring any obligation to similarly alter products previously purchased.



Shipments not in compliance with this Guarantee and Limited Warranty Return Policy will not be accepted by Industrial Computer Source.

Return Procedure

For any Limited Warranty or Guarantee return, please contact Industrial Computer Source's Customer Service at **1-800-480-0044** and obtain a Return Material Authorization (RMA) Number. All product(s) returned to Industrial Computer Source for service or credit **must** be accompanied by a Return Material Authorization (RMA) Number. Freight on all returned items **must** be prepaid by the customer who is responsible for any loss or damage caused by common carrier in transit. Returns for Warranty **must** include a Failure Report for each unit, by serial number(s), as well as a copy of the original invoice showing date of purchase.

> To reduce risk of damage, returns of product must be in an Industrial Computer Source shipping container. If the original container has been lost or damaged, new shipping containers may be obtained from Industrial Computer Source Customer Service at a nominal cost.

Limitation of Liability

In no event shall Industrial Computer Source be liable for any defect in hardware or software or loss or inadequacy of data of any kind, or for any direct, indirect, incidental, or consequential damages in connection with or arising out of the performance or use of any product furnished hereunder. Industrial Computer Source liability shall in no event exceed the purchase price of the product purchased hereunder. The foregoing limitation of liability shall be equally applicable to any service provided by Industrial Computer Source or its authorized agent.

Some *Sales Items* and *Customized Systems* are **not** subject to the guarantee and limited warranty. However, in these instances any deviations will be disclosed prior to sales and noted in the original invoice. ***Industrial Computer Source reserves the right to refuse returns or credits on software or special order items.***

Advisories

Three types of advisories are used throughout the manual to stress important points or warn of potential hazards to the user or the system. They are the Note, the Caution, and the Warning. Following is an example of each type of advisory:

Note: The note is used to present special instruction, or to provide extra information which may help to simplify the use of the product.

CAUTION!

A Caution is used to alert you to a situation which if ignored may cause injury or damage equipment.

WARNING!

A Warning is used to alert you of a situation which if ignored will cause serious injury.

Cautions and Warnings are accented with triangular symbols. The exclamation symbol is used in all cautions and warnings to help alert you to the important instructions. The lightning flash symbol is used on the left hand side of a caution or a warning if the advisory relates to the presence of voltage which may be of sufficient magnitude to cause electrical shock.

Use caution when servicing any electrical component. We have tried to identify the areas which may pose a Caution or Warning condition in this manual; however, Industrial Computer Source does not claim to have covered all situations which might require the use of a Caution or Warning.

You must refer to the documentation for any component you install into a computer system to insure proper precautions and procedures are followed.

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CE Declaration of Conformity

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Current Revision 19B

October 1997

Chapter 1: Introduction

General

The 7520 Series computer chassis from Industrial Computer Source has been designed to meet the most vigorous commercial and industrial applications. It is a rack mount chassis, constructed of zinc plated, cold rolled steel to provide the needed strength required by our customers.

The 20-slot passive backplane architecture is ideal for applications requiring a large number of expansion slots for feature cards. It accepts the standard plug in type CPU cards and is available with ISA or PCI compatibility. The ISA backplane further offers the ability to split the backplane to create multiple CPU's in one chassis. Standard configurations of 10/10 or 5/5/5/5 are available.

The chassis connector and indicator locations have been carefully thought out and placed in the most accessible areas possible. There are clearly visible front panel indicators for Fan Status, Temperature Status, Drive Activity, and Power On. There is also a separate indicator for each power supply output. The power supply output of Redundant power supply models will have two sets of these power supply output LED's; one set for each power module. The system power switch, front keyboard connector, disk drive access, and system reset button are easily accessible behind the locking front access door.

The rear panel of the 7520 chassis contains the keyboard connectors, Power On LEDs, and the system reset buttons on the split backplane configurations. It also has knockouts for two DB-9 and one DB-25 connectors.

Multiple CPU's

One of the key advantages of the 7522(4) Series chassis is its ability to accept multiple CPU cards. The backplane is split into separate groups, allowing each group to function as a separate computer. Keyboard connectors and reset buttons for up to five different groups are available on the rear panel. In this split backplane configuration the system reset button and keyboard connector, located on the front panel, control the first CPU group.

Power Supply

The 7520 Series chassis offers a wide choice of power supplies. The standard power supply is a switch selectable 115 or 230 VAC, 300 Watt input supply offering 32 Amps @ +5V. There are 400 and 500 Watt versions available, or the chassis may be ordered with a 48 VDC input power supply of 350 Watts offering 35A @ +5VDC output. Redundant power supplies are also available with the 7520 Series chassis. There is a switch selectable 115 or 230 VAC, 300 Watt supply offering 30 Amps @ +5V or a redundant 48VDC 300 Watt supply.

The redundant power supply offers two power modules. The power modules are in parallel to each other and therefore share the total load. If either supply should fail, the other supply will take over as the sole supply. You will be notified by an audio alarm and the corresponding power supply light on the front panel will go out. The audio alarm may be disabled by depressing the *Alarm Reset* switch, located at the chassis rear on the power supply. The modules are hot swappable so the failed power module may be changed without bringing the system down.

Drive Bays

Four easily accessible 5.25" half-height drive bays are located behind the locking front access door. Each bay is vibration dampened to help protect the drive. The 5.25" bays may be configured in many different ways, including (with the use of an adapter) mounting any 3.5" device.

Cooling and Filtration

The 7520 series chassis contains four 45CFM fans in front of the card cage area. The input air passes through a filter element and over the feature cards to provide maximum cooling. The filter element provides filtration to 30ppi. The filter access door allows easy removal and installation of the filter element. Circulation in the chassis is further enhanced by the additional 45CFM power supply exhaust fan.

Global Interference Reduction System (GIRSystem™)

The GIRSystem (Global Interference Reduction System) was developed and employed by Industrial Computer Source to eliminate EMI emission and static discharge sensitivity problems associated with today's ultrahigh speed computer systems. As processor and bus speeds are accelerated, it makes the task of containing radio frequency noise inside the system enclosure much more demanding. Processor speeds in industrial "PC" systems already are passing 166, 200 and even 300MHz with the bus speeds at 66MHz and climbing.

The GIRSystem incorporates many design features that were previously used only in high end workstations, not PC's. RFI gasketing is employed to seal the top, weldments are tightened to guarantee integrity, front panel access doors for disk drives are well grounded, and extra precautions taken throughout the fabrication process to reduce leakage paths.

Additionally, the GIRSystem employs an RFI *leakproof* design for the mounting of adapter cards. The original XT design card mounting bracket has never been altered nor has there been any significant changes in the way the brackets are grounded. As processor speeds have been increased, the typical long gap between the mounting bracket and the chassis has become a cavernous exit for RFI leakage. This leakage point is the weakest point in a chassis for EMI and RFI. The GIRSystem includes a gasketed bracket guide that seals this gap without interfering with the use of standard PC adapter cards. This bracket guide provides a full length RFI seal on every adapter card installed - no special adapter cards or modifications to your normal adapter cards are necessary.

With the use of the GIRSystem, Industrial Computer Source, has successfully satisfied the 89/336/EEC directive for CE marking now required in Europe. These requirements are even more stringent than FCC Class B requirements both for emissions and susceptibility. These requirements were met with a 233MHz Alpha Processor based system and 166MHz Pentium based systems!

Specifications

Note: Specifications are for the power supply, chassis, and backplane. Choice of motherboard, CPUs or other user selected feature cards may reduce the maximum specifications. Operating altitude, temperature and power supply loading are interactive and affect the actual specifications according to application. Special backplanes and chassis paint colors are available on request. Consult with the factory for a quotation to meet your requirements.

Mounting

Rack

Backplanes, Passive

ISA -

7520-34H - 20 Slot, 6 Layer, Low Capacitance

7522-34H - 10x10 Slot (split backplane), 4 layer, Low Capacitance

7524-34H - 5x5x5x5 Slot (split backplane), 4 layer, Low Capacitance

PCI -

7520P-34H - 18 Slot, 6 Layer, Low Capacitance

15 Full Length ISA, 16 bit

1 ISA Dedicated CPU Slot

2 Full Length PCI, 32 bit

7520P6-34H - 18 Slot, 6 Layer, Low Capacitance

11 Full Length ISA, 16 bit

1 ISA Dedicated CPU Slot

6 Full Length PCI, 32 bit

7520P9-34H - 18 Slot, 6 Layer, Low Capacitance

8 Full Length ISA, 16 bit

1 ISA Dedicated CPU Slot

9 Full Length PCI, 32 bit

Split Backplanes Available -

10x10 Slot in Model 7522-34H

5x5x5x5 Slot in Model 7524-34H

Note: Numerous other configurations are also available, including split backplanes, more PCI slots, and various combinations of bus architecture.

A/C Power Supplies

300W Supply
115/230VAC Input, 50/60Hz, Switch Selectable

400W Supply
115/230VAC Input, 50/60Hz, Switch Selectable

500W Supply
90-132/180-264VAC Input, 47-63 Hz, Switch Selectable

Input Current

300W Supply	400W Supply	500W
6.2A@ 115VAC	8A @ 115VAC	12A @ 115VAC
3.1A @ 230VAC	4A @ 230VAC	12A @ 230VAC

Maximum Output

300W Supply	400W Supply	500W Supply
+5VDC @ 32A	+5VDC @ 50A	+5VDC @ 80A
+12VDC @ 8A/20A Pk	+12VDC @ 10A/18A Pk	+12VDC @ 10A/16A Pk
-5VDC @ 3A	-5VDC @ 3A	-5VDC @2A
-12VDC @ 2A	-12VDC @ 2A	-12VDC @10A

Note: The -5V and -12V combined not to exceed 25W total on the 300W or 400W supplies.

Overcurrent Protection

300W Supply

Short circuit protected with automatic recovery. Current limit is based on the total input power and set at approximately 160% above maximum load.

400W Supply

Short circuit protected with automatic recovery. Current limit is based on the total input power and set at approximately 130% above maximum load.

500W Supply

All outputs are protected against overload and short circuit. Automatic recovery upon removal of fault.

Minimum Load

300W Supply	400W Supply	500W Supply
3.0A @ +5V	1.0A @ +5V	8.0A @ +5V
.5A @ +12V	1.0A @ +12V	0.0A @ +12

Load Regulation

300W Supply	400W Supply	500W Supply
±5% @ +5V	±4% @ +5V	±1% @ +5V
±5% @ +12V	±5% @ +12V	±1% @ +12V
±10% @ -5V	±5% @ -5V	±1% @ -5V
±10% @ -12V	±5% @ -12V	±1% @ -12V

Inrush Current

300W Supply	400W Supply	500W Supply
40A @ 115 VAC Max.	70A @ 115 VAC Max.	80A @ 115 VAC Max.
80A @ 230 VAC Max.	95A @ 230 VAC Max.	20A @ 230 VAC Max.

Auxiliary Output Receptacle

1A @ 115VAC
.5A @ 230VAC

3.3VDC Output Power Supply

400W Supply with 3.3VDC Output
115/230VAC Input, 50/60Hz, Switch Selectable

Note: This power supply is available with the PCI chassis only and is required for SB21064 RISC processor board or Pentium Pro models.

Input Current

8A @ 115VAC
4A @ 230VAC

Maximum Output

+3.3VDC @ 15A
+5VDC @ 50A
+12VDC @ 18A/28A pk
-5VDC @ 1A
-12VDC @ 2A

Note: The total load of the -5V and -12V cannot exceed 25W, and the total power capacity cannot be over 400W.

Overcurrent Protection

Short circuit protected with automatic recovery. Current limit is based on the total input power and set at approximately 130% above the maximum load.

Minimum Load

+3.3VDC @ 0A
+5VDC @ 1A
+12VDC @ 1A
-5VDC @ 0A
-12VDC @ 0A

Load Regulation

±4% @ +3.3V
±4% @ +5V
±5% @ +12V
±5% @ -5V
±5% @ -12V

Inrush Current

70A @ 115VAC
95A @ 230VAC

Auxiliary Output Receptacle

1A @ 115VAC
.5A @ 230VAC

DC Power Supplies

350 Watt Supply, 48 VDC Input

Maximum Output

+5VDC @ 35.0A
+12VDC @ 9A/15A Peak
-5VDC @ 1.0A
-12VDC @ 1.0A

Note: A minimum load is required of 8A on the +5V and 3A on the +12V.

Overload Protection
Fully Protected from Overload and Short Circuit Conditions.

Load Regulation
±0.5% all outputs. (Note: +5V requires 10% minimum load to maintain specified performance.)

Inrush Current
Limited by soft start circuitry.

Redundant Supplies

115/230VAC at 50/60Hz Input, Switch Selectable
300W Output Each, N+1 Automatic, Hot Swappable, Alarm Signal on Failure

48VDC Input
300W Output Each, N+1 Automatic, Hot Swappable, Alarm Signal on Failure

Input Current, AC Power Supply

7A @ 115VAC
3.5A @ 230VAC

Maximum Output

115/230VAC Supply	48VDC Supply
+5VDC @ 30A	+5VDC @ 30A
+12VDC @ 12A	+8VDC @ 8A/10A peak
-5VDC @ 0.5A	-5VDC @ 0.5A
-12VDC @ 1.0A	-12VDC @ 2A

Overload Protection

115/230VAC Supply

When output power is 105% to 150% of maximum wattage, power supply will shut down by itself; Automatic recovery on removal of fault.

48VDC Supply

Short circuit protected with automatic recovery. Current limit is based on the total input power and is set at approximately 130% above maximum load.

Minimum Load

115/230VAC Supply	48VDC Supply
+5VDC @ 8A	+5VDC @ 3A
+12VDC @ 3A	+12VDC @ 1.0A
-5VDC @ 0.0A	-5VDC @ 0.1A
-12VDC @ 0.0A	-12VDC @ 0.5A

Load Regulation

115/230VAC Supply	48VDC Supply
±5% @ +5V	±3% @ +5V
±5% @ +12V	±5% @ +12V
±10% @ -5V	±5% @ -5V
±10% @ -12V	±5% @ -12V

Inrush Current

115/230VAC Supply	48VDC Supply
45A @ 115VAC	20A
80A @ 230VAC	

External Redundant Power - DE Option

Up to 500W of +5, -5, +12, -12 and +3.3VDC. DC Control Module replaces standard PS/2 form factor power supply and interfaces chassis to model 7100 Series External DC Power Bay. Multiple system chassis may be powered from one power bay.

Cooling Fans

Four 45CFM Fans Filtered at 30ppi in Front Panel Assembly and 24 CFM fan in Power Supply Module.

Fan Intake Filter

15.10 x 4.40 x .25in

30ppi, Open Cell, Polyfoam, SIF 'Z'

Part Number 41171-01A

Disk Drive Capacity

Four half-height 5¼" Drive Bays, Vibration Dampened

Keyboard Connector Locations

Front Panel- Behind Locking Front Access Door

Rear Panel (for each additional split backplane Section)

Front Panel Indicators

Power On Indicator

Power Supply Status LEDs

Disk Activity LED

Fan Status LED

Overtemp Indicating LED

Front Panel Controls (Behind Locking Front Access Door)

Power On/Off

System Reset

Rear Panel Controls

Separate Reset Switch for each additional split backplane Section

Input/Line Power On/Off switch on the 7520-34H-D4 chassis

Input/Line Power On/Off switch on the 7520-54H chassis

Input/Line Power On/Off switch, and individual module power On/Off switches on the 7520-34HR chassis

Note: For normal operation, any rear panel power On/Off switches should be left in the "On" position and system power should be turned on and off with the front panel computer power switch. For information on the heirarchy of switches please see the Power Supply section of this manual on page 2-5 (or page 2-7 for redundant power supply chassis).

Rear Panel Connectors

Separate Keyboard Connector for each additional split backplane Section

Knockouts for DB-9 and DB-25 Shell Connectors

Dimensions (W x H x D)

19.0 x 10.5 x17.0in

(483 x 267 x 432mm)

Weight

47 lbs (21.7kg)

Finish

Chassis- Gold Zinc Plated

Front Panel- Painted, Gray

Paint Color

Cardinal Paint, #8103-44705, Gray, Medium texture, Water based

Operating Environment

Temperature

10 to +50°C

Humidity

8% to 90% RHNC

Altitude

25,000ft (7,695m)

Vibration

1.5G, 3 Axis Vibration

Shock

10G, 3 Axis Shock

Storage Environment

Temperature

-40 to 60°C

Humidity

8% to 90% RHNC

Altitude

25,000ft (7,695m)

Vibration

1.5G, 3 Axis Vibration

Shock

10G, 3 Axis Shock

MTBF

> 80,000 P.O.H. @ 30°C AC 300W Power Supply

> 80,000 P.O.H. @ 30°C AC 400W Power Supply

> 80,500 P.O.H. @ 30°C AC 400W, 5-output Power Supply

> 100,000 P.O.H. @ 30°C AC 500W Power Supply

> 200,000 P.O.H. @ 30°C DC 350W Power Supply

> 65,000 P.O.H. @ 30°C AC 300W Redundant Power Supply

> 200,000 P.O.H. @ 30°C DC 300W Redundant Power Supply

Agency Approvals, 7520-34H, 7520-34HR, and 7520-44H-B4 Models Only

FCC Part 15, Class B

UL Recognized Component

CE Compliance 73/23/EEC, EMC 89/336/EEC

Agency Approvals, 7520-44H, 7520-34H-D4 Models Only

FCC Part 15, Class A

UL Recognized Component

CE Compliance 73/23/EEC, EMC 89/336/EEC

CE

CE

Dimensional Drawings

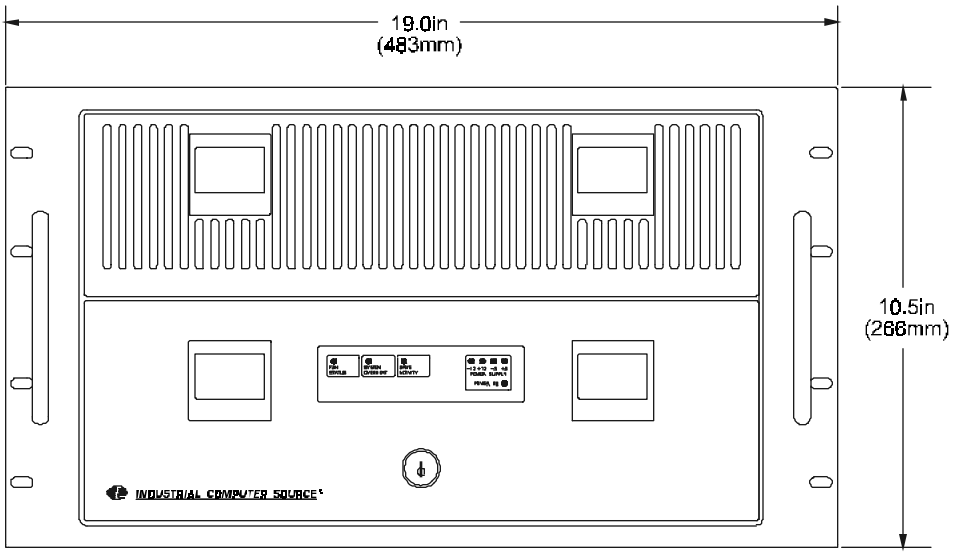

Figure 1-1: 7520-34H, Front View

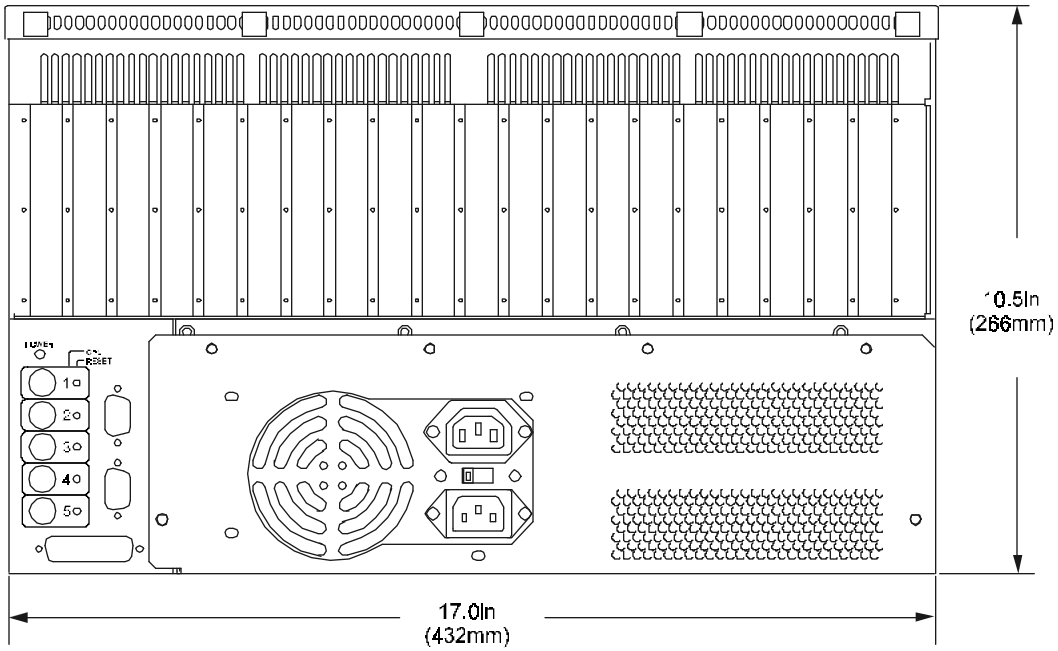

Figure 1-2: 752X-34H Rear View

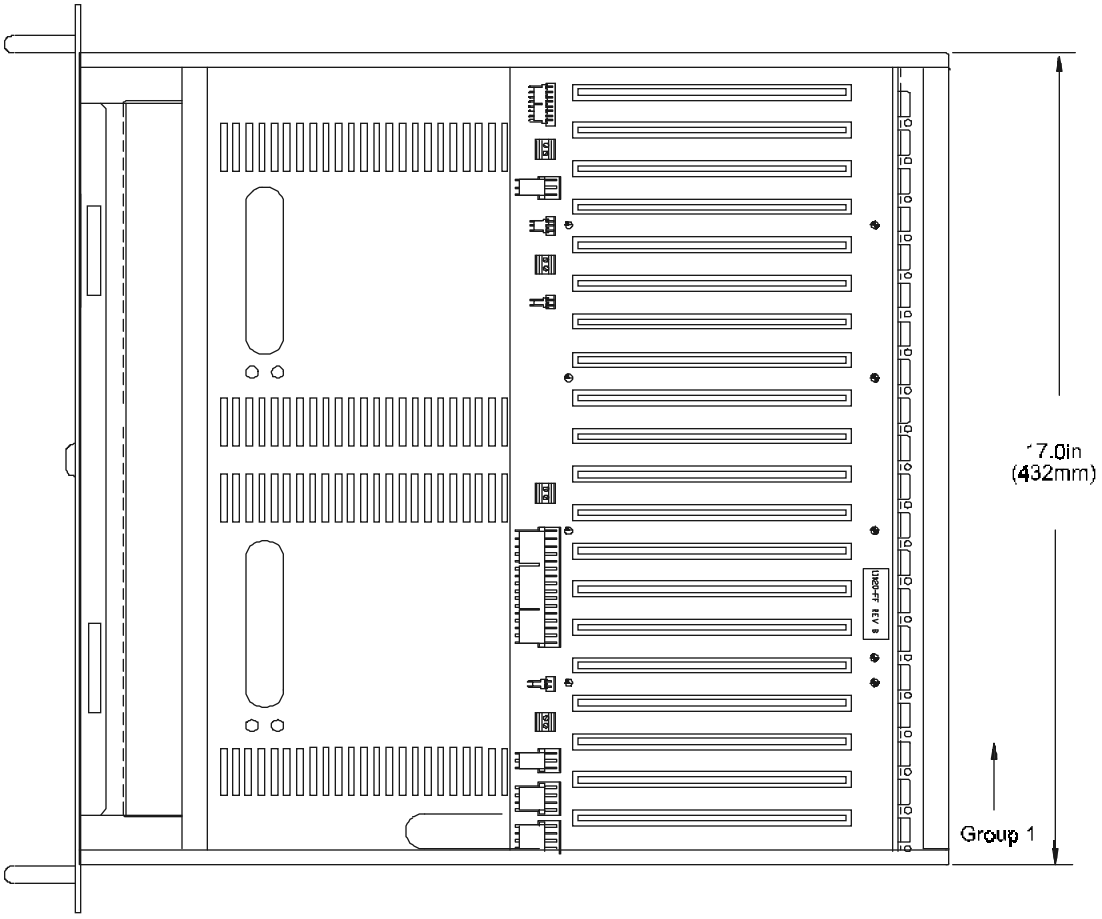

Figure 1-3: 752X-34H Top View, Cover Removed

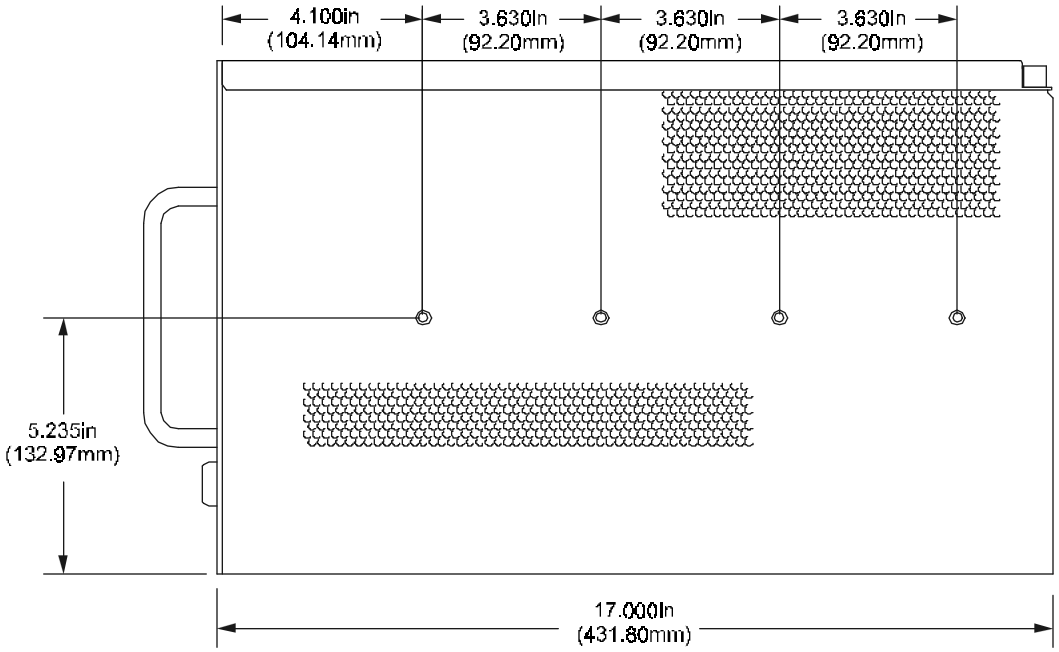

Figure 1-4: 752X-34H, Side View

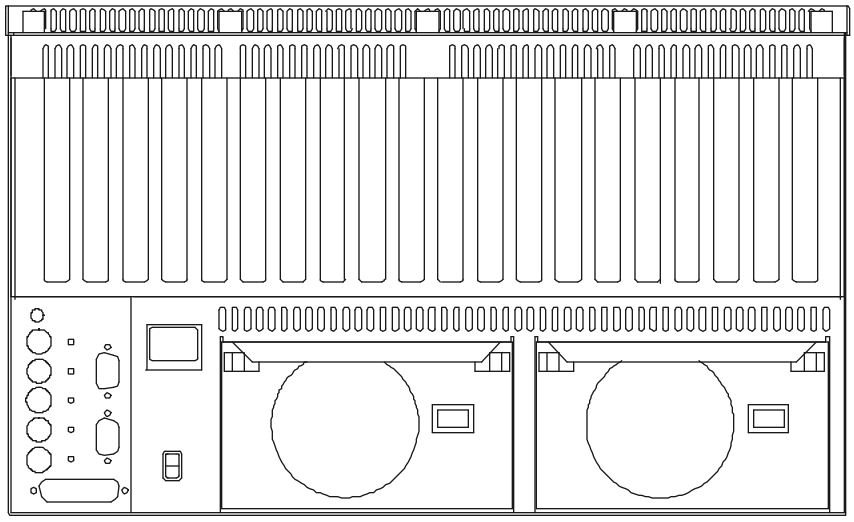

Figure 1-5: 752X-34HR, Rear View

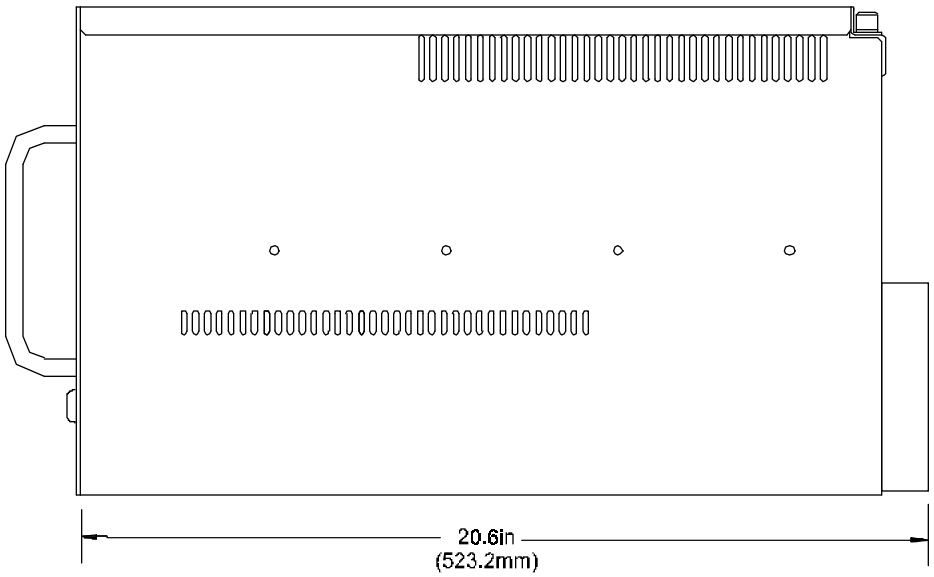

Figure 1-6: 752X-34HR, Side View

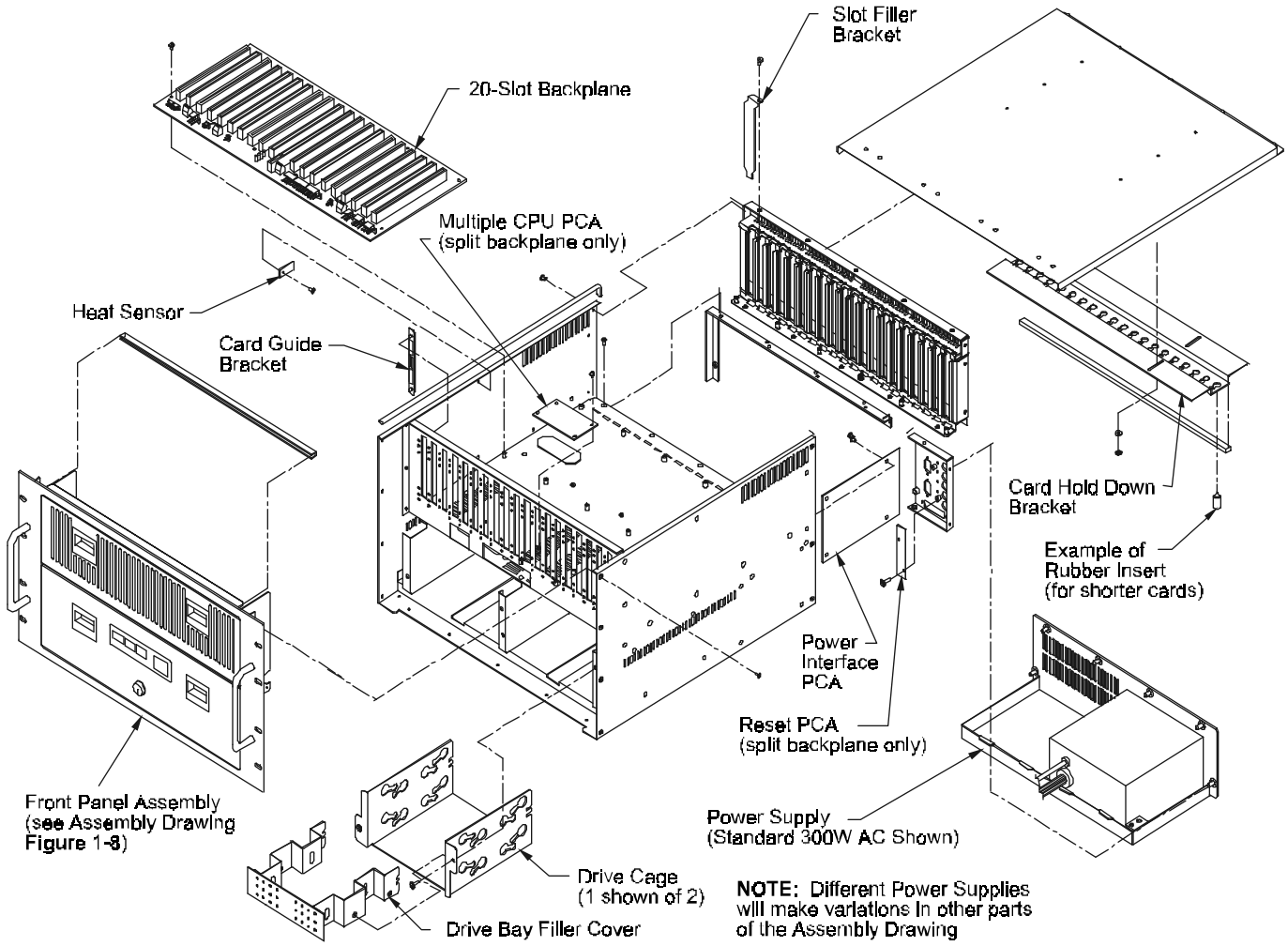

Figure 1-7: Top Assembly

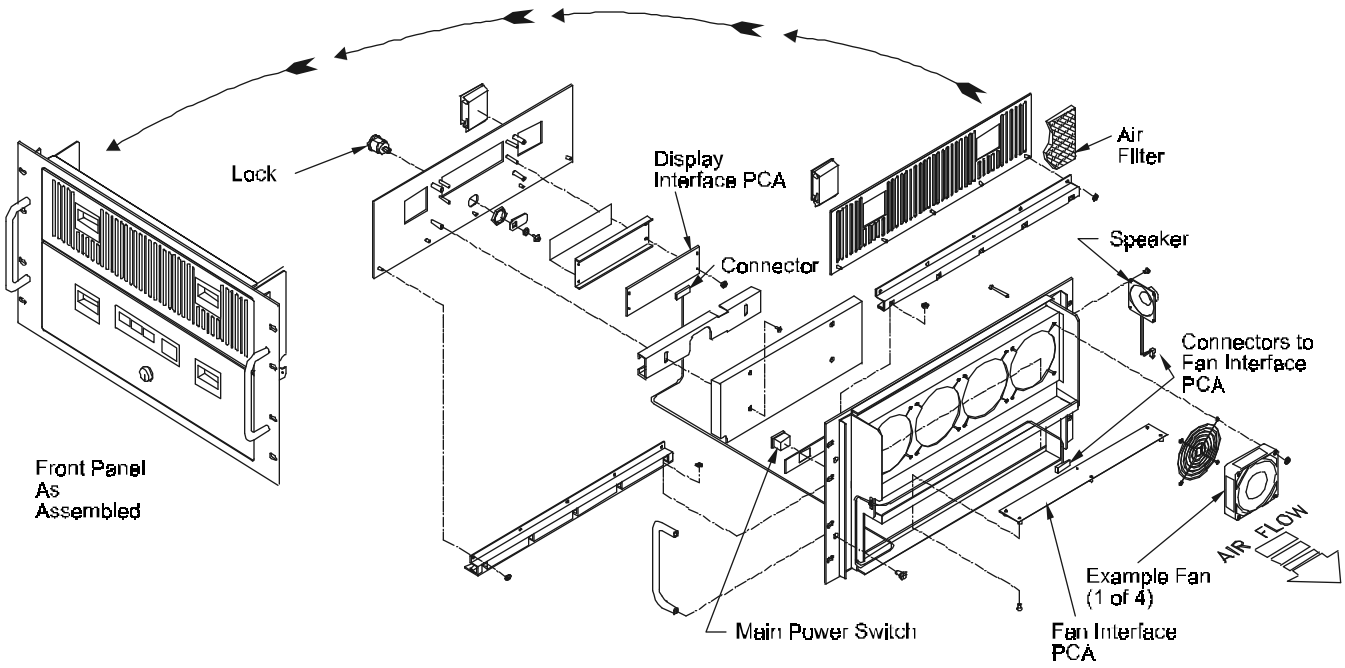

Figure 1-8: Front Panel Assembly

Chapter 2: Installation

The 7520-34H is a rack mount chassis. The front panel will not support the weight of a fully loaded system. Equipment slide rails, Model 7500-RMK, are necessary for installation to support the chassis and permit easier access to the computer for maintenance and troubleshooting, as required. The mounting holes on the front panel are set to RTMA standard spacing and will fit into any standard equipment rack with 10.5" of vertical space available. Electrical power must be connected to the unit with a certified power cord for the country where the equipment is to be used.

CAUTION!

If the power cord is damaged or is not suitable for the country of use, replace with a 3-conductor, 18AWG (0.75mm^2 cross sectional area) cord, certified to the local electrical codes.

This chassis mounts a passive 20-slot backplane. This is installed in the card cage area, which is designed to provide easy installation and maintenance of the backplane or feature cards. The card cage is discussed in more detail in the Card Cage section on page 2-14. To access the backplane you must remove the chassis top cover. Loosen the five spring loaded retaining screws on the rear of the chassis that secure the top cover. Slide the top cover toward the rear of the chassis, then lift the top cover clear of the chassis. Use caution when removing cover not to damage the gasket.

The chassis will accept up to four half-height 5.25" drives or other devices. Device mounting is explained in detail in the Installation of Disk Drive section beginning on page 2-3.

For more information on Printed Circuit Assemblies or other chassis hardware, please refer to the appropriate section in this chapter.

Rack Mounting

The front panel may not support the weight of a fully loaded system. Equipment slide rails may be necessary to support the chassis, and will permit easier access to the computer for maintenance and troubleshooting. For 24 to 30-inch deep cabinets use Model 7500-RMK slide rails, or for 18 to 24 inch deep cabinets use Model 7500-RMK18 slide rails. The mounting holes on the front panel are set to RTMA standard spacing and will fit into any standard equipment rack with 10.5 inches of available vertical space.

After you have installed the rack mount chassis slides kit, slide the chassis into the rack and secure it to the rack frame with four retaining screws. Failure to do so may cause the chassis to slide forward if the cabinet is tilted or vibrated, resulting in possible mechanical or electrical damage to your system or injury to personnel.

CAUTION!

The weight of the 7520-34H chassis exceeds 48 pounds (22kg). There is a real danger of toppling when extended on its slide rails from the rack. **Industrial Computer Source strongly recommends securely fastening the mounting rack of the 7520-34H to the floor or wall to eliminate this danger.**

Installation of CPU

The installation of a plug-in CPU card is simply a matter of inserting the CPU card into the backplane and connecting the appropriate connectors. The CPU card installs into the backplane just like any other feature card would. Align the CPU card with a slot and firmly press down. Do not force the board. If it does not slide into place, check the alignment and try again. Make sure the card bracket is flat against the rear panel and slide straight down to insure proper fit. The bracket will be seated between the retaining bracket and the EMI gasket when correctly installed. For an illustration of proper slot filler bracket installation see **Figure 2-1**.

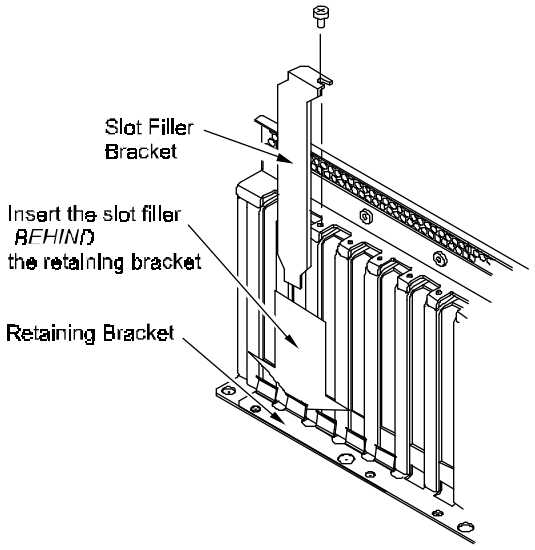

Figure 2-1: Seating the Slot Filler Bracket

The backplane will be connected at P10 to the Fan Interface Board to supply the system reset, keyboard, and speaker signals. A cable connected to J12 of the Fan Interface Board should be connected to the CPU hard drive indicator output. Please refer to the wiring diagram in Appendix A for further information.

Note that a chassis may require a load on the power supply to function. Industrial Computer Source offers an optional ISA plug-in Power Supply Load Board that provides the minimum loading requirements. For more information please see page 4-2: Troubleshooting.

Multiple CPU's

The Multiple CPU Board is used to consolidate the separate CPU controlled sections of split backplanes into a single chassis. The CPUs are installed into their sections of the backplane following the installation instructions above, then the keyboard, speaker, and reset signals are connected to the Multiple CPU Board. A cable from the CPU will connect to the Multiple CPU Board at J1 for the first CPU, J2 for the second CPU, J3 for the third CPU, J4 for the fourth CPU, and J5 for the fifth CPU. The connector location on the CPU will vary according to the manufacturer. For more information see the section on Multiple CPU's on Page 2-10, and Appendix A: Split Backplanes.

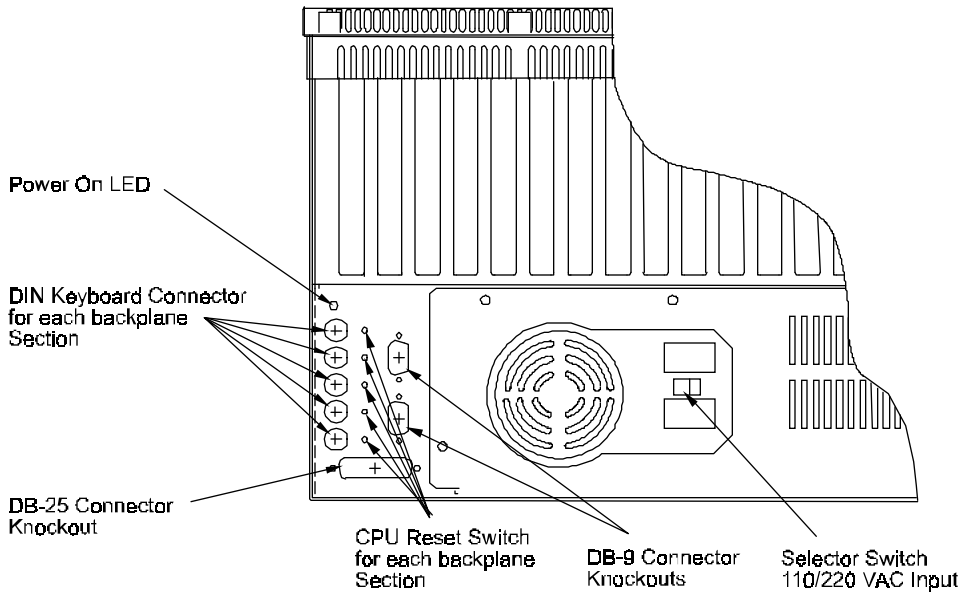

Figure 2-2: Rear Chassis Connectors (Multiple CPU Configuration)

Installation of Disk Drives

The 7520-34H Series chassis has two drive brackets that will mount up to a total of four half-height 5.25" devices. The drive brackets are all located in the front of the drive cage area, behind the locking front door.

If you have purchased your disk drives from Industrial Computer Source with your chassis, CPU, and drive controller, the drives will be installed and tested for you prior to shipment. If you have purchased your drives separately or purchased additional drives as an add-on, follow these instructions:

1. Gain access to the drive cage by opening the locking front access panel.

2. Remove the drive cage from the system chassis. To accomplish this, loosen the two retaining screws located on the front of the drive cage. Slide the drive cage forward and out of the chassis. If necessary, remove connectors from existing drive(s) for better access.

3. Remove the filler cover from the drive bay.

4. If you want to mount an optional 3.5" device in the drive bay, install the device in the Drive Bay Filler Cover Bracket (see **Figure 2-3**).

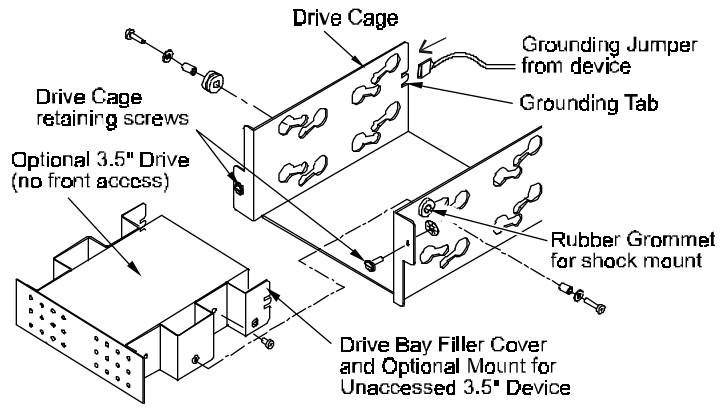

Figure 2-3: Optional Device Mounting

5. Position the drive(s) into place in the drive cage and attach with four screws (see **Figure 2-4**). Be sure to use the proper thread (SAE or Metric) and length screws for your drive(s). Using a screw that is too long may cause damage to your drive electronics, CPU, or both. For shock mount drives, install rubber grommet in the drive cage, then follow the assembly guide below for hardware installation.

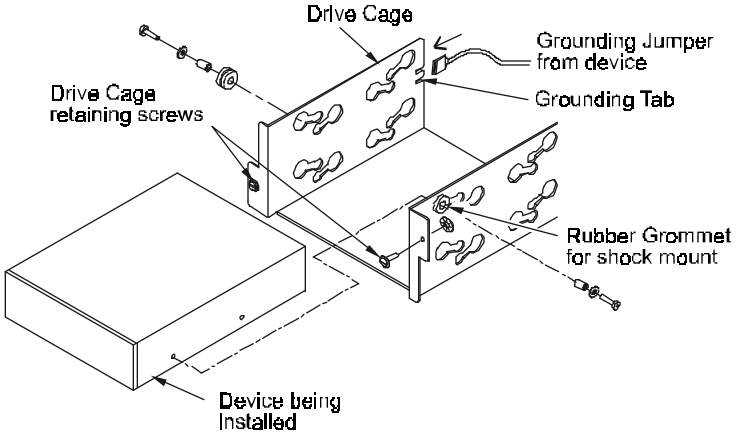

Figure 2-4: Disk Drive Installation

Note: Select a position for your drive(s) that will not interfere with the door latch of the chassis and that will permit easy insertion/removal of your disk media.

6. Attach a grounding jumper cable (provided in the shipping kit) from the disk drive to the grounding tab. See **Figure 2-3**.

7. Attach a power connector to the drive(s). The power connector is keyed and can only be inserted in the correct orientation.

8. Attach the hard disk or floppy disk cables between the appropriate connectors on the drives and the drive controller you have purchased. IDE fixed disk drives require one cable for up to two drives and floppy disk drives require one cable for up to two devices.

9. Place the drive cage in position once again. Insure the drive cage slides into the retaining brackets on the bottom of the chassis. Insure that the front access door will close and that drive media can be inserted/withdrawn without interference. Secure the drive cage in place with the two retaining screws.

10. Close front access panel.

Power Supply

The following DOES NOT apply to chassis with redundant power supplies. See instead the section Redundant Power Supply Modules, Page 2-7.

The power module is secured with six self retaining fasteners. There are two cable assemblies connecting the power module to the power interface board. The main power to the power switch is connected to J4 and J6 on the power interface board, and the four output voltages are connected to J7, J9, J18, and J19 (**Figure 2-8**). To install a power supply module, use the following removal and installation procedures.

On the 7520-34H-D4 and the 7520-54H chassis there is a Line Filter power switch on the rear panel. This is the main power switch for these chassis, and the front panel power switch is secondary. For normal operation the rear panel power On/Off switch should be left in the 'On' position. System power should be turned on and off with the front panel power switch.

CAUTION!

The power supply located inside the power module uses High Voltages. Extreme care should be exercised while handling the module and associated connections to the computer chassis. Failure to due so can result in damage to equipment or injury to personnel.

CAUTION!

Before removing or installing any component, ensure static electricity has been discharged from yourself and any object that will have contact with the component. Failure to do so may result in damage to the computer or its components.

Installation/Replacement

Removal

1. Make sure that the unit is unplugged and that proper static precautions have been taken ***before*** starting any work.

2. Prepare the system for upgrade by removing all computer boards from the systems' backplane and by disconnecting the power connectors from all devices. This will help to avoid damage to the system.

3. Loosen the six retaining screws securing the power module to the computer chassis. The screws are self retaining and cannot be completely removed. See **Figure 2-5**.

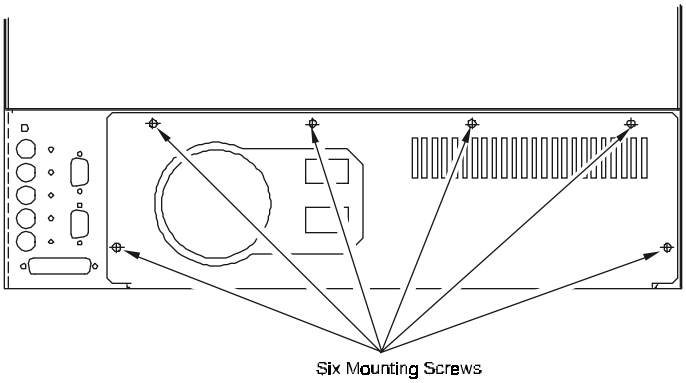

Figure 2-5: Power Module Mounting Screws

4. Pull the power module straight out of the chassis. DO NOT force the module. The wiring harness will prevent the module from being completely removed. Position the module so that access is gained to the power module connections on the power interface board.

5. On the power interface board (**Figure 2-8**), remove the wires connected to **T5** (Blk), **T6** (Wht), **T7** (Brn), and **T8** (Blu). The connections are made with pull off terminals. Grasp the terminals to remove; do not pull on the wires.

6. On the power interface board, disconnect **J4** and **J6** (main power from power supply), **J7**, **J9**, **J18**, and **J19** (drive power connectors).

7. On the 300W AC and 400W AC models ONLY, you must then disconnect the chassis ground wire. This wire is connected to the front wall of the chassis power module bay and is secured with a nut and lock washer.

8. The power module should now be free from the computer chassis.

Installation

Note that special care should be taken not to pinch or crimp the power supply cables during installation.

1. Position the power module to allow connection of the wire bundles.

2. Connect the four terminals (black, white, brown, and blue wires) to their respective terminals on the power interface board: **T5**(Blk), **T6**(Wht), **T7**(Brn), and **T8**(Blu). Each terminal on the power interface board is silk-screened with the corresponding wire color for the connection.

3. Connect the four drive connectors to their associated socket on the power interface board: **J7**, **J9**, **J18**, and **J19**.

4. Connect **J23** of the power module to **J23** on the power interface board.

5. Connect **J6** of the power module to **J6** on the power interface board.

6. Connect **J4** of the power module to **J4** on the power interface board.

7. Confirm all connections have been made to the appropriate connectors and are properly seated. Incorrect connection of the connectors could result in damage to the power supply or other computer equipment.

8. Insert the power module into the computer chassis. Insure the horizontal mounting tabs on the front of the module are inserted into the slots on the chassis.

9. Secure the six retaining screws on the power module.

10. Connect the system power cord and verify proper operation of the power module. Upon power-up, check the four outputs going to the backplane with a multimeter and ensure proper voltage readings and polarity (**Figure 3-1**). Readings may not be properly regulated due to a lack of minimum load on the system, however they will be sufficient to verify proper connection of the power module. Note that if the power supply cables have been crimped or pinched the power supply will sense the short and shut off. It will also automatically sense the removal of the short and restore operation.

After verifying proper operation of the power supply, turn computer power off and reinstall any boards and connectors that were removed to facilitate the installation of the power module.

Redundant Power Supply Modules

The Redundant Power Supply modules are designed to allow quick replacement if a failure should occur. If a module needs replacement, it may be hot-swapped by simply pressing inward on both of the spring loaded Locking Tabs while pulling out the supply module (see **Figure 2-6**). The new module may then be slid into place and secured by the Locking Tabs. The failure circuitry will sense the new module, illuminate the appropriate power supply LED on the front panel, and rearm the audio alarm. Make sure that the new modules selector switch is set for the same (correct) input voltage as the other module.

On the 7520-34HR chassis there is Line Filter power switch on the rear panel. This is the main switch for this chassis, and the front panel power switch is secondary. There are also power On/Off switches on each power supply. These switches are for the individual power supplies only. For normal operation, the rear panel power On/Off switches should be left in the 'On' position, and system power should be turned on and off with the front panel power switch. The switches on the individual power supply modules may be left 'On' when the power supply module is removed.

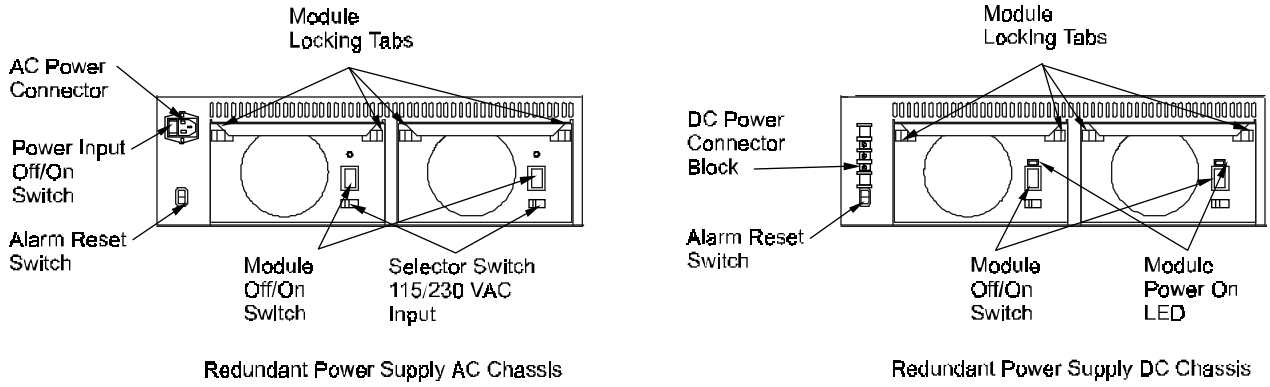

Figure 2-6: Redundant Power Supply Modules

Fan Interface Board

The Fan Interface Board is a multipurpose board that interconnects and monitors chassis components and functions. It contains a front keyboard connector, front reset switch, and speaker volume adjustment potentiometer. The board interfaces with the cooling fans, keyboard, reset switch, temperature sensor, and the display interface board. It is mounted on the lower front panel behind the protective cover. A schematic of the Fan Interface Board is provided in Appendix B, titled 'SCH PCB FAN INTERFACE.'

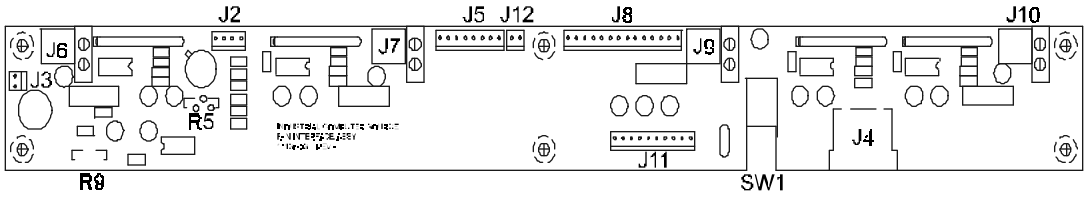

Figure 2-7: Fan Interface Board

Cooling Fans

The four chassis cooling fans are provided +12 volts through the Fan Interface Board. The board also contains circuitry to monitor each fan and sends a fan status signal out J11 to the display interface board. Note that anything impeding the free turning of the fans will report as a fault and the front panel LED for Fan Status will turn red.

Keyboard

A keyboard for a single CPU chassis may be connected to the front keyboard connector on the fan interface board or the mini DIN connector at the rear of the chassis. If the keyboard is connected to the front connector, the keyboard signals will be sent from the power interface board (J5) directly to the CPU card . If it is connected to the rear connector, the signals will be sent from the power interface board (J2) to the fan interface board (J8) and then to the CPU through J5 of the fan interface board. If multiple CPU's are present in the chassis, the front keyboard connector will control the CPU in group 1.

Reset Switch

The reset switch is a push button type switch that will provide a ground potential when depressed. This will reset the CPU or group 1 for multi CPU chassis.

Temperature Sensor

A temperature sensor is used by the fan interface board to monitor chassis temperature. Under normal conditions, the sensor provides a low impedance condition causing no signal from the fan interface board to be generated. If the temperature sensor senses an overheat condition, it will change to a high impedance condition. This will cause the fan interface board to generate an alarm signal to the display interface board.

Speaker

The speaker signal is also routed through the fan interface board. It is received from J5 and sent through an amplification circuit which can boost the output. The adjustments to the speaker gain are made using R9 on the fan interface board. The signal is then sent out J3 to the speaker.

Power Interface Board

The Power Interface Board (PIB) receives power from the power supply and distributes it throughout the chassis. It also contains a power on LED, five mini DIN keyboard connectors for multiple CPU chassis, and a 10A fuse on the input line power. The board is located in the rear of the chassis, near the power supply. A schematic of the Power Interface Board is provided in Appendix B, titled 'SCH PWR MULTI KBD IFACE.'

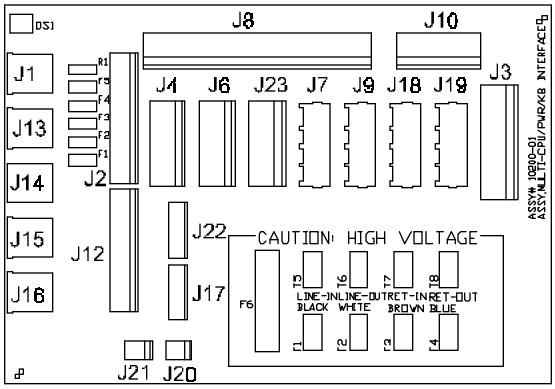

Figure 2-8: Power Interface Board

Power Supply

The power supply and power switch are connected directly to the PIB. The main power connectors from the power supply are connected to J4 and J6. Power is routed through the board and out several locations to distribute it as needed. The connectors normally connected to the disk drives are connected to J7, J9, J18, and J19 on the PIB. The disk drives receive power from J3 on the PIB.

Backplane

The backplane's main power (P1) is received from J8 of the PIB. This connector also provides a ground and a power good signal from the power supply. Additional power is supplied to the backplane from J10 of the PIB. J10 is connected to P3 and P7 of the backplane and provides +5 volts and +12 volts along with additional grounds.

Rear Chassis Power On Indicator LED

The Power On indicator on the rear of the chassis (see **Figure 1-2**) is directly wired into the +5V of the PIB. As long is there is +5V present it will stay lit.

Multiple CPU's

When the chassis contains multiple CPUs (a split backplane configuration), the PIB has several additional functions, including handling the multiple keyboard connections and the system resets.

Keyboard

On chassis with multiple CPUs, several other features of the PIB are used. The multi CPU board receives the signals from the five mini DIN keyboard connectors located on the PIB. Keyboard signals from keyboards 2 through 5 are sent through J12 of the PIB to the multi CPU board. Signals from keyboard 1 are sent to the fan interface board where they are routed to either the CPU or backplane for single CPU chassis or to the multi CPU card for multiple CPU chassis. Each keyboard receives +5 volts from the PIB and is protected by a 1 amp fuse.

Reset

Another group of signals the PIB receives for multiple CPU chassis is the reset signals. These signals are generated at the reset board and sent to the PIB through J17. Reset signals from group 2 through 5 are sent through J12 of the PIB to the multi CPU board. Reset signals from group 1 are sent to the fan interface board where they are routed to either the CPU or backplane for single CPU chassis or to the multi CPU card for multiple CPU chassis.

Redundant Power Supplies

On chassis with redundant power supplies, the PIB receives signals from the Redundant Power Board (J22) and routes them to the appropriate locations. The PIB receives the power supply's LED signals and sends them to the fan interface board through J2. The PIB also receives the alarm signal from the Redundant Power Board and routes it through J12 to the Multi CPU Board.

Display Interface Board

The Display Interface Board provides a visual indication of chassis functions. It is located in the front panel and contains the Overheat, Fan Status, Power Supply, and Hard Drive LED's. The Display Interface Board receives all power and signals from the Fan Interface Board. A schematic of the Display Interface Board is provided in Appendix B, titled 'SCH DISPLAY IFACE.'

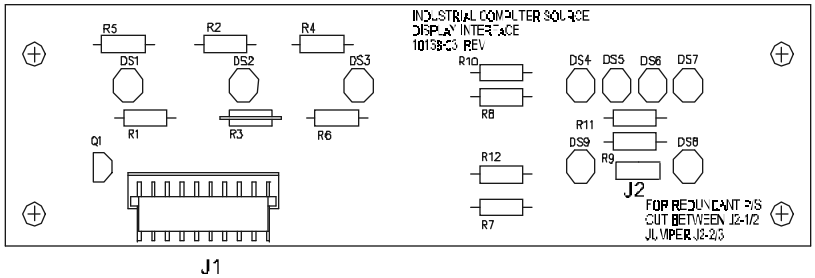

Figure 2-9: Display Interface Board

Overheat LED

The overheat LED is provided to give a visual indication of the chassis temperature. If the LED is green, the chassis is within its operating range. If the LED is red, the chassis is beyond its temperature limit (50° C). If this situation occurs and if possible, physically check the chassis to verify that it is hot which will eliminate the possibility of a malfunctioning LED. If the chassis is overheating, close all software applications and turn off chassis power. Refer to Chapter 4 for troubleshooting procedures.

Fan Status LED

The fan status LED provides a visual indication of the cooling fans operation. Under normal conditions, the fan status LED will remain green, indicating proper operation. If a malfunction should occur with any fan, the LED will turn red. If the fan status LED is red, close all software applications and turn off chassis power. Refer to Chapter 4 for troubleshooting procedures.

Power Supply LEDs

The power supply LEDs provide a visual check of +5V, +12V, -5V, and -12V coming from the power supply. If the LED is lit, the equivalent voltage is present. This does not, however, confirm that the voltage is within specified tolerances.

PS1 and PS2

On redundant power supply models, the display panel contains an LED for each power supply module. A lit LED signifies the presence of the power good signal from the associated power supply module.

Hard Drive

The hard drive LED indicates whether the hard drive is being accessed. If the LED is lit, the hard drive is being accessed; if out, the hard drive is idle. This signal is sent from the hard drive, through the Fan Interface Board to the Display Interface Board.

Multiple CPU Board

The Multiple CPU Board (MCB) separates the signals for CPU groups 2 through 5 and sends them to the correct CPU card. Keyboard and reset signals for each of these groups are received from Power Interface Board. Signals for CPU group 1 are received from the Fan Interface Board and sent to the group 1 CPU card. The speaker signals are combined for all CPU groups on the MCB and sent to the Fan Interface Board where it is amplified and sent to the speaker. A schematic of the Multiple CPU Board is provided in Appendix B, titled 'SCH MULTI CPU.'

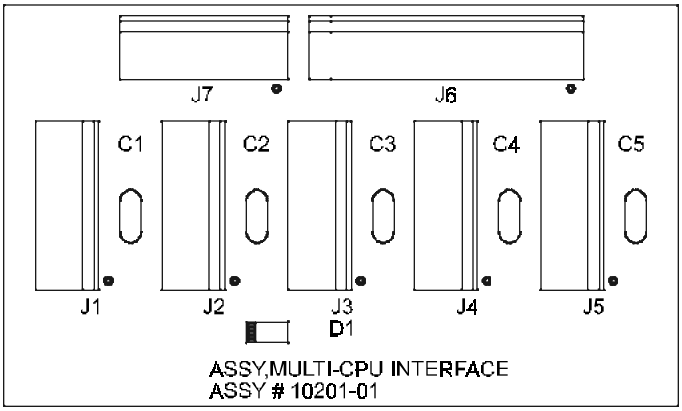

Figure 2-10: Multiple CPU Board

Reset Board

The Reset Board contains five reset buttons which will reset groups 1 through 5 when the appropriate button is depressed. The board supplies a ground to the selected group's reset signal which is sent to the Multi CPU Board via the Power Interface Board. The reset signal is then sent to the correct CPU group.

When multiple CPU groups are used, the reset button on the front panel will reset group 1 only.

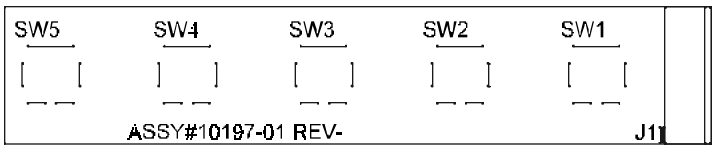

Figure 2-11: Reset Board

Redundant Power Supply Board

The Redundant Power Supply (RPS) board is the interface between the two power supply modules and the rest of the chassis. Each power supply module supplies its outputs to the RPS through J4 and J5. The -12V output is stepped up to -5V and a *power good* signal is generated by the RPS board. The four power outputs, along with ground and the power good signal, are sent to the power interface board for disbursement throughout the chassis. The board has a fuse on the input power of 10A on redundant AC chassis, or 15A on redundant DC chassis.

The RPS board is also responsible for alarm signal generation. The power good signal is used in the audio alarm circuitry and to light the associated PS LED on the display panel. A loss of this signal (failure of either power supply) will activate the audio alarm and deactivate the PS LED on the display panel. The audio alarm may be disabled by the Alarm Reset switch. The alarm circuit will wait for the power good signal before resetting to its initial state.

A schematic of the Redundant Power Supply Board is provided in Appendix B, titled 'SCH PCA REDUNDANT P/S INTERFACE.'

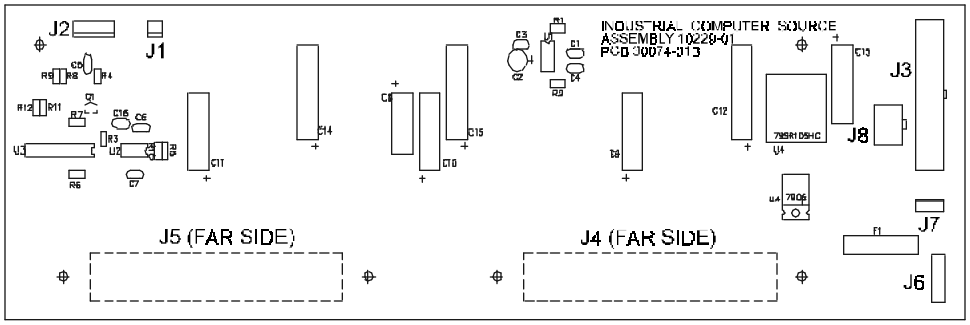

Figure 2-12: Redundant Power Supply Board

Card Cage

The upper area of the chassis that contains the backplane is generally referred to as the card cage. The card cage provides all the necessary mounting hardware typically needed for installing and securing XT and AT sized feature cards. The rear panel is outfitted with the GIRSystem gasket which holds the front edge of feature cards. Unused expansion slots are filled by Slot Filler Brackets. A card hold-down bracket is provided to help keep feature cards seated. For more information refer to the Card Hold-down Bracket Section following.

The card cage is fitted with four 45CFM cooling fans with 30ppi filters. These fans bring air in the rear of the chassis and circulate it through the card cage area to permit operation of the system in environments of up to +50°C.

Card Hold-down Bracket

The card hold-down bracket is mounted on the top of the chassis to secure feature cards installed in the backplane. The card hold-down bracket is adjustable to compensate for ribbon cable routing, or may be removed from the system if not needed. Rubber inserts may be installed in the bracket to adjust for shorter cards (see the Assembly Drawing, page 1-14).

To adjust the bracket, loosen the four nuts securing the bracket and slide it to the desired position. If necessary, remove the four nuts and washers and place the bracket on the other standoffs to avoid cables or other protrusions.

Shipping Kit

The 7520-34H Series is delivered with a kit containing the appropriate parts for shock mounting for the drives, rubber inserts for Card Hold-down Bracket adjustment, an AT to PS/2 Keyboard Connector, and grounding jumper cables for mounting disk drives. For more information on the shock mounting of disk drives please refer to the section on disk drive installation, Page 2-3. For more information on the Card Hold-down Bracket please refer to the section above.

Chapter 3: BUS Architecture

Industrial Computer Source passive backplanes are manufactured to the highest standards. These backplanes are available in size configurations of 4-, 6-, 8-, 10-, 15-, and 20-slot. All connectors are AT 16-bit connectors.

The Industrial Computer Source passive backplanes have been tested with a variety of plug-in CPU cards, from 8088 XT through Pentium AT and Alpha versions to ensure compatibility. For severe applications involving option cards that are sensitive to bus impedance, termination SIP (Single Inline Pin) resistors are available to terminate bus signals.

Each backplane is of a low capacitance design. This design minimizes signal crosstalk while keeping trace capacitance low which improves signal edges and rise and fall times. Ground and power are on seperate layers from the signal. The power plane is predominantly +5VDC.

Each power supply output is monitored by the exclusive Industrial Computer Source Bus Power Check™ circuitry. A separate LED is lit by each supply voltage for a visible check of power supply operation. This is not, however, a tolerance verification. These LEDs provide a quick check of power supply operation without the need of a multimeter.

Features

- 4 or 6 layer printed circuit board
- Extremely high EMI and RFI noise immunity
- Accept power connectors from standard PC bus power supplies
- Bus Power Check™ LED indicators for +5, -5, +12 and -12 VDC supplies
- Bus terminating resistors available on 8-slot and larger backplanes
- Split bus designs available on special request
- Special configuration backplanes available on special order

20-Slot Backplane Construction

The 7520-34H Series chassis comes standard with a 20-slot backplane or with either of two split backplane options. The split backplane options are either two groups of 10 slots each, or four groups of 5 slots each. The split backplane construction is covered in more detail in Appendix A.

Standard Backplane

The standard 20-slot backplane, designed using recent technological approaches, is constructed of 6 layers. Because the signals are spread among 3 layers, they are further apart than 4-layer boards and do not require intertrace shielding.

- Layers 1, 3 and 6 are the signal layers.
- Layers 2 and 5 are ground planes.
- Layer 4 is the power plane.

The 20-slot board is 0.125" thick. Each layer's thickness is optimized to match the trace impedance closely. Normally, traces on inner layers will have higher impedances because of the surrounding fiberglass than traces on surface layers. Because of this, the layer thicknesses and trace widths in the 20-slot backplane are varied to match theoretically the impedances on the different layers. Impedance mismatches will cause timing shifts in signals which can cause operational errors. With layer optimization and by matching trace impedance in the 20-slot backplane, these timing errors are minimized.

Layers 4 (Power) and 5 (Ground) are only 0.004" apart and act as a large plane capacitor to help filter the power. Signal layers are 1 oz. copper; ground and power planes are 2 oz. copper. For backplane layout and dimensioning see **Figure 3-2**.

Split Backplane

The 7520 Series chassis have an option of using split backplanes in 10x10 and 5x5x5x5 configurations. For information on the split backplanes, see Appendix A.

Backplane Connectors

Each backplane provides a 16-pin Molex-style connector for power input. The 20-slot backplane provides for 16-pin connectors in addition to other input connectors for solid, noise free input power and minimum voltage drop across the connectors, regardless of backplane power load. The 20-slot backplane provides three additional screw terminal pairs for +5V and ground input for applications with exceptionally high power requirements.

Note: The connector configuration on split backplanes is different from the Standard 20-slot backplane. For more information see Appendix A.

Standard AT-type power supplies may be used with the 20-slot backplane by careful installation of the power connectors. The P8 connector will install at the rearmost position of the board. Skip two positions between it and the P9 connector. The backplane labeling also reflects these locations as P8 and P9.

Input Power

Each input is filtered by one or more large electrolytic capacitors for low frequency line noise rejection. Ceramic bypass filter capacitors of 0.1µF improve noise immunity. All four input voltages have bypass capacitors. See **Figure 3-1** for connection voltages from the power supply.

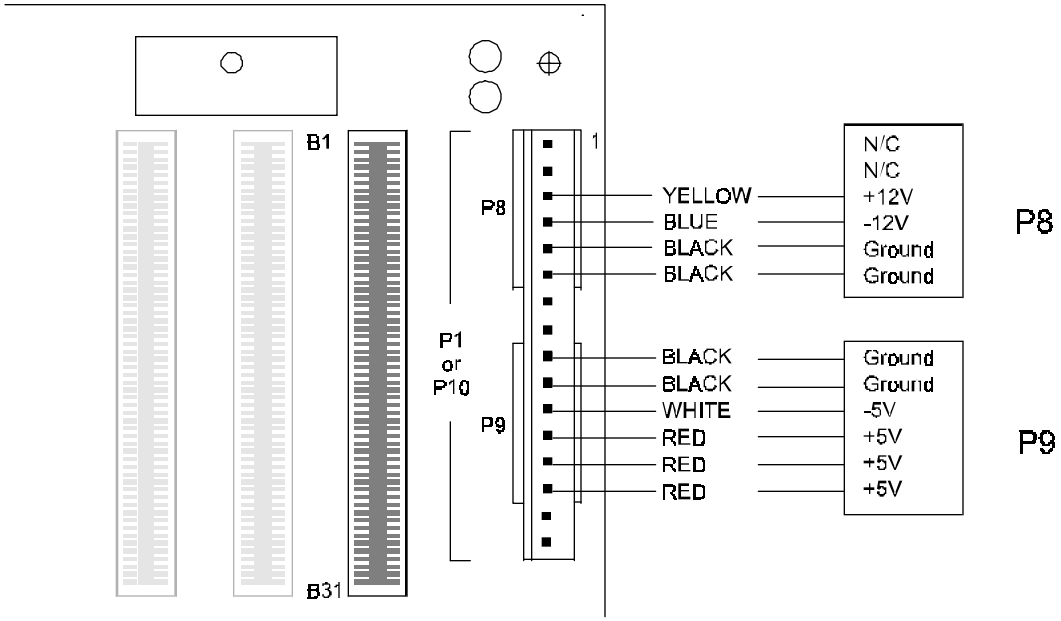

Figure 3-1: Connection Voltages

Each power supply output is monitored by the exclusive Industrial Computer Source Bus Power Check™ circuitry. A separate LED is lit by each supply voltage for a quick visible check of power supply operation. This is not, however, a tolerance verification. Troubleshooting requirements may require actual measurement of the power supply values to ensure operation to specified limits.

The backplane is provided with a location for an optional -5V regulator (LM7905) and filter capacitors. The LM7905 uses the -12V input to generate - 5V, allowing the use of a three-output power supply in custom applications.

20-Slot Backplane Connectors

Connection from Power Supply

P1 - 1	No Connection
P1 - 2	No Connection
P1 - 3	+12VDC
P1 - 4	-12VDC
P1 - 5	Ground
P1 - 6	Ground
P1 - 7	Ground
P1 - 8	Ground
P1 - 9	Ground
P1 - 10	Ground
P1 - 11	-5VDC
P1 - 12	+5VDC
P1 - 13	+5VDC
P1 - 14	+5VDC
P1 - 15	+5VDC
P1 - 16	+5VDC

I/O Power Out

P3 - 1	+5VDC
P3 - 2	+12VDC
P3 - 3	Ground
P4 - 1	+5VDC
P4 - 2	+12VDC
P4 - 3	Ground

Remote Sense

P5 - 1	+5VDC
P5 - 2	Ground
P6 - 1	+5VDC
P6 - 2	Ground

I/O Power Out

P7 - 1	+5VDC
P7 - 2	+12VDC
P7 - 3	Ground

CPU Signals

P10 - 1	No Connection
P10 - 2	No Connection
P10 - 3	No Connection
P10 - 4	No Connection
P10 - 5	No Connection
P10 - 6	No Connection
P10 - 7	No Connection
P10 - 8	No Connection
TB1 - 1	+5VDC
TB1 - 2	Ground
TB2 - 1	+5VDC
TB2 - 2	Ground
TB3 - 1	+5VDC
TB3 - 2	Ground
TB4 - 1	+12VDC
TB4 - 2	Ground

20-Slot Backplane Dimensional Drawing

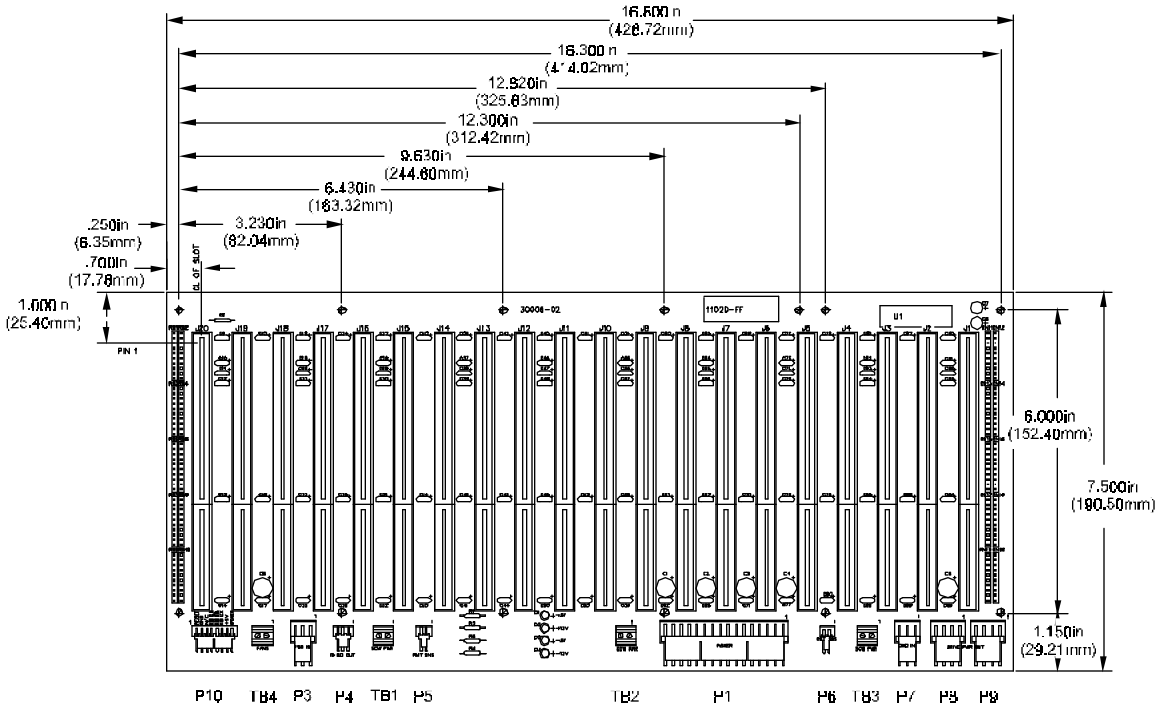

Figure 3-2: 6 layer 20-Slot Backplane

Bus Termination

Bus Termination is only an option on the standard 20-slot and the 10x10 split backplane only, not on 5x5x5x5 split backplane. Termination works as an impedance mismatch at the end of the bus, minimizing or preventing reflections and interference. If there is no termination, signals reach the end of the bus and reflect back down the bus. In extreme cases, the reflected signals can interfere with the real bus information, leading to spurious operation or lockups. This can become a significant factor as bus lengths and speeds increase. The applications most likely to be affected are telephony or other applications with many I/O boards drawing high current values off the +12V or -12V power connections. Industrial Computer Source backplanes have supported 166MHz systems without bus termination and without problem. However, provision is made for installing terminations that might be required for your application.

Terminations connect the bus to +5VDC and ground, providing a path for the bus signals to dissipate. A terminated bus provides signals with less noise, although rise and fall times are slower. However, results are dependent on the CPU and option cards being used, and must be evaluated on a case-by-case basis.

There are three types of terminations that may be used: A Resistor Network; an RC Network; or a Diode Termination. A Resistor Network will provide the required impedance mismatch, but does result in loading. A RC Network does not impose a static load as a Resistor Network will, but it will affect the timing factors of the line to some degree. A Diode Termination is generally used in conjunction with a Resistor Network to reduce over and under shoot of the signal.

Backplane termination sockets are found at the end of the bus. These sockets accept standard 10-position SIPs manufactured by Bournes and others. Not all signal lines are available for termination. Refer to the appropriate section for Terminated BUS signal information.

All Pentium and 486 vesa local or PCI CPU control signals that should never be terminated are as follows:

A-1 (RES 2-2)	I/OCHCK
B-8 (RES 1-7)	0WS
D-1 (RES 7-4)	MEMCS16
D-2 (RES 7-5)	I/OCS16
D-17(RES 9-9)	MASTER

To end termination of a signal, simply cut the wire on the terminating resistor for the appropriate signal.

Resistor Termination

The goal of termination resistors is to provide an impedance mismatch at the end of the bus to prevent signal reflections. This mismatch has to be balanced by the electrical capability of the CPU and option cards to drive the load imposed by the resistors.

Generally, terminations that connect to both +5V and ground work best, although terminations to +5V only are allowable.

One way to provide terminations in digital systems is a resistor network connected to both +5V and ground. The following two examples represent such a resistor network. Note that in both examples, the SIPs are inserted with pin 1 of the SIP toward the back of the chassis. While the following examples specify Bourns part numbers, equivalent values from other manufactures may be used. The following provides 330 ohms to +5V and 220 ohms to ground. See **Figure 3-3**.

- Bourns part # 4610X-104-221/331 (Low profile)
- Bourns part # 4610M-104-221/331 (Medium profile)

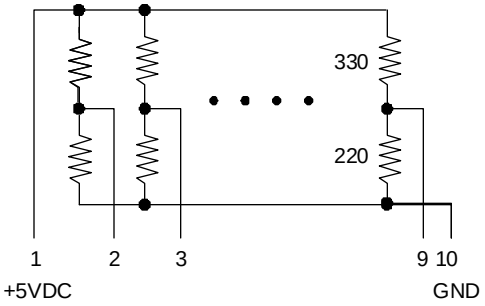

Figure 3-3: Resistor SIP Network

Reading the resistance from the signal pin of the SIP to either pin 1 or pin 10 will not provide the expected resistance of, for example, 220 or 330 ohms. This is because of the parallel resistance of the other paths. For example, the 220 ohms side will read 143 ohms (pin 10), and the 330 ohms side will read 156 ohms (pin 1). The actual values will change slightly because of allowed tolerance.

The following combination provides less bus loading than the first example and provides 330 ohms to +5 and 470 ohms to ground:

- Bourns part # 4610X-104-331/471 (Low profile)
- Bourns part # 4610M-104-331/471 (Medium profile)

Other values are manufactured and can certainly be used if a problem persists on the bus. Not all cards behave well on large buses or in combination with other cards and may require some experimentation to completely isolate all intermittent operation. Turning the SIP around is also allowed, even recommended occasionally, to better shape the signal being pulled high.

RC Network Termination

An alternative to a resistor network is an RC network. An RC network connects the signal lines, through a resistor in series with a capacitor, to either +5V or ground. An advantage of an RC Network is that no static load is imposed on the bus, but increased capacitance on the line will affect timing factors. RC Networks are also slightly more expensive than Resistor Networks. For an example schematic of an RC Network SIP see **Figure 3-4**.

DIODE Termination

In some cases, diodes can be connected between the signal lines and both +5V and ground. Any spikes greater than the +5V rail are shunted and limited to +5V. Any negative spikes are shunted to ground. Thus, the bus sees only signals in the range of 0-5V. Diode termination reduces over and under shoot, but doesn't improve signal shape or edge times. Diode termination is generally used in conjunction with resistor termination. For an example schematic of an Diode Network SIP see **Figure 3-5**.

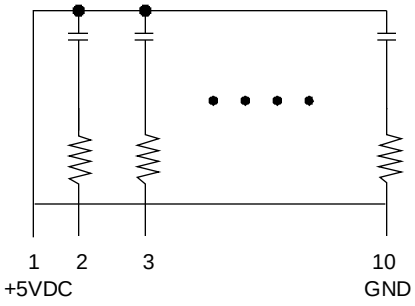

Figure 3-4: RC SIP Network

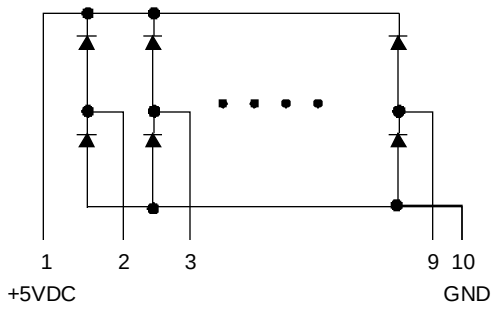

Figure 3-5: Diode SIP Network

XT (8 BIT) Bus Pin Assignments

Solder Side of Option Board			
Description	**Res**	**Pin**	**Side**
Ground	NC	1	B
+Reset	4.7K	2	B
+5 Volts	NC	3	B
+IRQ2 or 9	NC	4	B
-5 Volts	NC	5	B
+DRQ2	NC	6	B
-12 Volts	NC	7	B
-OWS	1-7	8	B
+12 Volts	NC	9	B
Ground	NC	10	B
-SMEMW	1-9	11	B
-SMEMR	4-2	12	B
-IOW	3-3	13	B
-IOR	3-4	14	B
-DACK3	3-5	15	B
+DRQ3	NC	16	B
-DACK1	3-7	17	B
+DRQ1	NC	18	B
-REFRESH	3-9	19	B
CLK	5-2	20	B
+IRQ7	NC	21	B
+IRQ6	NC	22	B
+IRQ5	NC	23	B
+IRQ4	NC	24	B
+IRQ3	NC	25	B
-DACK2	5-5	26	B
+T/C	5-6	27	B
+BALE	5-7	28	B
+5 Volts	NC	29	B
OSC	5-9	30	B
Ground	NC	31	B

Component side of Option Board			
Side	**Pin**	**Res**	**Description**
A	1	2-2	-I/O Chck
A	2	2-3	SD7
A	3	2-4	SD6
A	4	2-5	SD5
A	5	1-5	SD4
A	6	2-6	SD3
A	7	2-7	SD2
A	8	2-8	SD1
A	9	2-9	SD0
A	10	NC	I/O Chck Rdy
A	11	3-2	AEN
A	12	4-3	SA19
A	13	4-4	SA18
A	14	4-5	SA17
A	15	4-6	SA16
A	16	3-6	SA15
A	17	4-7	SA14
A	18	4-8	SA13
A	19	3-8	SA12
A	20	4-9	SA11
A	21	6-2	SA10
A	22	6-3	SA9
A	23	5-3	SA8
A	24	6-4	SA7
A	25	5-4	SA6
A	26	6-5	SA5
A	27	6-6	SA4
A	28	6-7	SA3
A	29	6-8	SA2
A	30	6-9	SA1
A	31	8-2	SA0

Note: Pin B4 is IRQ2 for an XT

Pin B4 is IRQ9 for an AT which is redirected as IRQ2

* -REFRESH is -DACK0 on an XT 8-bit system.

AT (16 BIT) Bus Extension Pin Assignments

Solder Side of Option Board			
Description	**Res**	**Pin**	**Side**
-MEMCS16	7-4	1	D
-I/OCS16	7-5	2	D
+IRQ10	NC	3	D
+IRQ11	NC	4	D
+IRQ12	NC	5	D
+IRQ15	NC	6	D
+IRQ14	NC	7	D
-DACK0	7-9	8	D
+DRQ0	NC	9	D
-DACK5	9-3	10	D
+DRQ5	NC	11	D
-DACK6	9-5	12	D
+DRQ6	NC	13	D
-DACK7	9-6	14	D
+DRQ7	NC	15	D
+5VDC	NC	16	D
-MASTER	9-9	17	D
GROUND	NC	18	D

Component Side of Option Board			
Side	**Pin**	**Res**	**Description**
C	1	7-3	SBHE
C	2	8-3	LA23
C	3	8-4	LA22
C	4	8-5	LA21
C	5	8-6	LA20
C	6	8-7	LA19
C	7	8-8	LA18
C	8	8-9	LA17
C	9	10-2	-MRMR
C	10	10-3	-MEMW
C	11	9-4	SD08
C	12	10-4	SD09
C	13	10-5	SD10
C	14	10-6	SD11
C	15	10-7	SD12
C	16	9-8	SD13
C	17	10-8	SD14
C	18	10-9	SD15

BUS Signals sorted by SIP Resistors

Side	Pin	Res	Description
A	5	1-5	SD4
B	8	1-7	-OWS
B	11	1-9	-SMEMW
A	1	2-2	-I/O CHCK
A	2	2-3	SD7
A	3	2-4	SD6
A	4	2-5	SD5
A	6	2-6	SD3
A	7	2-7	SD2
A	8	2-8	SD1
A	9	2-9	SD0
A	11	3-2	AEN
B	13	3-3	-IOW
B	14	3-4	-IOR
B	15	3-5	-DACK3
A	16	3-6	SA15
B	17	3-7	-DACK1
A	19	3-8	SA12
B	19	3-9	-REFRESH
B	12	4-2	-SMEMR
A	12	4-3	SA19
A	13	4-4	SA18

Side	Pin	Res	Description
A	14	4-5	SA17
A	15	4-6	SA16
A	17	4-7	SA14
A	18	4-8	SA13
A	20	4-9	SA11
B	20	5-2	CLK
A	23	5-3	SA8
A	25	5-4	SA6
B	26	5-5	-DACK2
B	27	5-6	+T/C
B	28	5-7	+BALE
B	30	5-9	OSC
A	21	6-2	SA10
A	22	6-3	SA9
A	24	6-4	SA7
A	26	6-5	SA5
A	27	6-6	SA4
A	28	6-7	SA3
A	29	6-8	SA2
A	30	6-9	SA1
C	1	7-3	SBHE
D	1	7-4	-MEMCS16
D	2	7-5	-I/OCS16
D	8	7-9	-DACK0

BUS Signals sorted by SIP Resistors (continued)

Side	Pin	Res	Description
A	31	8-2	SA0
C	2	8-3	LA23
C	3	8-4	LA22
C	4	8-5	LA21
C	5	8-6	LA20
C	6	8-7	LA19
C	7	8-8	LA18
C	8	8-9	LA17
D	10	9-3	-DACK5
C	11	9-4	SD08
D	12	9-5	-DACK6
D	14	9-6	-DACK7
C	16	9-8	SD13
D	17	9-9	-MASTER
C	9	10-2	-MRMR
C	10	10-3	-MEMW
C	12	10-4	SD09
C	13	10-5	SD10
C	14	10-6	SD11
C	15	10-7	SD12
C	17	10-8	SD14
C	18	10-9	SD15
A	10	NC	I/O CH RDY
B	1	NC	GND
B	3	NC	+5 VOLTS

Side	Pin	Res	Description
B	4	NC	+IRQ 2 OR 9
B	5	NC	-5 VOLTS
B	6	NC	+DRQ2
B	7	NC	-12 VOLTS
B	9	NC	+12 VOLTS
B	10	NC	GND
B	16	NC	+DRQ3
B	18	NC	+DRQ1
B	21	NC	+IRQ7
B	22	NC	+IRQ6
B	23	NC	+IRQ5
B	24	NC	+IRQ4
B	25	NC	+IRQ3
B	29	NC	+5 VOLTS
B	31	NC	GND
D	3	NC	+IRQ10
D	4	NC	+IRQ11
D	5	NC	+IRQ12
D	6	NC	+IRQ15
D	7	NC	+IRQ14
D	9	NC	+DRQ0
D	11	NC	+DRQ5
D	13	NC	+DRQ6
D	15	NC	+DRQ7
D	16	NC	+5VDC
D	18	NC	GND
B	2	4.7K	+RESET TO GROUND

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Chapter 4: Maintenance

Your chassis should provide many years of trouble free service. However, should a failure occur, the following troubleshooting guide should provide some assistance. A generalized repair guide covering all possible computer problems is beyond the scope of this manual. Only problems directly related to the chassis will be covered. If you would like assistance with these procedures, please call Customer Service at **1-800-480-0044**. We will be happy to help.

Air Filters

Industrial Computer Source provides four front mounted fans to cool the inside of the chassis. The installed fans are provided with a filter to remove most large dust particles from the air. This filter should be cleaned as often as necessary to prevent overheating due to reduced air movement. The filter can be blown out or washed in soapy water. Remove the filter from the chassis before cleaning and insure it is dry before reinstalling.

To remove the filter, simply open the filter access panel on the front of the chassis and remove the filter.

In particularly dirty environments, a filter enhancement spray may be used to improve dirt retention. These sprays are available from a wide variety of sources. High efficiency filter material is also available and can be cut to shape. Be careful not to reduce the cooling airflow with various filter media to the point where chassis overheating becomes a problem.

Note: Filters do not remove fumes or gases. Do not use the chassis in environments where airborne contaminants which may damage the system are present.

For the most part, dust poses no danger to a computer except for disk drives. The exception is dust that is conductive such as metal or carbon particles. For particularly dirty environments, floppy drive lifetimes will be significantly reduced. For such environments, you should consider solid state “disks” such as the Industrial Computer Source EPROM, SRAM, or FLASH disk emulators or hard disks. Solid state PCMCIA/JEIDA data cards can be used in place of floppy diskettes for portability. Networks can also be used in dirty environments to replace floppy drives.

FCC Compliance Statement for FCC Class B Devices

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that

interference will not occur in a particular installation. If this equipment does cause harmful interference to a radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: The assembler of a personal computer system may be required to test the system and/or make necessary modifications if a system is found to cause harmful interference or to be non-compliant with the appropriate standards for its intended use.

FCC Compliance Statement for FCC Class A Devices

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

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 radiate radio frequency energy and, if not installed and used in accordance with the instructions, 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 or her own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: The assembler of a personal computer system may be required to test the system and/or make necessary modifications if a system is found to cause harmful interference or to be non-compliant with the appropriate standards for its intended use.

How to remain CE Compliant

This device complies with CE Directives 72/23/EEC and EMC 89/336/EEC. CE compliance is based on the interaction of all the components of a system. Any modifications made to the equipment may affect the CE compliance and must be approved in writing by Industrial Computer Source. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to claim CE compliance.

Troubleshooting

The components of a computer are all interrelated. That is, a "video" problem may be caused by the disk controller. The simplest diagnostic technique involves replacing the suspect card with a new one. If that doesn't fix the problem, remove all cards except for the minimum required by the system. Then run the system, replacing each card until the problem shows itself.

Note that troubleshooting a chassis may require a load on the power supply. Industrial Computer Source offers an optional ISA plug-in Power Supply Load Board that provides the minimum loading requirements of 0.96A load on +12VDC and 4A load on +5VDC. Please mention Model 10273-01B when ordering.

CAUTION!

The following procedures may involve working with high voltage. Contact with this voltage can injure you. Accidental shorting of the circuits can damage the computer.

Unit doesn't power up when switched on.

A) Check front panel switch to make sure that it is switched on.

B) Check that the power cord is completely plugged in and power is available at the source.

C) Check the LEDs on front panel and on the backplane. If they are flickering there is insufficient load on the powersupply.

D) Check if the power supply cables in the chassis may have been crimped or pinched. In the case of a short the power supply will sense the short and shut off. It will also automatically sense the removal of the short and restore operation.

Note: The power supply will not operate if not minimally loaded. Be sure a CPU or load card is installed to load the supply, otherwise the supply will appear to be faulty.

System gets power, but computer doesn't run. No disk activity or beeps.

A) Check backplane LED's for power. Remove all cards except CPU and video card. Turn on system and watch for picture and listen for beeps. If no activity, remove video card and turn on the system. Listen for beeps. If no beeps, replace CPU or test CPU in another chassis. If beeps heard, replace video card.

B) If picture comes up from A) above, replace each card one at a time. Faulty card will prevent system from booting.

Systems beeps, but no picture.

A) Be sure monitor power is connected and monitor is properly connected to the computer.

B) Check switches on video card. If correct, replace video card.

C) Strip the system down by removing cards until the defective card is identified.

Power Supply LED's on Front Panel don't light.

The power supply may be shorted or the supply wires may be open. The power supply "chirps" if the +5V output is shorted. If chirping is not evident, the problem is probably an open circuit in the supply wiring. Check the I/O connectors on the backplane to be sure they are not shorted with a piece of solder or wire and not damaged.

Note: There is no user service access to the power supply - it is a sealed unit. If the seal on the power supply is broken, the warranty is void.

One Power Supply LED on Front Panel doesn't light.

A) The LED may be faulty. Check the LED on the backplane. If it is lit, the LED on the front panel is most likely faulty. Otherwise, insure that the proper voltage is being supplied to the LED.

B) If the backplane LED does not show voltage present, then test for voltage at the power supply connector using a multimeter (see **Figure 3-1**). If voltage is not present then check the connector for correct pin placement, open connections, bad wire crimps, etc.

Note: Be careful when probing the connectors. Do not short across the connector pins because damage will occur if the supply pins are shorted to a signal pin. This damage is not covered by warranty. Do not bend the pin in the connector with your probe tip.

Overheat LED changes color from green to red.

A) Physically check to verify that the unit is in a overheat condition. If it is then proceed to step B). If the unit is not in an overheat condition (above 50°C), insure that the Temperature Sensor is connected to J2 of the Fan Interface Board.

B) This means that most likely there was a fan failure. All the fans must be running. Remove the cover and check if all of the chassis and power supply fans are turning. Insure that the front intake vent is not blocked and the intake filter is clean. Insure that the airflow direction is *into* the chassis (see **Figure 1-8**).

C) If any fan is not turning, check for faulty power connections to the fan.

D) If the power to the fan is correct, but the fan is not working, replace the fan. If there is no power to the fan, check the Fan Interface Board (FIB) Printed Circuit Assembly (PCA) for signs of damaged fan interface wiring. For more detailed information see the Schematic in Appendix B. Replace the FIB PCA if necessary.

Fan Status LED changes color from green to red.

A) Check to see if the fan(s) are operating. If they are, a malfunction may have occurred with the fan status circuitry on the Fan Interface Board (FIB) PCA. Note that anything impeding the free turning of the fans will report as a fault.

B) If the fan(s) are not operating, check the wiring and the power connections between the fans and the FIB. The cooling fans operate off +12VDC. The fan wires are connected to the FIB with screw terminals. If voltage is present at the FIB, insure that the wires are connected to the fan. If so, the fan may have malfunctioned.

Returns

If you need to return a product to Industrial Computer Source for any reason, the following applies:

A) Call Customer Service for an Return Authorization (RA) number. The RA number must be visible on the outside of the box you pack the product into for return shipment. Shipments without an RA number will not be accepted by Customer Service Receiving.

B) Properly pack the product:

1) Insert a shipping protector in any 5.25" floppy drives.
2) Remove any protruding keys, light pens, keyboards, cables, etc.
3) Secure all plug-in cards with screws. Screw down the lid. Be sure the drive cage is screwed down as applicable and that access doors are closed.
4) Put the computer in a bag to prevent moisture and dirt from entering the drive and card areas.
5) Provide adequate packaging and use standard Electro Static Discharge (ESD) precautions. If possible, use the original box and packing the system arrived in. chassis weigh from 50 to 80 pounds. A minimum of 4 inches of proper packing material is required around all sides of computer systems. Double thick cardboard is preferred. **Do not use styrofoam peanuts or loose fill to pack.** Assume the box will be dropped several feet during shipping.
6) Do not ship by motor freight. Use a carrier such as Burlington, Airborne, or Federal Express.

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Appendix A: Split Backplanes

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20-Slot Split Backplane Construction

One of the special features of the 7520 series chassis is the option of a split backplane. This allows multiple CPU cards to be utilized; in essence allowing multiple computers in one chassis. Standard configurations are 10x10 (P/N 10199-01) and 5x5x5x5 (P/N 10205-01B). The 10x10 configuration allows two separate groups, each with ten slots. The 5x5x5x5 allows four separate groups, each with five slots. The power supply voltages are shared between the independent systems. The chassis is also equipped with a keyboard connector and reset button, located on the rear panel, for each separate system.

A 20-slot split backplane is constructed of 4 layers, with internal ground and power planes for RFI and EMI noise immunity and low trace capacitance. The signal traces are located on layers 1 and 4 (the outer layers). Layer 2 is the Ground plane. Layer 3 is the Power plane.

Overshielding can distort signals by lengthening rise and fall times of the signal edges. Some option cards can have problems driving high capacitance lines. The 20-slot board is constructed with ground dipoles between signal traces to minimize crosstalk while keeping trace capacitance to the lowest practical value.

Connectors

Each backplane provides a 16-pin Molex-style connector for power input. The 20-slot backplane provides other input connectors for solid, noise free input power and minimum voltage drop across the connectors, regardless of backplane power load. See **Figure A-1** or **Figure A-2** for the connector locations.

Standard AT-type power supplies may be used with the 20-slot backplane by careful installation of the power connectors. The power supply P8 connector will install at the backplane P1 connector, pins 1 through 6. Skip two pins between it and the power supply P9 connector, and install the P9 connector at P1 pins 9 through 14.

Input Power

Each input is filtered by one or more large electrolytic capacitors for low frequency line noise rejection. Ceramic bypass filter capacitors of 0.1µF improve noise immunity. All four input voltages have bypass capacitors. See **Figure 3-1** for connection voltages from the power supply.

Each power supply output is monitored by the exclusive Industrial Computer Source Bus Power Check™ circuitry. A separate LED is lit by each supply voltage for a quick visible check of power supply operation. This is not, however, a tolerance verification. Troubleshooting requirements may require actual measurement of the power supply values to ensure operation to specified limits.

Bus Termination

Bus termination is an option on the 10x10 split backplane, but it is not an option on the 5x5x5x5 split backplane. Each 10-slot group of the bus can be terminated independently using the connector on that end of the backplane. Bus termination of the 10x10 split backplane is the same as for the unsplit 20-slot backplane. For more information see page 3-5, Bus Termination.

20-Slot Split Backplane Connectors

Connection from Power Supply

P1 - 1	No Connection
P1 - 2	No Connection
P1 - 3	+12VDC
P1 - 4	-12VDC
P1 - 5	Ground
P1 - 6	Ground
P1 - 7	Ground
P1 - 8	Ground
P1 - 9	Ground
P1 - 10	Ground
P1 - 11	-5VDC
P1 - 12	+5VDC
P1 - 13	+5VDC
P1 - 14	+5VDC
P1 - 15	+5VDC
P1 - 16	+5VDC

I/O Power Out

P3 - 1	+5VDC
P3 - 2	+12VDC
P3 - 3	Ground

P4 - 1	+5VDC
P4 - 2	+12VDC
P4 - 3	Ground

Remote Sense

P5 - 1	+5VDC
P5 - 2	Ground

P6 - 1	+5VDC
P6 - 2	Ground

I/O Power Out

P7 - 1	+5VDC
P7 - 2	+12VDC
P7 - 3	Ground

P8-1	+12V
P8-2	GND
P8-3	GND
P8-4	+5V

P9-1	+12V
P9-2	GND
P9-3	GND
P9-4	+5V

CPU Signals

P10 - 1	Connects to P11-1
P10 - 2	Ground
P10 - 3	No Connection
P10 - 4	Connects to P11-4
P10 - 5	Connects to P11-5
P10 - 6	Connects to P11-6
P10 - 7	+5VDC
P10 - 8	Connects to P11-8

P11 - 1	Connects to P10-1
P11 - 2	Ground
P11 - 3	-5V
P11 - 4	Connects to P10-4
P11 - 5	Connects to P10-5
P11 - 6	Connects to P10-6
P11 - 7	+5VDC
P11 - 8	Connects to P10-8
P11 - 9	+12V
P11 -10	-12V

P13 - 1	-12V
P13 - 2	GND
P13 - 3	GND
P13 - 4	-5V
P13 - 5	+12V
P13 - 6	+5V

Note: The backplane connector P13 may be mislabeled as P10 on the backplane.

Split 20-Slot Backplanes

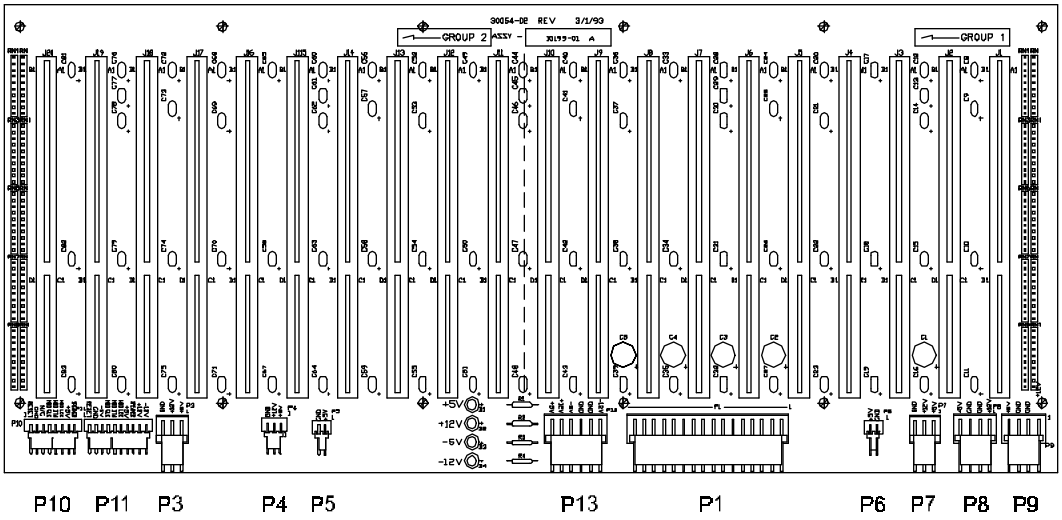

Figure A-1: Split 10x10 20-Slot Backplane

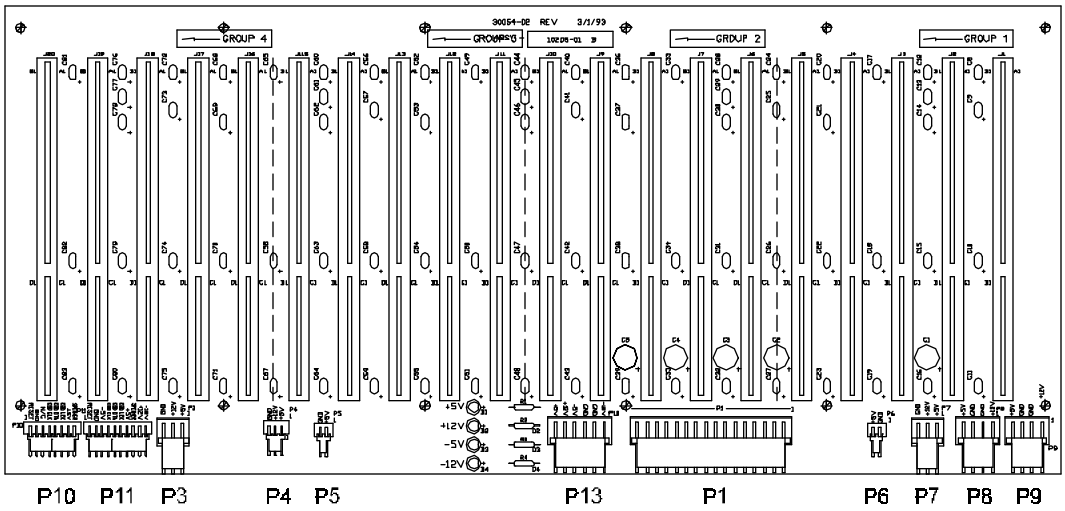

Figure A-2: Split 5x5x5x5 20-Slot Backplane

Appendix B: Schematics and Wiring Diagrams

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Insert
Schematic 20003-00A Rev A
SCH PCB FAN INTERFACE

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Insert
Schematic 20005-00C Rev C1
SCH PWR MULTI KBD IFACE

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Schematic 20004-00A Rev A
SCH DISPLAY IFACE

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Insert
Schematic 20006-00A Rev A
SCH MULTI CPU

Then remove this page.

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Insert
Schematic 20001-00 Rev B
SCH PCA REDUNDANT P/S INTERFACE

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Insert
Wiring Diagram 80005-00E RevE1, 3 Pages
752X-34HX / -44HX/ -54HX

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7522-34H-D4 7524-34H-D4 7520P-34H-D4 7520P6-34H-D4 7520P9-34H-D4

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EN 50082-2:1995 Immunity, Generic Requirements.
-EN 61000-4-2 Immunity to Electrostatic Discharge.
-ENV 50140 Immunity for radiated RF electromagnetic fields.

EN 50082-1:1992 Immunity, Generic Requirements.
-IEC 801-3:1984 Immunity for radiated electromagnetic fields.
-IEC 801-4:1988 Immunity for AC and I/O lines, fast transient common mode.
-IEC 65A/77B Immunity for AC lines, transients, common, and differential mode.

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President & Chief Executive Officer

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7520P-34HR 7520P6-34HR 7520P9-34HR

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EN 50082-2:1995 Immunity, Generic Requirements.
-EN 61000-4-2 Immunity to Electrostatic Discharge.
-ENV 50140 Immunity for radiated RF electromagnetic fields.

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-IEC 65A/77B Immunity for AC lines, transients, common, and differential mode.

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