CompuPro™
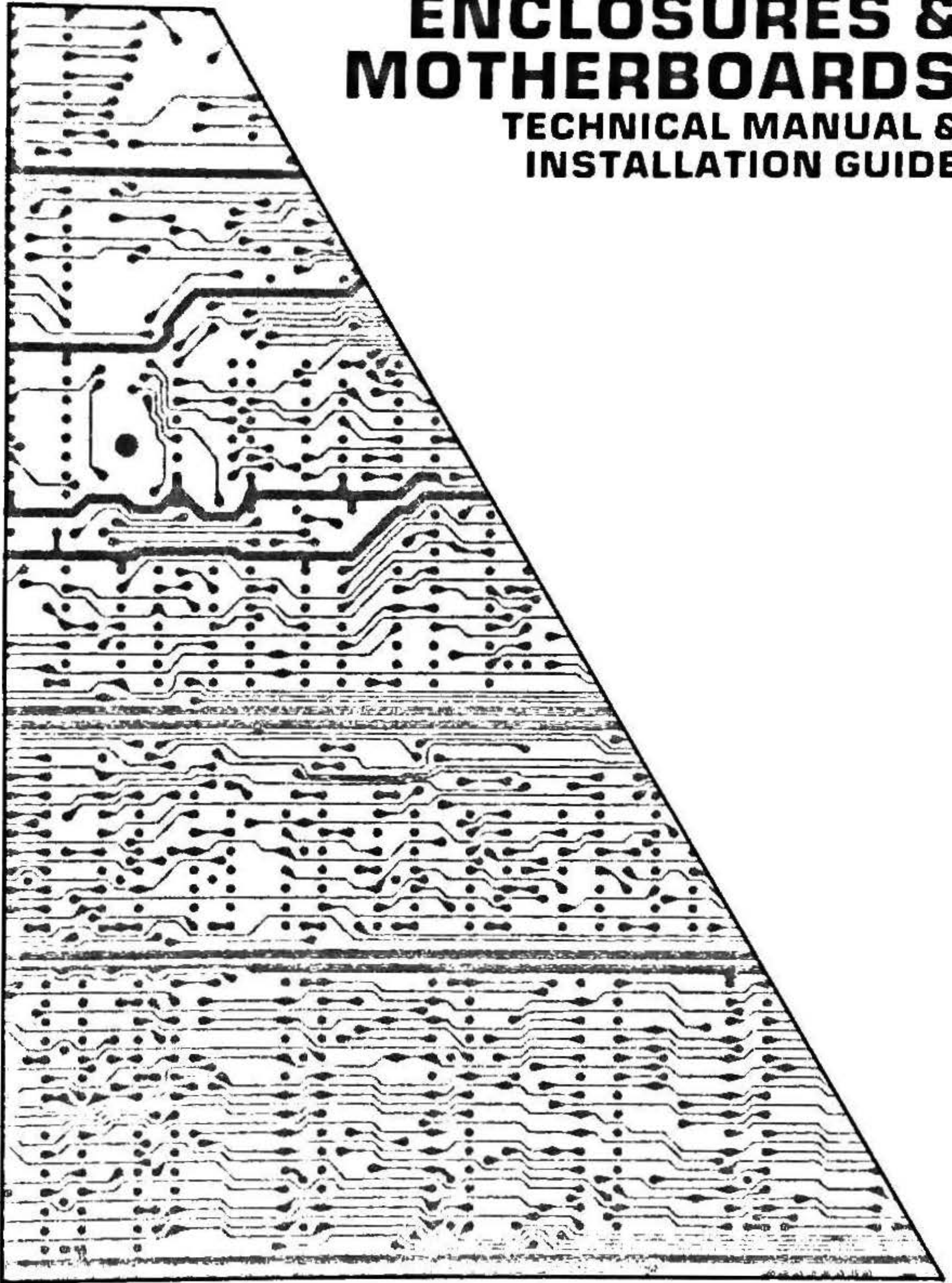
ENCLOSURES &
MOTHERBOARDS
TECHNICAL MANUAL &
INSTALLATION GUIDE

WARNING

This product is a Class A commercial digital device. This equipment generates, uses, and can radiate radio frequency energy if not installed and used in accordance with the installation manual and may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case users will be required to take whatever measures may be required to correct the interference at their own expense.

YOU MUST INSTALL SHIELDED EXTERNAL CABLES
WITH THIS EQUIPMENT TO REDUCE
RADIO FREQUENCY INTERFERENCE (RFI)
AND MEET FCC REQUIREMENTS.

Enclosures and Motherboards

Technical Manual

and Installation Guide

CONTENTS

Tables and Figures

Introduction

This document is the technical manual for the Enclosure 2, the Enclosure 3, the Drive Enclosure, the High Speed Motherboard and the standard motherboard. It is intended as an installation guide for these products and a reference for engineers and technicians who need to understand how these products function in a CompuPro computer system.

This manual is divided into six sections: a general guide for installation of CompuPro enclosures and a section for each of the product types documented. The appendices at the end of the document list the specifications for each product and references for further information.

Installing the System and Drive Enclosures

Caution: Computer enclosures can be very dangerous if not worked with carefully. They contain voltage sources that can be lethal as well as fan blades that can cause injury. Be extremely careful not to touch any exposed wiring while the system is on. Never wear metal jewelry or watches and never wear a tie or other loose or dangling piece of apparel while working on a system. If system power must be on while the cover is removed, place a sheet of 6" by 19.5" plexiglass over the power supply area for protection. Follow good shop practice when working on this equipment!

Unpacking the Enclosure(s)

Open the large cardboard box and carefully remove the enclosure from the packing material. Place the unit on a flat surface and inspect the outside of the enclosure for any signs of shipping damage. Find and remove the power cord and put it aside for the moment.

The enclosure has been shipped in packing materials that help prevent damage during shipping. Save these packing materials for shipping the system later. Repacking the enclosure in the original container gives you the best shipping protection.

There should be an invoice with the shipment. Use it to verify that all components have been received. We suggest you file the invoice for future reference.

Note: Warranty service requires proof of purchase.

To prevent shipping damage, a floppy drive is shipped with a cardboard shipping disk inserted in the drive slot. Be sure to remove this disk before using the drive. Save this cardboard disk with the shipping materials. If you need to ship the drive enclosure, or if you move it, be sure to replace this cardboard disk in the floppy drive.

Rules for Proper System Installation

- Install systems only in clean, well ventilated locations.

  Systems should not be installed where the temperature or humidity goes to great extremes. They also should not be installed in dusty or dirty locations.

- Install systems only on stable surfaces.

  Never use furniture that is weak or might be knocked over or bumped into.

- Leave adequate space around the system for ventilation.

  Note that the air flow is into the fan and out the left side of the enclosure. Both of these areas should have at least three inches of free space for proper air circulation and system cooling.

- Insure that system power is clean, stable, and has a good ground.

  Never connect a computer to outlets that are shared with other equipment, such as copiers or air conditioners.

  Make sure there are enough power outlets for the system and all the peripheral devices.

- Insure that all cables are neat and labeled.

  Long drive cables should be bundled with rubber bands so they won't be tripped over. Cables that can be screwed to the chassis should be. Label both ends of each cable and the connector that they plug into.

- Use only good quality shielded cables.

  The use of poor quality or improperly installed cables will lead to unreliable system operation.

  All cables to external devices must be shielded from emitting RFI (Radio Frequency Interference).

Allow yourself room to get to the front and to the back of the computer comfortably. You need access to both of these areas to install the system.

System Enclosure Installation

Installation of the system enclosure consists of testing the enclosure, inserting the boards into the motherboard, and attaching the cables to the backpanel. If this is a rack mount enclosure, refer also to the instructions on the Rack Mount Enclosures section of this chapter.

Testing the Enclosure

Remove the six (desktop) or four (rack mount) 6-32 screws holding the cover onto the chassis and remove the cover. Inspect the inside of the enclosure for any visible problems and verify that:

- All power supply connections are secure.

- The enclosure has no foreign objects inside.

- The fan spins freely when touched.

- All mechanical connections are secure.

Connect the line cord to the enclosure, turn the power switch ON, and verify that the fan spins freely and the RESET indicator lamp glows.

Note: For the Enclosure 3 RESET lamp to glow or to test the Enclosure 3 motherboard voltage, there must be at least a 3 amp load on the +5 volt line. This load may be supplied either by a resistor load or by three or four boards inserted in the bus.

With the power **ON**, use a calibrated voltmeter set to DC volts to check that the enclosure voltages match those in Table 1. Measure the voltages on the power supply connector to the motherboard.

Table 1: Enclosure Voltages

Pin No.	Color	Enclosure 2	Enclosure 3
1 and 51	Red	+8 to +10 VDC	+5 VDC +3%
2	Grey	+16 to +18 VDC	+12 VDC +3%
52	Purple	-16 to -18 VDC	-12 VDC +3%
20, 50, 53, 70, and 100	Black	GND ref. (0 V)	GND ref. (0 V)

If the voltage is out of specification, refer to the **Power Supply** section of the chapter that covers the enclosure.

Next, measure the voltage on the nut holding U1 to the motherboard. This voltage should be nominally +2.8 volts, but can range from +2.7 to +3.0 volts. This is the motherboard terminator voltage and is very critical. If it is not within the specified range, return the board to the factory for repair.

After verifying power to the motherboard, turn the system **OFF**. The RESET button will glow for some time due to the stored charge in the power supply. You should wait for it to stop glowing before proceeding to set up your system.

Inserting the S-100 Boards into the Motherboard

Refer to the operating system installation guide for the proper switch and jumper settings for CompuPro operating systems. Refer to the board technical manuals for further information on board installation.

Caution: CompuPro boards may have on-board regulators or they may be unregulated. Use only boards with regulators in an Enclosure 2 and unregulated boards in an Enclosure 3.

Use the following guidelines in inserting boards into the S-100 slots:

● CPU boards should be placed in or near the center slot.

● A DISK 1A (or B) board should be relatively close to the CPU board (within five slots).

● RAM boards should be the closest boards to the CPU board.

● Console and disk I/O boards should be placed close to the backpanel. Those I/O boards that have connections to the bottom of the backpanel should be placed closest to the backpanel.

● If there are any spare slots in the system, they should be left near the boards that create the most heat. If there is only one, leave it on the component side of the CPU board; leave a second slot on the component side of the DISK 3 board.

For guidelines on where to attach the cable connectors to the backpanel, refer to page 15.

Refer to the board technical manual for specific instructions on connecting the internal cables to the enclosure in addition to the following general instructions.

Note: FCC regulations require that cables to external devices be shielded from emitting RFI. This requires that provision be made to ground external shielded cables to the chassis. CompuPro RS-232, PC VIDEO, and network internal cables all provide this ground. To provide a shield ground for a parallel cable, use an RFI I/O shield (illustrated below) at the parallel cable connection to the system back panel.

Figure 1: RFI I/O Shield
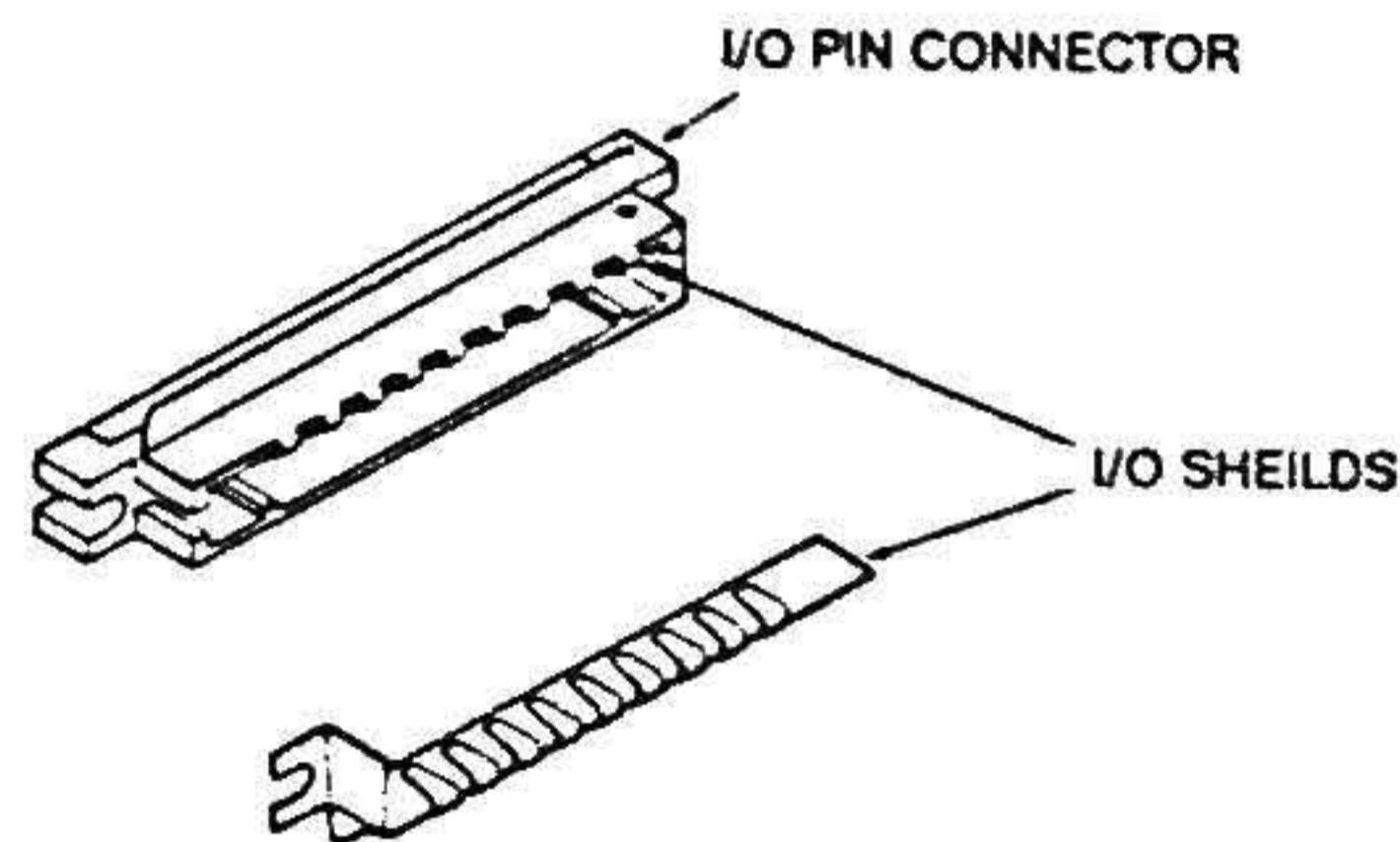
When you attach a ribbon cable to a CompuPro board, attach the socket connector so that the stripe (Pin 1) is to the left as you face component side of the board. Install the cables within the system in such a way that they do not come into contact with the fan during system operation.

Attach a connector which has mounting ears to the backpanel as follows:

● The pins face outward and the stripe on the cable (Pin 1) is at the top or right as viewed from the back of the enclosure.

● The nut and lockwasher are inside the enclosure and the screw and flat washer are outside the enclosure.

● The RFI shield is between the connector and the backpanel.

Figure 2: Ribbon Cable to Backpanel Connection
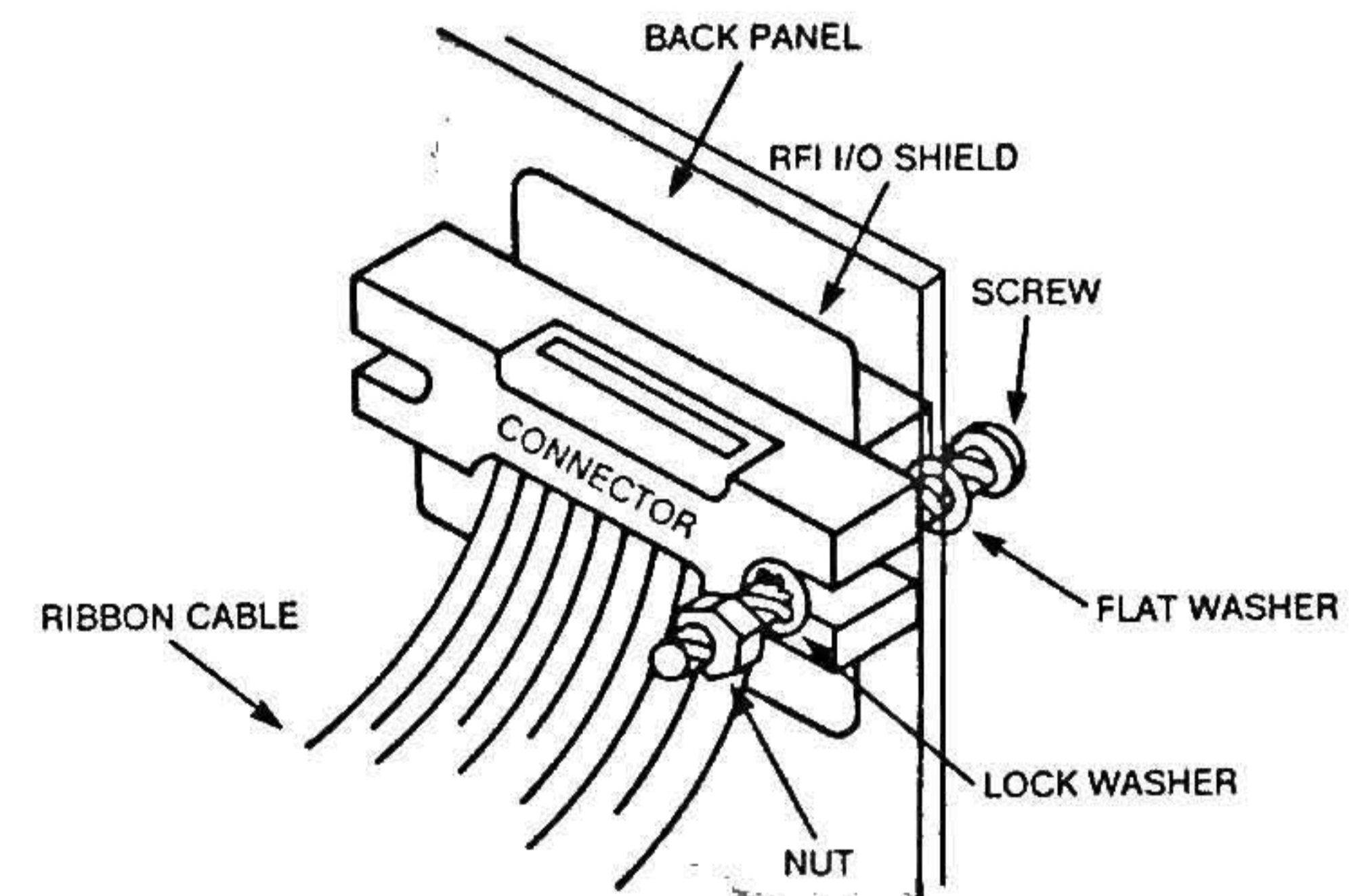
Drive Enclosure Installation

If this is a rack mount enclosure, refer to the instructions on the **Rack Mount Enclosures** section of this chapter.

Attach the power cord and turn ON power to the enclosure. The fan should spin freely. Turn the power OFF to the enclosure. To connect this enclosure to the system enclosure, refer to the **External Cabling** section of this chapter.

Note: Refer to the section on **Changing the Drive Configuration** in the **Drive Enclosure** chapter if you are adding drives to a system that is configured as a single unit (such as a 286/80 that you are upgrading by adding a second hard drive) or if you are making any other changes in drive configuration.

Rack Mount Enclosures

The rack mount versions of the system and drive enclosures conform to the EIA RS-310 standard. The front panel is 19" wide by 7" high for the system enclosure and 8-3/4" high for the drive enclosure.

The rack mount system enclosure consists of the basic system enclosure chassis, a cover, and a front panel. The rack mount drive enclosure does not use the same chassis as the desktop model.

The following mounting hardware is shipped with the enclosure:

- Two 21" three-section slides, CompuPro No. 1450-0750,

- Two 7" slide extenders, CompuPro No. 1410-1014, and

- A variety of screws, nuts, bar nuts, and rear support brackets to accommodate almost any rack or cabinet.

Use the following steps to mount the enclosure in a rack or cabinet:

Step 1. Attach the chassis slides to the enclosure.

Detach the chassis section (the inner section) from one slide.

Place the chassis section against the enclosure so that the holes lie flat against the five slide mounting holes. These holes are at the top of a drive enclosure and about two-thirds of the way down on a system enclosure.

Attach the chassis section to the enclosure with five of the 10-32 pan or binder head screws.

Repeat for the second slide.

Step 2. Match the distance between the front and rear rails to the slide length.

The distance between the front and rear rails should match the combined length of the slide and either the rear support bracket or the slide extender.

If the rear rails are adjustable, set them to the distance desired.

Attach either the slide extenders or the rear support brackets to the rail mounting sections of the slides with 10-32 screws and nuts or nut bars.

Step 3. Attach the slides to the mounting rails.

Carefully check the height for mounting the slides. Note that the center of the slide is 4-5/8" from the top of the front panel on a system enclosure and 1-3/4" from the top of the front panel on a drive enclosure.

Use the appropriate mounting hardware to mount each slide to the rack or cabinet rails. Use the flat head screws if a flush mount to the front rail is needed.

Step 4. Mount the enclosure in the rack or cabinet.

Pull the slides out to their fullest extension. Carefully insert the chassis sections into the rail mounting sections of the slides, sliding them in until they lock. Then push the entire enclosure towards the rails until the front panel is flush with the rack or the front of the cabinet. If you wish, you may attach the front panel to the mounting rail with four additional screws (not provided).

External Cabling

Always use shielded cable between the system and the external drive.

When you install the ribbon cables between the system enclosure and the drive enclosure, Pin 1 should always be on the right as you face the backpanel from behind the box.

CompuPro recommends that you follow the guidelines set out in the following pages when building RS-232 cables.

We recommend the following cables. These cables provide six conductors, which is more than enough for almost all installations. The minimum number for most applications is five conductors with shield.

- For normal installations use Belden or equivalent 9631 cable, 6 conductor, 28 gage, foil and braid shield, PVC insulation, UL Recognized 2464 for 300V, 80C.

- For Plenum installations use Belden or equivalent 83506 cable, 6 conductors, 24 gage, foil and braid shield, Teflon insulation, NEC Article 725-(b), Class 2 Circuits, UL Classified for 200C, Subject 13. This lower capacitance may be a factor in installations using the SPIO and System Support 2 boards where baud rates of 38,400 are possible.

Always use metal DB-25 shells or metalized plastic shells when constructing a cable. These shells complete the shielding of the cable, and are very important in reducing RFI.

Male DB-25 connectors and each wire of the cable should be connected as shown below:

PIN #1	Shield wire (chassis ground)
PIN #2	Red wire (transmit data)
PIN #3	Green wire (receive data)
PIN #5	Brown wire (Clear To Send (CTS))
PIN #7	Black wire (signal ground)
PIN #20	White wire (Data Terminal Ready (DTR))

Connect the following line only if your installation uses this signal. This line is typically only used with modems.

PIN #8	Blue wire (Data Carrier Detect (DCD))

The shield drain wire should be soldered to pin #1 of the DB-25 and the shield braid should be exposed and pulled back so that when the DB-25 shell is clamped over the cable, a good electrical connection is made between the metal or metalization of the shell, metal portion of the DB-25 connector, and the shield of the cable. Carefully follow the instructions provided by the metal shell and connector manufacturer.

The key to a successful cable is a good connection between the cable shield and the metal portion of the DB-25 connector. Don't be afraid to solder directly to the metal portion of the DB-25 to obtain a good connection.

The following is a list of DO's and DON'T's that should be followed.

- **Do not run RS-232 cables over 150 feet.**

  Long run cables cause serious signal degradation, and will force you to use lower baud rates. For long runs, use a short haul modem instead.

- **Do not run RS-232 cables over or near fluorescent light fixtures.**

  They induce lots of interference into cables.

- **Always screw the DB-25 connector and shell firmly into the jackscrews on the equipment chassis.**

  This provides the chassis ground connection between the computer and peripheral equipment and allows the shielding of the cable to work.

- You should **never** connect an RS-232 cable to your computer from a piece of equipment that is installed on different power branch circuit without first having the ground differential checked! A voltage difference could result in a shock or fire hazard as well as serious equipment damage.

  If a potential difference exists between the computer ground and the peripheral equipment grounds, you have a serious electrical problem in the building. Contact a licensed electrician or electrical contractor and have the wiring in the building corrected before you connect the cables to the computer.

  Don't become a statistic! Proper cabling is serious business and deserves careful attention!

- Consider the cost of returning to an installation to correct poor cable construction and installation as opposed to doing the job correctly the first time!

Rules for Periodic Preventive Maintenance

- Clean the fan filter(s) at least once a month!

- Inspect for loose or damaged cables and repair if necessary.

- Vacuum the enclosure out if it is dusty.

- Clean gold fingers (if required) only with freon or alcohol solvent and a paper towel. Never use an eraser.

Enclosure 2

Introduction

The Enclosure 2 consists of a chassis (identical to the Enclosure 3 chassis except for the power supply mounting), a power supply, and a motherboard. It is available in rack mount and desktop versions. This system enclosure is one of the most versatile and reliable microcomputer enclosures on the market today. It provides a home for your computer now and plenty of room to expand your system if your needs change.

Warning: As with any electrical device that plugs into the wall, there are voltages present that can cause a bad shock or possible death. The power supply should be serviced only by qualified service personnel. The oval capacitor near the transformer has a charge of more than 600 V and should be avoided at all times.

Before working in the power supply area, make sure the system is OFF, and unplugged from the wall for at least five minutes to let the stored charge bleed off. Remove any rings, watches, or other metal objects before carefully reaching into the power supply area.

Enclosure 2 Interior Layout

The following diagram shows the interior layout of the Enclosure 2. Note that the power supply is mounted on top of the mounting bracket.

Figure 3: Enclosure 2 Interior Layout
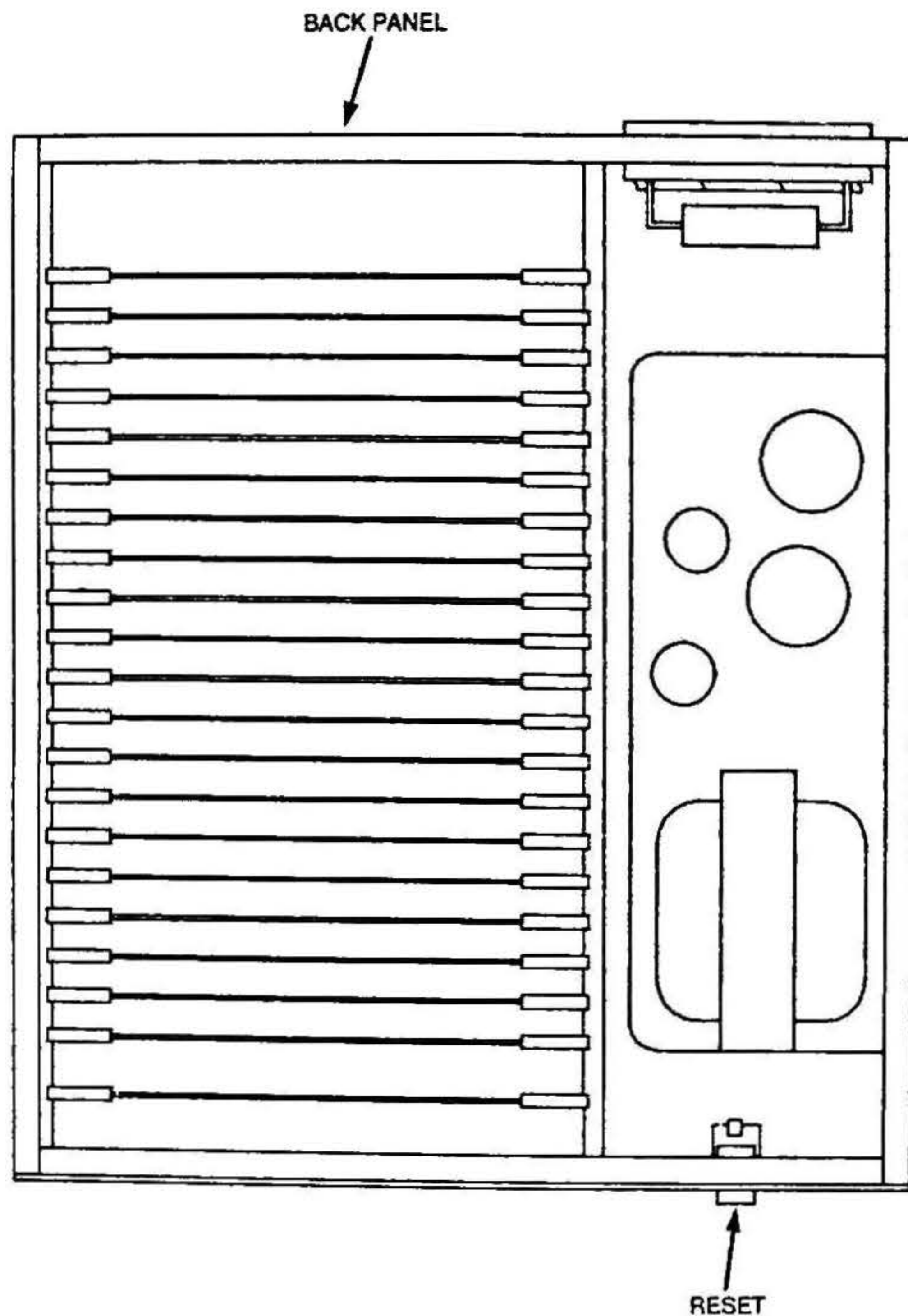
System Enclosure Backpanel

The diagram below shows the system enclosure backpanel. The Enclosure 3 and Enclosure 2 backpanels are identical, except that the Enclosure 3 also has a switch to alternate between 115 and 230 VAC power sources.

Figure 4: System Enclosure Backpanel
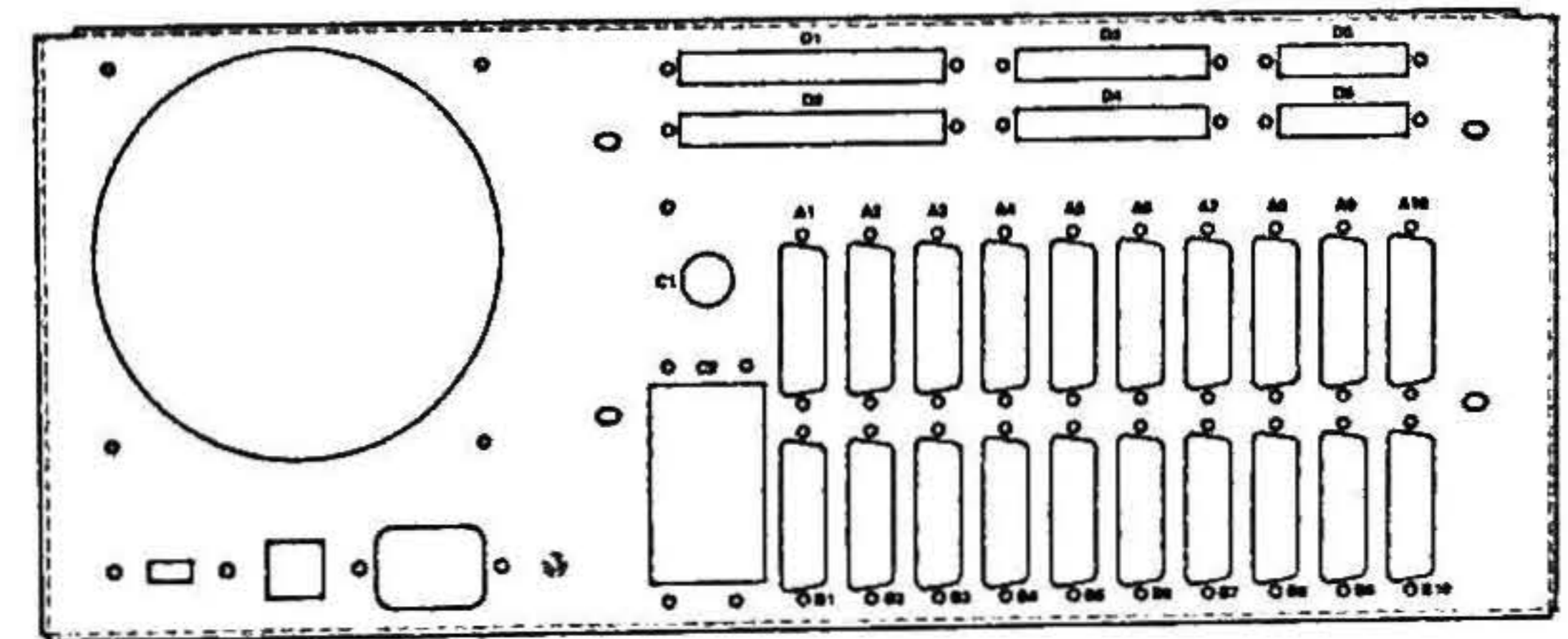
The following guidelines are used at the factory to determine the cutouts to use for the various I/O cables:

A1, B1	System Support 1^{tm} and System Support 2^{tm}
A2 - A10 and B2 - B10	RS-232 and Centronics® DB-25 connectors
C1	Network cable
C2	PC VIDEO^{tm} or DB-34 Centronics connectors`
D1, D2	8" floppy drive or SCSI device
D3, D4	5.25" floppy drive or hard disk control cable
D5, D6	Hard disk data cable

AC Power Distribution

The computer enclosure wiring is color coded to provide easy voltage identification. The following drawing and schematic can be used to identify any system AC power problems.

Figure 5: Enclosure 2 AC Power Distribution
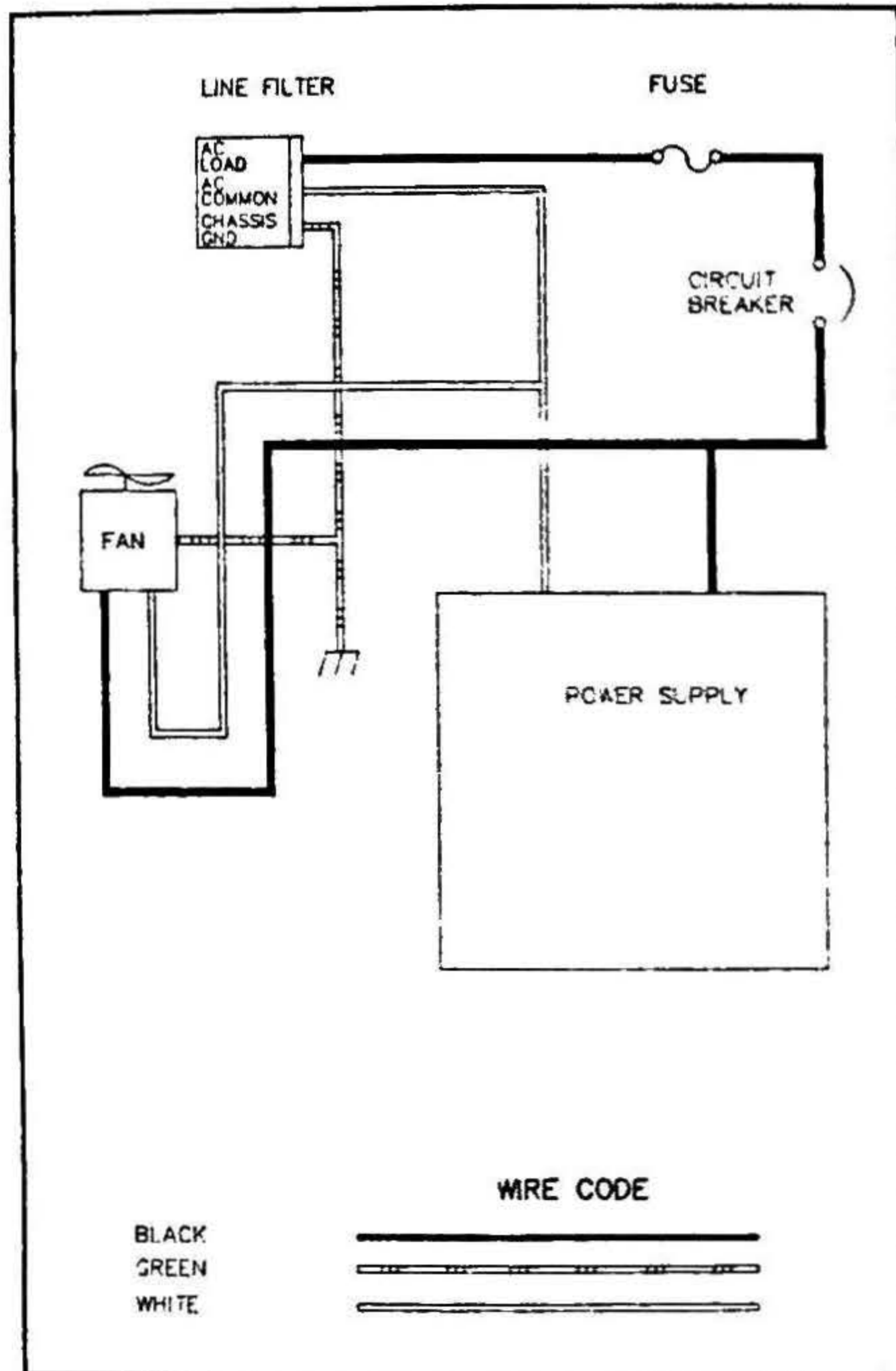
Power Supply

The power supply for the Enclosure 2 is CompuPro part no. 4025-0000. This is an unregulated, constant voltage ferroresonant power supply that has an operating range of approximately 90 to 130 VAC. It is very tolerant of variations in line voltage, but must be operated only at 60 Hz.

Figure 6: Enclosure 2 Power Supply Schematic

The power connection to the motherboard and a top view of the motherboard power socket are shown below:

Figure 7: Enclosure 2 Power Connections

Color Voltage

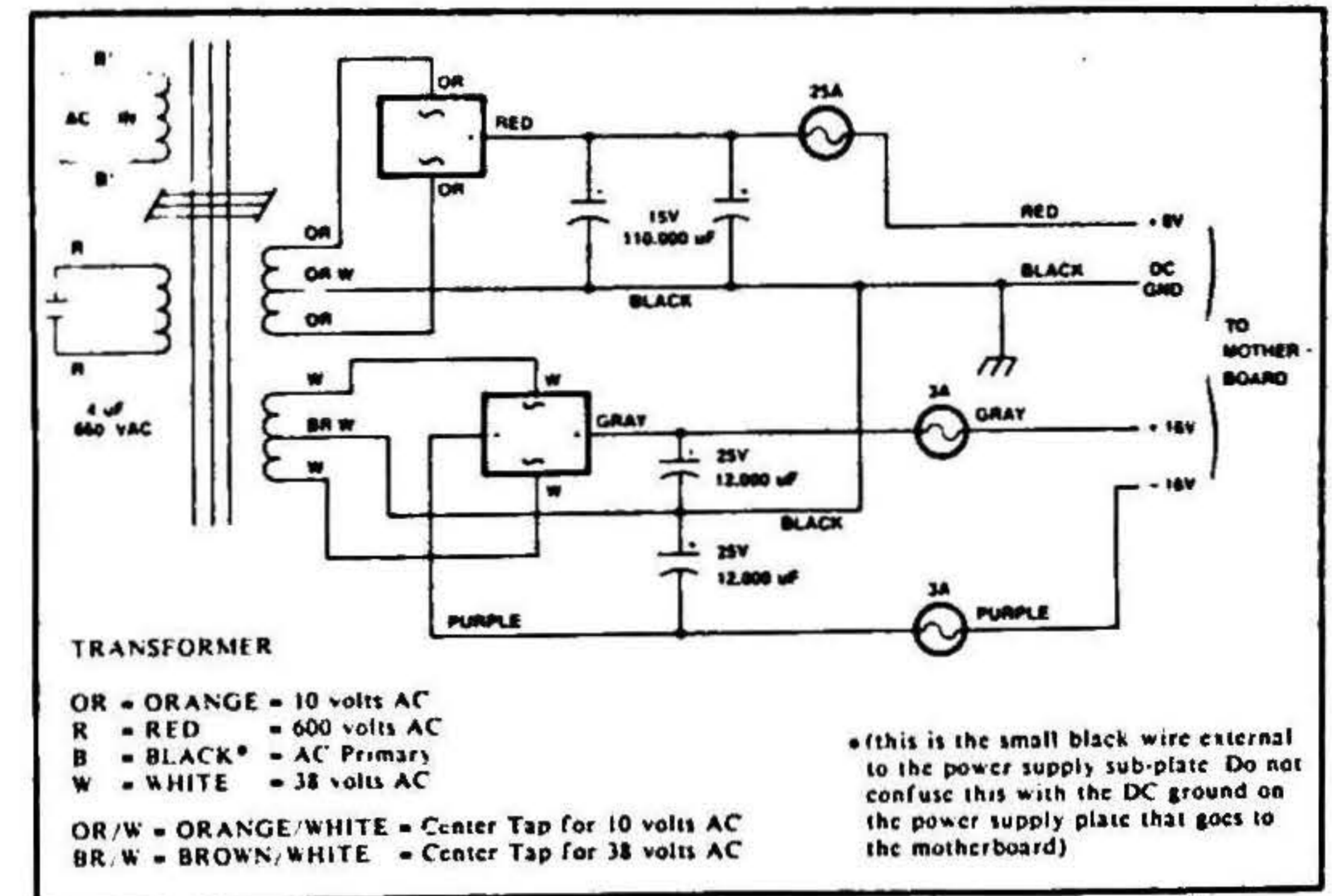|		Top View				
Black	GND	GND	GND	+8	+8	-16
Red	+8V	J3				
Grey	+16V	GND	GND	+8	+8	+16
Purple	-16V					

If any of the above voltages are incorrect, unplug the motherboard power connector and retest. If the voltages are still wrong, the problem is probably in the power supply. If the problem is not in the power supply, inspect for a blown fuse or a loose wire.

The three fuses are located on the floor and wall of the fan end of the power supply mounting bracket.

Note: Before changing a blown fuse, it is recommended that you discharge the capacitor through a low ohm load directly on the top of the capacitor. The capacitor normally discharges through the fuse.

Enclosure 3

Introduction

The Enclosure 3 consists of a chassis (identical to the Enclosure 2 chassis except for the power supply mounting), a power supply, and a motherboard. It is available in rack mount and desktop versions. This system enclosure is one of the most versatile and reliable microcomputer enclosures on the market today. It provides a home for your computer now and plenty of room to expand your system if your needs change.

Warning: As with any electrical device that plugs into the wall, there are voltages present that can cause a bad shock or possible death. Before working in the power supply area, make sure the system is off, and unplugged from the wall for at least five minutes to let the stored charge bleed off. Remove any rings, watches, or other metal objects before carefully reaching into the power supply area.

Enclosure 3 Interior Layout

The following diagram shows the interior layout of the Enclosure 3. Note that the power supply is mounted in the interior of the mounting bracket.

Figure 8: Enclosure 3 Interior Layout
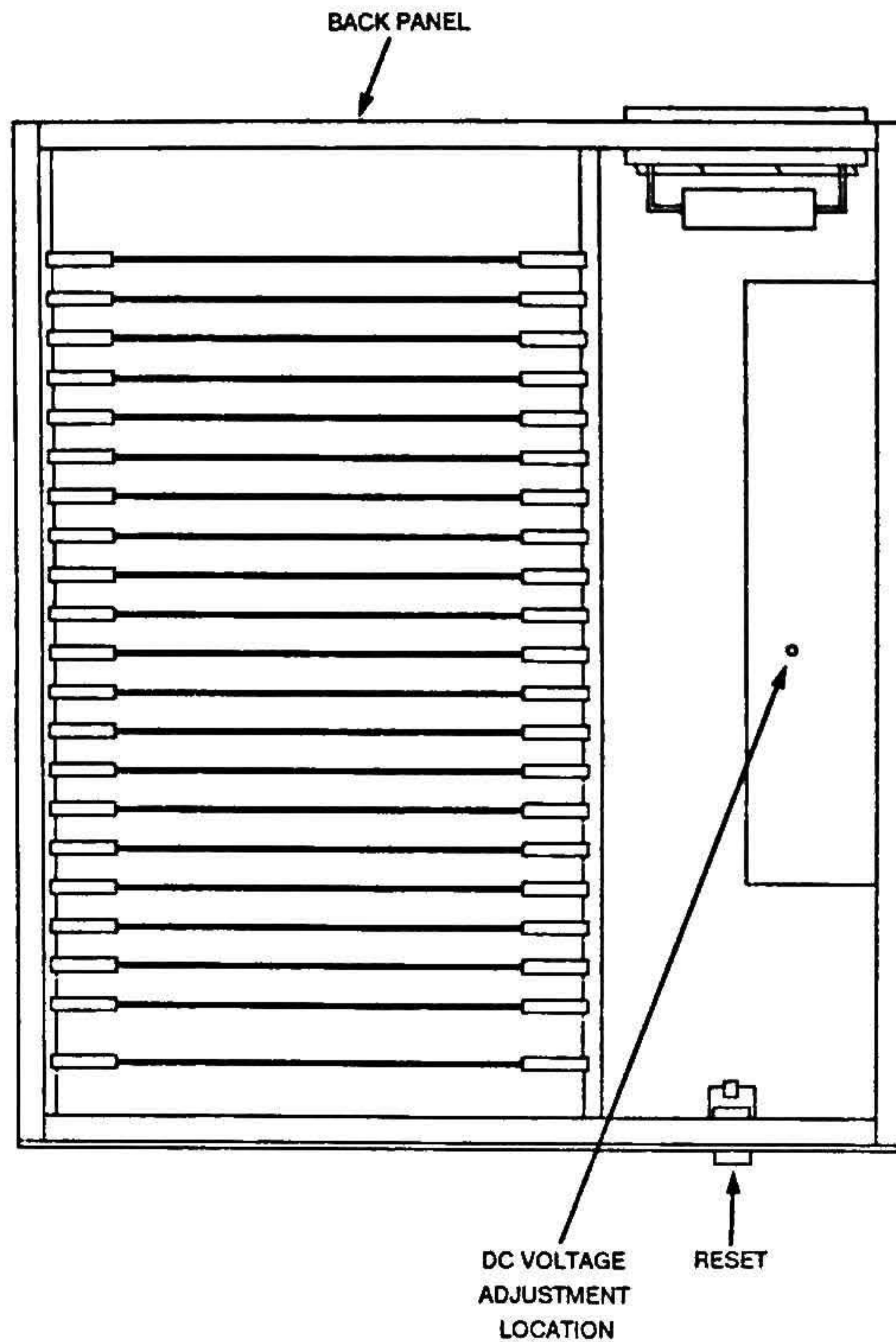
Enclosure 3 Backpanel

The Enclosure 3 backpanel is essentially identical to the Enclosure 2 backpanel. Refer to the chapter on the Enclosure 2 for guidelines to determine the cutouts to use for the various I/O cables.

AC Power Distribution

The Enclosure 3 wiring is color coded to provide easy voltage identification. The following drawing and schematic can be used to identify any system AC power problems.

Figure 9: Enclosure 3 AC Power Distribution
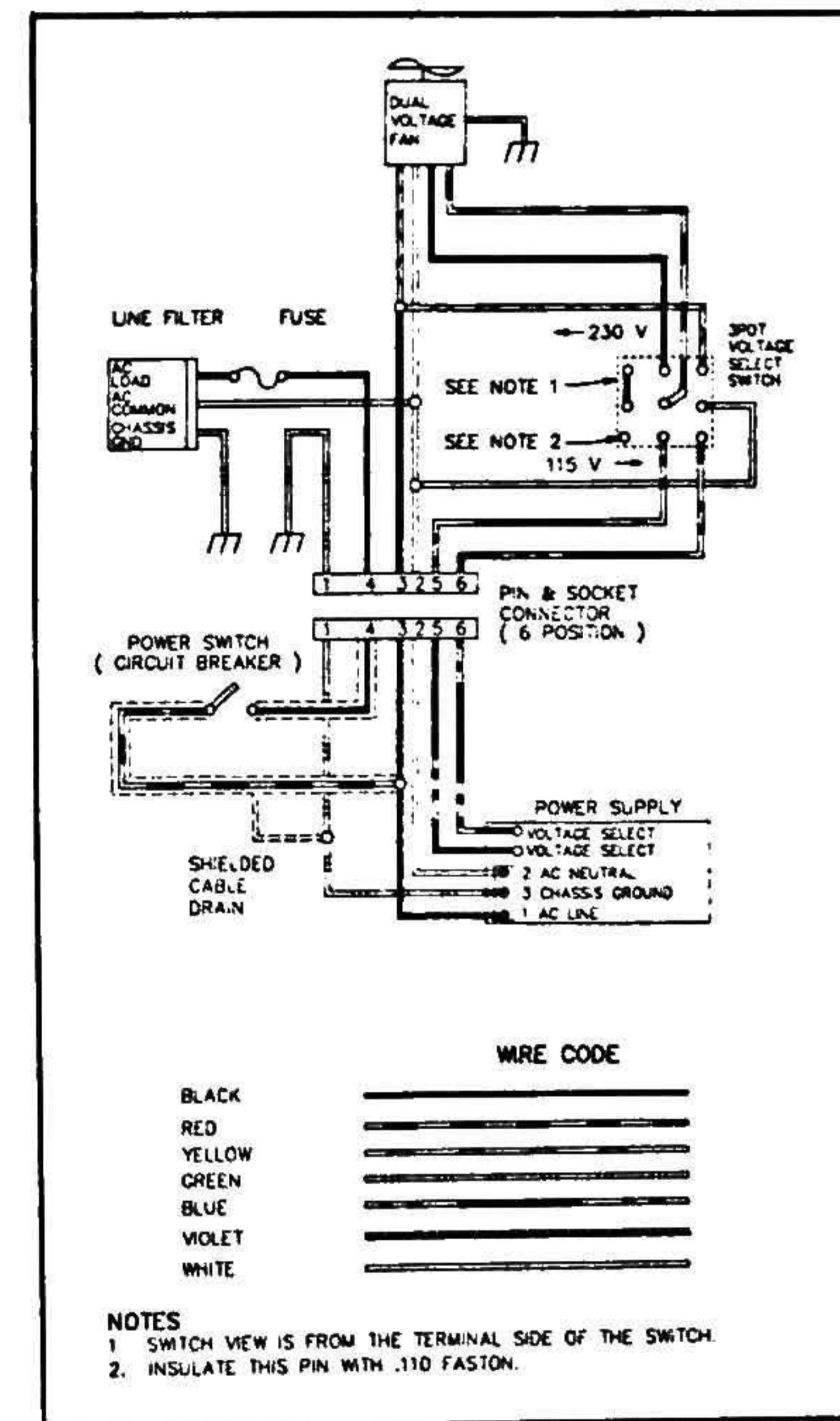
Power Supply

The power supply for the Enclosure 3 is CompuPro part no. 4020-0050. This is a 115/230 VAC to +5 VDC and ±12 VDC regulated power supply. The line voltage must be within 10% of 115 or 230 and the voltage selector switch must be set correctly.

Caution: Never attempt to repair the power supply module in this chassis yourself! This should always be returned for factory service only!

The power connection to the mother board and a top view of the motherboard power socket are shown below:

Figure 10: Enclosure 3 Power Connections

Color	Voltage*
Black	GND
Red	+5V
Grey	+12V
Purple	-12V

Power Socket Top View

GND	GND	+5	+5	-12
GND	GND	+5	+5	+12

J3

* Measure these voltages with a fully loaded system only.

Note: This power supply is set at the factory under an average load. If the system has an especially high or low final system load, it might be necessary to make a slight adjustment to get the output to the optimal voltage.

If the voltage of the power supply is slightly off specification, try the following adjustment:

With the system fully loaded (all required boards installed) and a digital voltmeter connected to the +5 volt line on the motherboard, carefully set the adjustment pot so that the voltage is exactly +5.05 volts. Check to make sure that the +12 and -12 volt lines are still within specification.

The adjustment pot is located next to the low voltage output barrier strip which is at the top center area of the power supply when mounted in the chassis. It may be set through the hole in the bracket (see Figure 8 for location).

Drive Enclosure

Introduction

The CompuPro Drive Enclosure is available in rack mount and desk top versions and provides for mounting the following mass storage devices:

- 5.25" floppy drives
- 8" floppy drives
- tape backup units
- 5.25" hard disk drives

The number and types of devices varies depending on the configuration.

Warning: As with any electrical device that plugs into the wall, there are voltages present that can cause a bad shock or possible death. The power supply should be serviced only by qualified service personnel.

The diagram below shows the Drive Enclosure Backpanel.

Figure 11: Drive Enclosure Backpanel
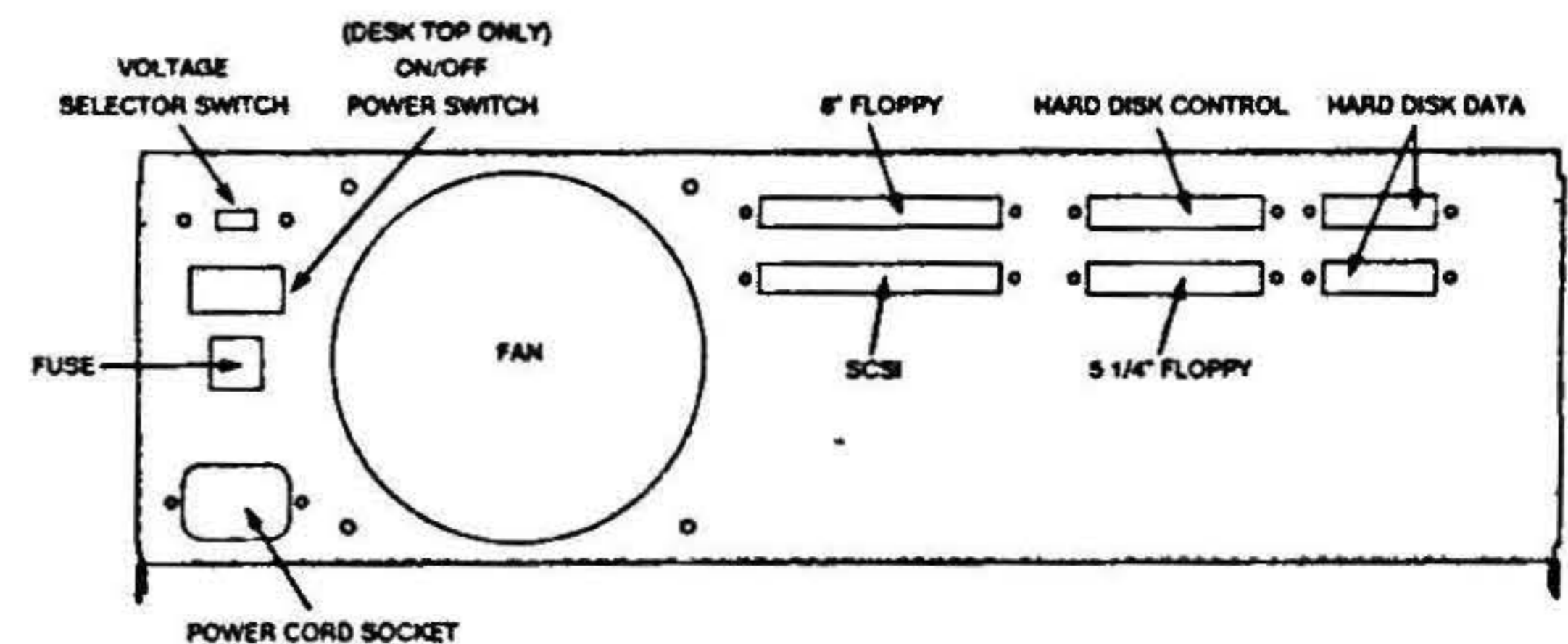
Power Supply

There are two power supplies shipped with drive enclosures:

- If there are any 8" floppy drives in the enclosure and/or if there are two hard drives, the "universal" power supply is used. The "universal" power supply may also be included as an option on drive enclosures that do not meet these criteria. This power supply, CompuPro No. 4025-0080, outputs +5 VDC, +12 VDC, and +24 VDC.

- If there are only 5.25" devices in the enclosure and if there is not more than one hard drive, the CompuPro No. 4025-0120 power supply may be used. This power supply outputs +5 VDC and +12 VDC.

You can differentiate between the two by checking the labels: if the label reads 404, it is the "universal" power supply; if it reads 205, it is the other version.

Figure 12: Schematic for Power Supply #205
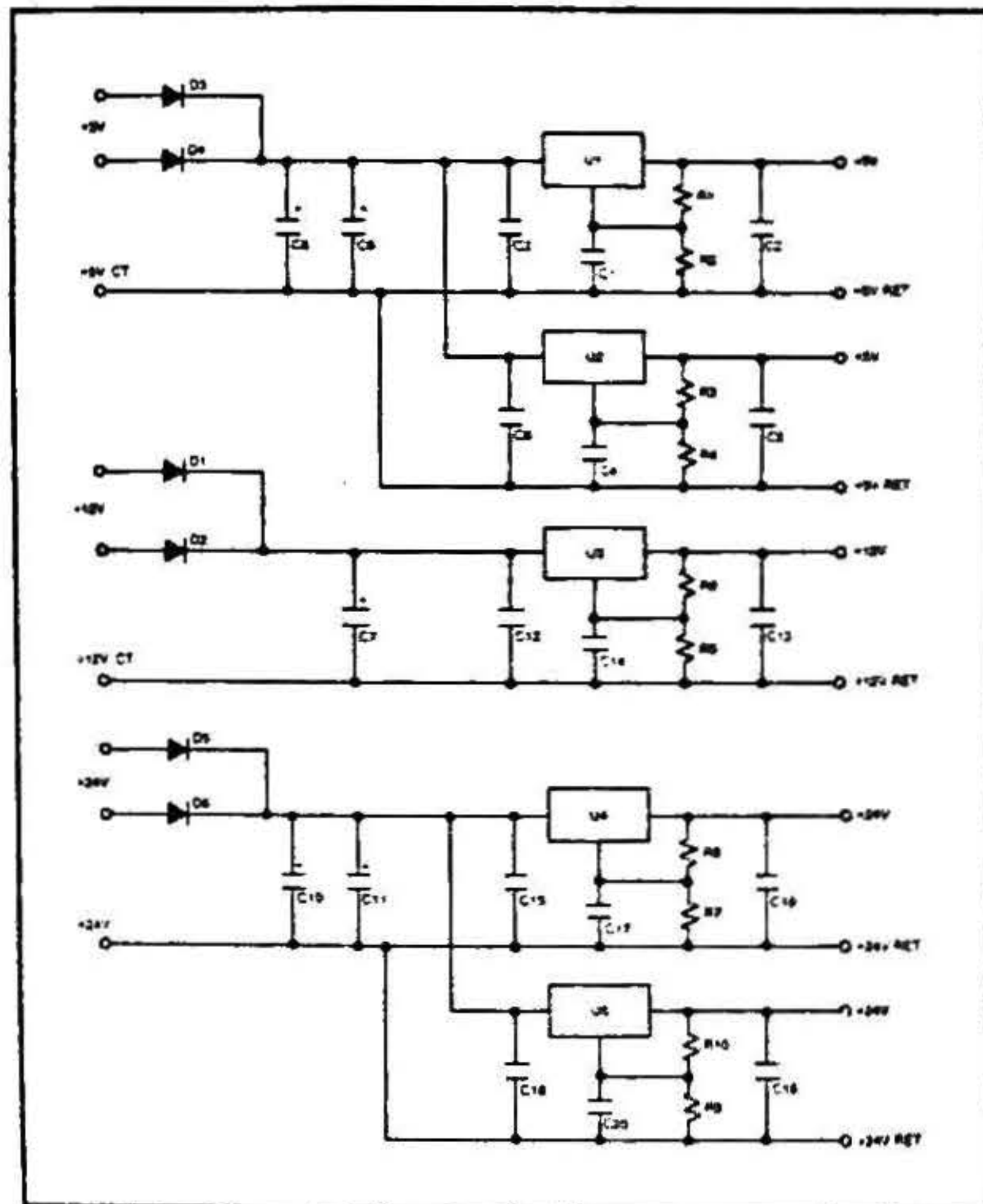
Figure 13: Schematic for Power Supply #404
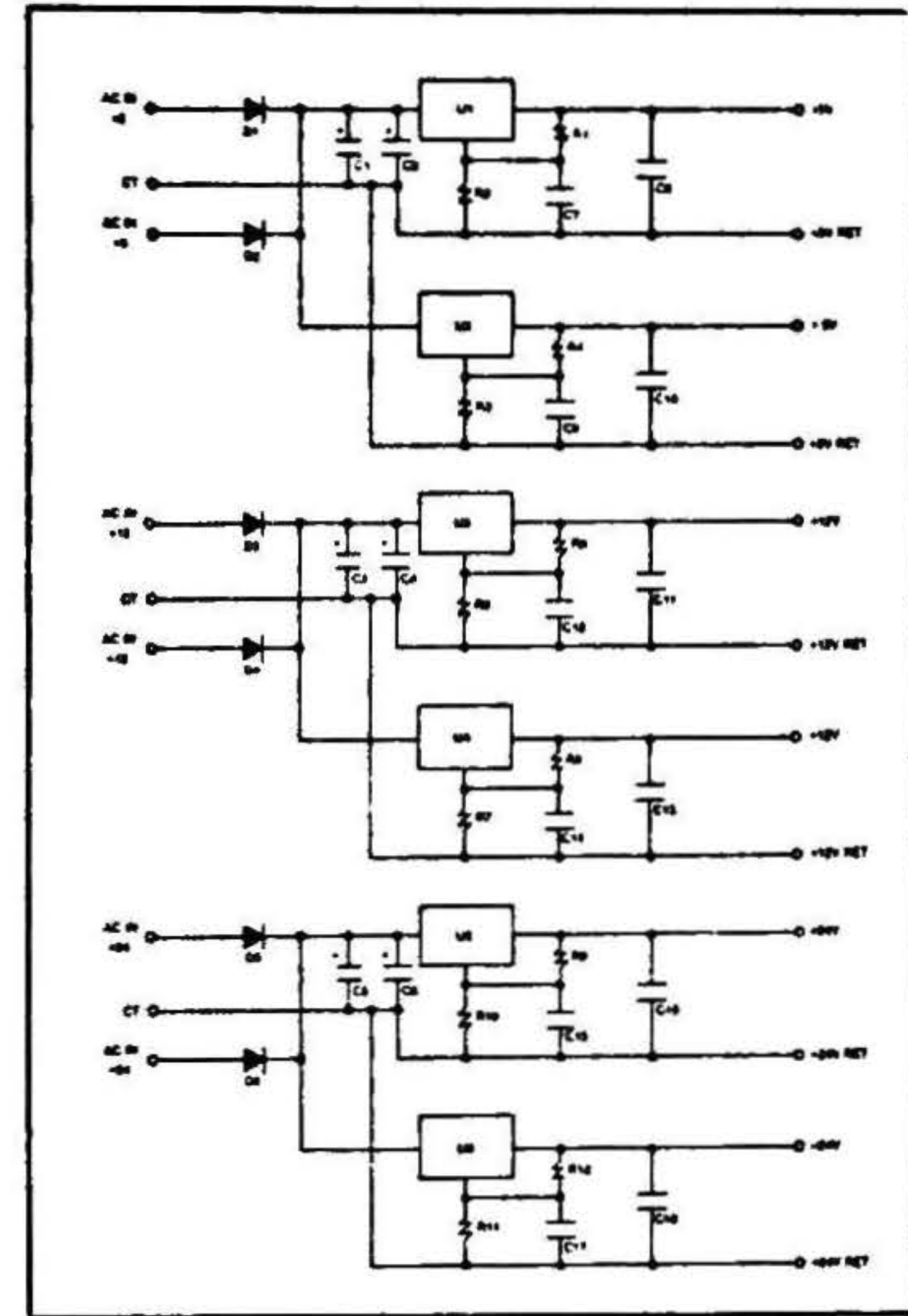
Changing the Drive Configuration

If you are adding the CompuPro Drive Enclosure to a system that already includes drives or if you are adding or removing drives in a Drive Enclosure, you need to ensure that the hardware and software match the new configuration. This section describes the changes you need to make to the cables, controller boards, drives, and power supply when you change the drive configuration. Refer to the operating system installation guide for the necessary software changes.

Caution: Some drive combinations require reassembly of the system file. Be sure to check the operating system installation guide before installing a drive combination you are not sure about.

This section discusses only devices controlled by the DISK3[tm], DISK 1A[tm], and DISK 1B[tm] board. For adding drives to other boards, refer to the technical manuals for those boards.

Drive Cables

Drive cables may be daisy-chained (connecting more than one device to a single connector on the controller board) or they may be radial (connecting only a single device). Several cables connected end-to-end are the same as a single cable for signal-carrying purposes. There is, however, a maximum of 10' allowable from the controller board to the last drive before signal strength is degraded too much for practical operation.

Hard disk drives connect to the controller board with both a 34-pin daisy-chained control cable and a 20-pin radial data cable; 8" floppy drives need a daisy-chained 50-pin cable; and 5.25" floppy or tape drives need a 34-pin daisy-chained control cable.

You should always have a drive on the last connector of a daisy-chained cable. This means that if there are drives in more than one enclosure (a CompuPro 286/80 with an additional external hard drive, for example), you must be sure that the cables are connected between the enclosures and that power is on to both enclosures.

Note: If you are adding a hard drive to a CompuPro 286/40 or 286/80, use CompuPro cable kit No. 6045-0007 for the connections from the DISK3, hard drive and backpanel. For a detailed description of hard disk drive removal, refer to the *CompuPro 286 Series Troubleshooting Guide*.

Controller Boards

A DISK3 board can control up to four hard disk drives and a DISK 1A or DISK 1B board can control up to four floppy disk drives or three floppy disk drives and one tape drive. The controllers recognize an individual drive as first, second, third, or fourth of four as determined by the placement of a shunt on the drive.

On a DISK3, connect the data cable for each drive for the drive that is shunted as first of four to J1 (the leftmost connector as you face the component side of the board), connect the second data cable to J2, and so on.

The size of the floppy device is determined by a jumper on the floppy disk controller board that may be set to position 5 (for a 5.25" device) or position 8 (for an 8" device). J4 through J1 on the DISK 1A board and J0 through J3 on the DISK 1B board correspond to the first through fourth floppy drives in that order.

Drive Select Shunts

The drive select shunt identifies each device as the first, second, third, or fourth of the four possible devices on the controller board.

Depending on the device manufacturer, the drive select shunt may be a jumper placed across a pair of pins or a switch paddle set to the ON position. On most drives, the first location is marked by a "DS" in the printed circuit legend; CDC drives are not marked -- the first position is the farthest away from the terminating resistor.

The drive number does not need to correspond to the position of the drive on the daisy-chained cable.

Terminating Resistors

Terminating resistors are required on the last physical drive on a cable and must be removed from all other devices. There is one exception: Irwin tape drives do not terminate all lines that require termination, so it is permissible to terminate a floppy drive that is physically very close to a tape drive when the tape drive is the last device on the cable.

On most devices, the terminating resistor is an 8 resistor 16-pin DIP resistor pack, but Priam drives use an 8-pin SIP. Because the terminating resistor in Mitsubishi (CompuPro's 5.25" floppy) drives is soldered onto the printed circuit board, you disable it by removing the eight shunts on the jumper adjacent to the terminating resistor rather than removing the resistor itself.
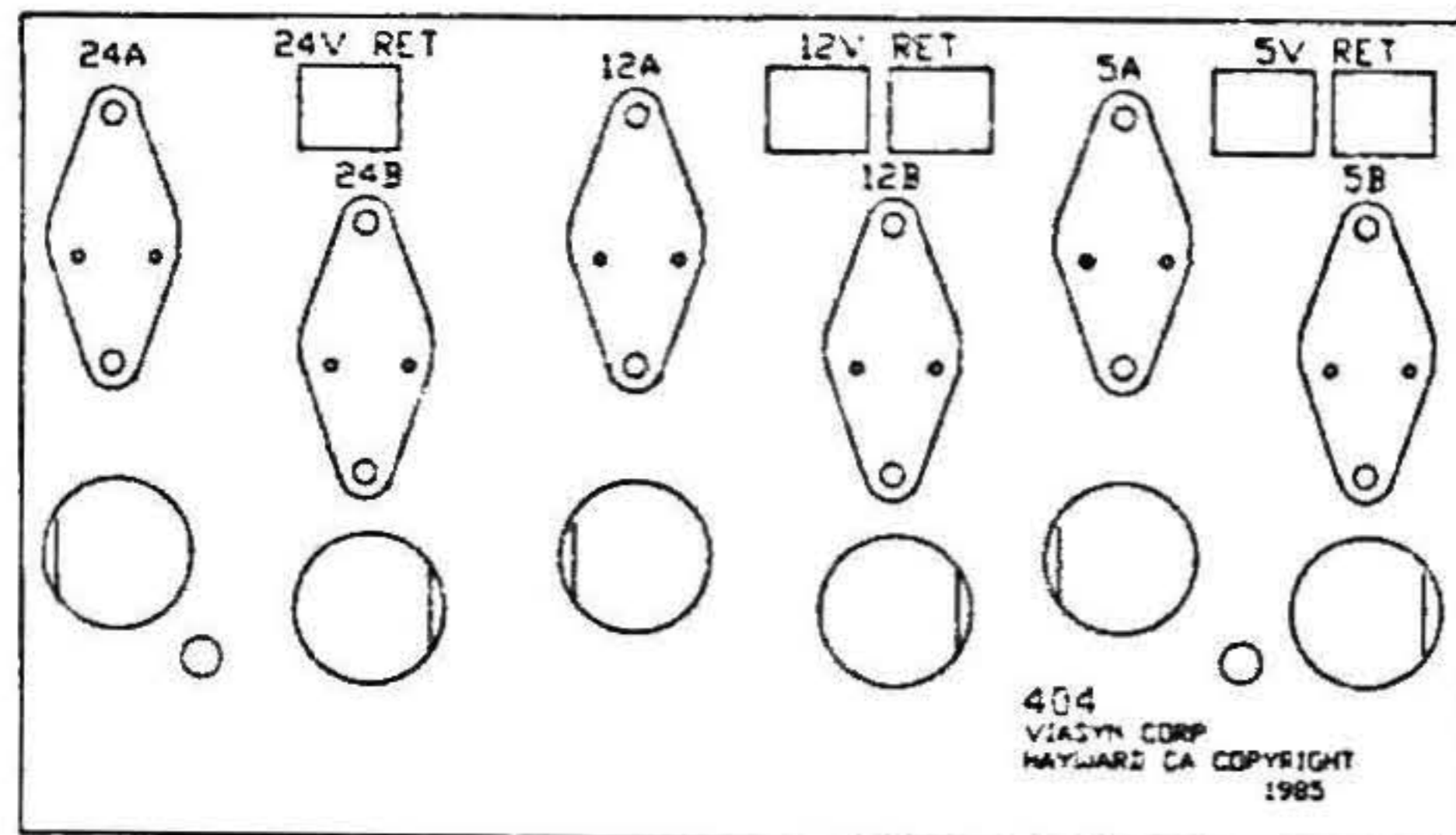
The "universal" power supply can be wired to accommodate a variety of 8" and 5.25" devices. The following general guidelines are for wiring the DC outputs of the power supply.

Use CompuPro cable No. 6050-0441 to connect the 24V and 5V power needed by 8" devices and CompuPro cable No. 6050-0442 to connect the 12V and 5V power needed by 5.25" devices.

Connect the solid color wire of each pair to the appropriate regulator tab and the black wire with the matching color stripe to the voltage return terminal. Use the grey and black/grey pair for 24V, purple and black/purple for 12V, and red and black/red for 5V.

Refer to Figure 14 to locate the specific cable connection points for each type of device.

Figure 14: DC Cable Connections for Power Supply #404

DRIVE →	1ˢᵗ DRIVE			2ⁿᵈ DRIVE		
VOLTAGE →	24V	12V	5V	24V	12V	5V
8" DRIVE	24A	——	5A	24B	——	5B
5.25" DRIVE	——	12A	5A	——	12B	5B
TAPE DRIVE	——	12A	5A	——	——	——
HARD DRIVE	——	12B	5B	——	12A	5A

Motherboards

Introduction

CompuPro motherboards conform to the IEEE 696/S-100 standards.

There are two families of CompuPro motherboards: the high-speed motherboards with both active and open collector termination and the standard motherboards with active termination only.

The major difference between the two is in the termination circuitry, as described in the **Termination Circuitry** section of this chapter.

CompuPro motherboards may have 6, 12, 16, or 21 slots.

Power Connection

There are three types of power connections on the motherboards.

The main power connector is a ten-pin connector. The power supply connector fits into the motherboard connector in only one orientation to prevent incorrect installation. Refer to the Enclosure 2 and Enclosure 3 chapters for the color coding on the power supply cables.

The LED power-on indicator and system RESET come in two configurations: a single three-pin connector with a shared ground; or two two-pin connectors, one for the LED and one for system RESET.

On all but the 6-slot motherboard, there are provisions for using tab connectors to distribute the +5 or +8 volts to the bus with very little loss due to board trace resistance. These tabs should be connected to the red wires from the power supply.

Termination Circuitry

The termination circuitry, which has evolved over the years, is a tried and proven method of reducing noise in the system. The voltage is fixed by precision resistors. You do not need to make any adjustments on new boards.

The 100 lines on the IEEE 696/S-100 bus can be divided into three categories needing three types of termination:

● *Active lines:*

The 65 active lines are the 24 address lines, 16 data lines, 8 status lines, 7 strobes, XRDY, POC*, CLOCK, 4 RFU (reserved for future use) lines, and 3 NDEF (not to be defined) lines. Both the high-speed and the standard motherboard use active termination on these lines.

● *Open collector lines:*

The 26 open collector lines are the 10 interrupt lines, 4 disable lines, 4 TMA arbitration lines, PWRFAIL*, SLAVE CLR*, SIXTN*, PHANTOM*, RDY, HOLD*, ERROR*, and RESET*. The high-speed motherboard uses open collector termination on these lines; the standard motherboard uses active termination on these lines.

● *Power lines:*

The 9 power lines need no termination at all.

Active Termination

The standard TTL termination is a 2.6V reference, comprising a 360 ohm resistor and a 390 ohm resistor in series across a 5V power supply. The active termination in the CompuPro Motherboard takes advantage of the fact that an equivalent active circuit, based on a voltage source and an isolating/current limiting resistor, can accomplish the same results.

With active termination, lines are terminated at each end of the bus with a resistor of about 910 tied to 2.8V, giving a parallel resistance of half that amount. Current can either source or sink through the parallel resistance, either dumping into or drawing from the voltage source. As a result, the standby current is only about 15 or 20 ma.

The current requirement goes up as lines require more sourcing or sinking. At any given moment, on 91 lines there will be a fairly random mix of 1's and 0's from instant to instant which tends to cancel out and thus reduce the current drive requirements of the voltage source. Nonetheless, although this keeps average current consumption down, there are instances when you might have an extreme momentary need for current. As a result, the voltage source has enough capacity built in to take care of the most adverse cases.

If there is a problem, the signal lines can be checked more extensively with an ammeter. With a constant voltage of 2.8V and a series resistance of 455 ohms, you should see approximately 6 ma measured from any one of the active terminator lines to ground. A reading of 0 or 3 ma indicates an open. A reading of 12 ma indicates a short. The voltage for open collector lines is about 5.0V, so you should see about 11 ma measured from any one of these lines to ground.

Caution: Do not place the meter across the power lines (Pins 1, 2, 51, and 52).

**Figure 15: Active Termination Circuitry**
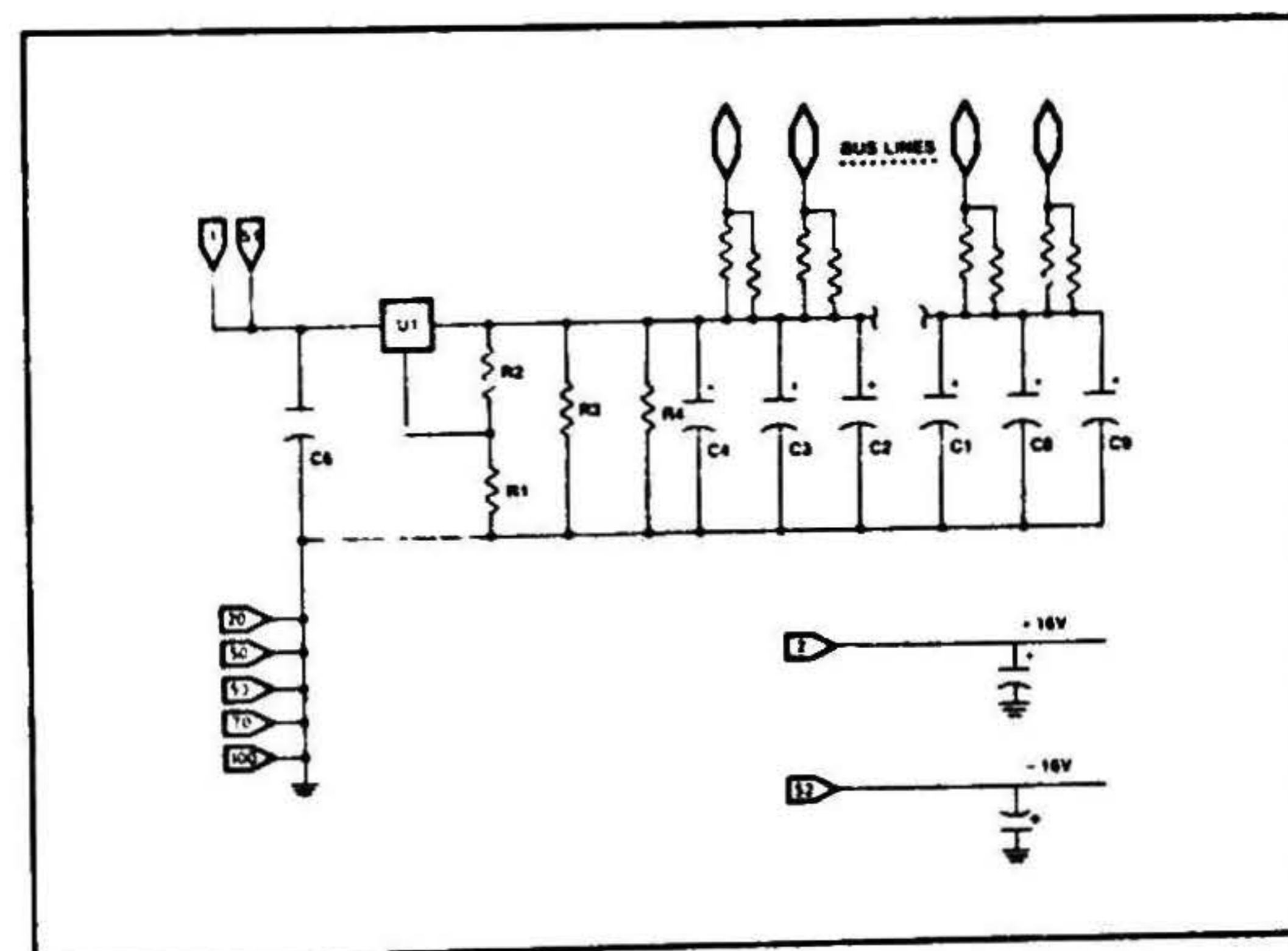
Open Collector Termination

The high speed motherboard incorporates enhancements to the basic motherboard design which will allow it to operate comfortably into the next generation of IEEE 696/S-100 products.

The 26 open collector lines are terminated at each end of the bus by a 910 ohm resistor tied the 5.0V. This stiff termination provides excellent noise margins and fast rise times on the open collector lines.

The 5.0V required by the high-speed motherboard may come from the power supply in a regulated power system or a 7805 regulator in a system using an unregulated +8V power supply. If you need +5 VDC on this board, install a 7805 regulator at U2 and cut the etched jumper around U2.

Figure 16: High Speed Motherboard Termination Circuitry
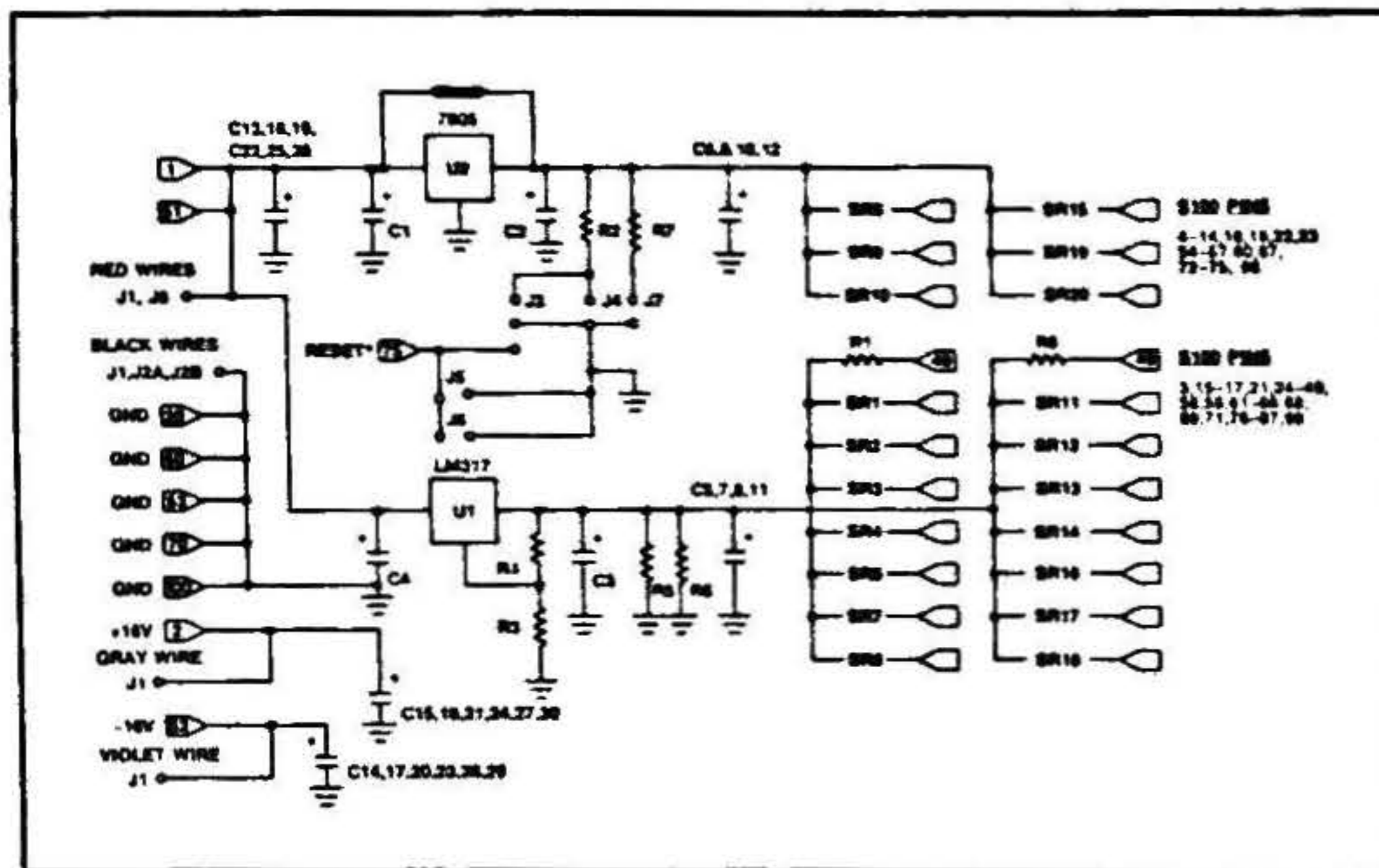
Appendix A

Specifications

Enclosure 2

Size:

Length	50 cm (19.5 in)
Width	43.2 cm (17 in)
Height	17.2 cm (6.8 in)

Rack Mount Front Panel:

Width	48.3 cm (19 in)
Height	17.8 cm (7 in)

Weight:

Desktop	16.6 kg (36.7 lb)
Rack mount	15 (33.2 lb)
Slides	2.5 kg (5.5 lb)

Power Supply:

Type	Constant voltage power supply will remain constant through short AC power dips or surges.
Voltage	8 volts at 25 amps and +16 and -16 volts at 6 amps total.
Fuses	(1) +8V 25A (2) ±16V 3A
Source Voltage:	115 VAC (± 30%) 60 Hz only

Additional Features

Quiet ventilation fan
Lighted RESET button for "POWER" indication
Punchouts for DB-25 and other connectors on rear
AC line filter for noise isolation
Fused DC power for motherboard
Replaceable fan filter

Enclosure 3

Size:

Length	50 cm (19.5 in)
Width	43.2 cm (17 in)
Height	17.2 cm (6.8 in)

Rack Mount Front Panel:

Width	48.3 cm (19 in)
Height	17.8 cm (7 in)

Weight:

Desktop	9.8 kg (21.6 lb)
Rack mount	8.5 kg (18.1 lb)
Slides	2.5 kg (5.5 lb)

Power Supply:

Type	Regulated switching
Voltage	5 VDC at 30 A, +12 VDC at 4 A, and -12 VDC at 0.5 A continuous
Fuse	115 VAC - 5A
	230 VAC - 3A

Source Voltage:	115 VAC or 230 VAC ($\pm$ 10%)
	50-60 Hz operation

Additional Features

Quiet ventilation fan
Lighted RESET button for "POWER" indication
Circuit breaker for safe operation
Punchouts for DB-25 and other connectors on rear
AC line filter for noise isolation
Replaceable fan filter

Drive Enclosure

Desktop size:

Length	51 cm (20 in)
Width	44.5 cm (17.5 in)
Height	14.5 cm (5.5 in)

Rackmount size:

Length	53.3 cm (21 in)
Width	45 cm (17.8 in)
Height	22.2 cm (8.8 in)

Rack Mount Front Panel:

Width	48.3 cm (19 in)
Height	17.2 cm (6.8 in)

Weight

Desktop	10.2 kg (22.4 lb)
Rack mount	15.6 kg (34.4 lb)
Slides	2.5 kg (5.5 lb)
Hard drive	~ 2.7 kg (6 lb) depending on type
8" floppy drive	3 kg (6.5 lb)
5.25" floppy drive	1.3 kg (2.8 lb)
Tape drive	~ .9 kg (2 lb) depending on type

Source Voltage:	115 VAC or 230 VAC ($\pm$ 10%)
	50-60 Hz operation
Fuse	115 VAC - 3A
	230 VAC - 1.5A

#404 Power Supply:

Type	Linear
Voltage	Typically 5 VDC at 3 A, +12 VDC at 4 A, and +24 VDC at 1.6 A, continuous.

#205 Power Supply:

Type	Linear
Voltage	Typically 5 VDC at 2.5 A, +12 VDC at 3.4 A, continuous

Additional Features
Quiet ventilation fan
Punchouts for parallel connectors on rear
AC line filter for noise isolation
Replaceable fan filter

Standard Motherboard

Size:
Length	Standard 6 slot - 15.7 cm (6.2 in)
	Standard 12 slot - 25.6 cm (10 in)
	High Speed 16 slot - 36.3 cm (14.3 in)
	Standard 21 slot - 45.2 cm (17.8 in)
Width	23 cm (9 in)

Weight:
	Standard 6 slot - .4 kg (.8 lb)
	Standard 12 slot - .7 kg (1.4 lb)
	High Speed 16 slot - .9 kg (1.9 lb)
	Standard 21 slot - 1.1 kg (2.4 lb)

Compatibility: Fully IEEE 696/S-100

Appendix B

Technical Data Sources

The following information is included here to help those who seek more detailed information than is included in this document.

RS-232-C and RS-310-C Standards

Electronic Industries Association
Engineering Department
2001 Eye Street N.W.
Washington D.C. 20006

IEEE 696 Standard

The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street
New York, NY 10017

LIMITED WARRANTY

Viasyn Corporation warrants this computer product to be in good working order for a period of 180 days from the date of shipment from the factory, or 90 days from the date of retail sale of the product to the original end user, whichever comes first. Should this product fail to be in good working order at any time during this warranty period, VIASYN will, at its option, repair or replace the item at no additional charge except as set forth below. Repair parts and replacement products will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts and products become the property of VIASYN. This limited warranty does not include service to repair damage to the product resulting from accident, disaster, misuse, abuse or unauthorized modification of the product. To obtain service under this warranty the item must be returned to VIASYN as described below.

If you need assistance, or suspect an equipment failure, always contact your Viasyn Reseller first. If you are not satisfied by the actions taken by your Viasyn Reseller, please call VIASYN at (415) 786-0909 to obtain a Return Material Authorization (RMA) number, or write to VIASYN at 26538 Danti Court, Hayward, CA, 94545-3999, Att: RMA. Be sure to include a copy of the original bill of sale to establish a purchase date. If the product is delivered by mail or common carrier, you agree to insure the product or assume the risk of loss or damage in transit, to prepay shipping charges to VIASYN and to use the original shipping container or equivalent. Be sure to mark the RMA number on the outside of the shipping container or delivery may be refused. Contact your Viasyn Reseller or write to VIASYN at the above address for further information.

All expressed and implied warranties for this product, including the warranties of merchantability and fitness for a particular purpose, are limited in duration to the above listed periods from the date of purchase and no warranties, either expressed or implied will apply after this period.

If this product is not in good working order as warranted above, your sole remedy shall be repair or replacement as provided above. In no event shall VIASYN be liable to you for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of or inability to use such product, even if VIASYN or a Viasyn Reseller has been advised of the possibility of such damages, or for any claim by any other party.

If this product is out of warranty, please call or write the VIASYN RMA department to obtain a quotation for factory service. If this product was sold as a system by VIASYN, it may eligible and you may elect to purchase on site/depot maintenance from UNISYS. Contact your Viasyn Reseller, or VIASYN for details.

If you have purchased a UNISYS service and maintenance agreement, the following two paragraphs also apply:

If VIASYN or its service contractor fails after repeated attempts to perform any of its obligations set forth in this agreement, VIASYN's or its service contractor's entire liability and VIASYN's customer's sole and exclusive remedy for claims related to or arising out of this agreement for any cause and regardless of the form of action, whether in contract or tort, including negligence and strict liability, shall be Viasyn's customer's actual, direct damages such as would be provable in a court of law, but not to exceed the cost of the item of equipment involved.

In no event shall VIASYN or its service contractor be liable for any incidental, indirect, special or consequential damages, including but not limited to loss of use, revenue or profit, even if VIASYN or its service contractor has been advised, knew or should have known of the possibility of such damages; or damages caused by VIASYN's customer's failure to perform its obligations under this agreement; or claims, demands or actions against VIASYN's customer by any other party.

Viasyn Corporation
26538 Danti Court
Hayward, CA 94545-3999
(415) 786-0909
TWX 510-100-3288

EFFECTIVE 10/1/87. This warranty supersedes all previous warranties. All previous editions are obsolete.

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