Development Platform

Technical Manual

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Ampro Computers, Incorporated
4757 Hellyer Avenue ✉ San Jose, CA 95138
Tel (408) 360-0200 ✉ FAX (408) 360-0222
http://www.ampro.com

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- **E-mail address: techsupport@ampro.com**

Revision History

Revision	Reason for Change	Date
A	Initial Release	3/97
B	Add New Versions	1/98
C	Update Pg. 1-2	2/98
D	Backpanel Dimension Change	5/98

PREFACE

This manual is for integrators of systems based on the Development Platform and Ampro CPUs. It contains information about the Little Board Development Platform, its features, specifications, and how to install an expansion backplane and peripheral boards

There are two chapters organized as follows:

Chapter 1—Introduction. General information pertaining to the Development Platform, including features, specifications, and mechanical dimensions.

Chapter 2—Configuration and Installation. Information about front panel controls, connectors, cabling, jumper settings, connector pinouts, and component installation.

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INTRODUCTION

1.1 GENERAL DESCRIPTION

Whatever your application, there will always be a need for an engineering development cycle. To help developers quickly assemble an embedded system, Ampro offers the Development Platform. The Development Platform provides an integrated and easy-to-use self-hosted development environment that lets you maximize the benefit of using off-the-shelf PC-compatible modules as the basis of your embedded system design. The Development Platform provides everything you need to get started, even a licensed copy of DOS so you can boot up and start developing immediately.

The Development Platform is a benchtop chassis. It provides a "known good" environment for your development work. You can install the Ampro CPU, MiniModules, conventional expansion boards, keyboards, monitors, and I/O devices to quickly create a platform for your hardware and software engineering needs. It is laid out to make all components of your system accessible. Development Platforms can be used in repair and support facilities as well, and on the production floor for system test.

The Development Platform comes in 4 different configurations. Each configuration is especially designed to support one of four types of Ampro CPU bus structures. Table 1-1 describes these different Development Platform configurations and the Ampro CPUs they support.

Table 1-1 Development Platform Configurations

Development Platform	CPU Bus Structure
LittleBoard Platform	Little Board CPU with ISA Bus only (Like Little Board/486*i*)
LittleBoard-*Plus* Platform	Little Board CPU with ISA and PCI Bus (Like Little Board/P5*e*)
CoreModule Platform	CoreModule CPU with ISA Bus Only (Like CoreModule/4DX*i)*
CoreModule-*Plus* Platform	CoreModule CPU with ISA and PCI Bus (Like CoreMoldule/P5*i)*

1.2 FEATURES

Easy to transport, compact size

- Only 13" X 10" X 6"
- Protective cover prevents damage to components
- Weighs just 10 pounds

A complete system

- 3.5" 1.44M Floppy disk drive.

- 1 GB (minimum) IDE Hard disk drive, pre-formatted and loaded with MS-DOS 6.22.
- Drive bay for an additional 5.25" peripheral (such as CD-ROM drive or tape drive).
- Mechanical mounting for the Ampro CPU.
- Convenient front panel with all necessary indicators and switches
- Supplies all required mounting hardware, I/O cables, and power cables for a complete system.
- Convenient removable back panel with all PC I/O connectors.
- 140 (min) watt power supply provides all standard PC/AT voltages (+5V, +12V, -5V, and -12V).
- Little Board Platform and CoreModule Platform Configurations:
  — Expansion Backplane with 2-slot PC/AT and PC/104
- Little Board-*Plus* Platform and CoreModule-*Plus* Platform Configurations:
  — Expansion Backplane with 2-slot PC/AT, 2-slot PCI, PC/104, and PC/104*Plus*
  — 3.3V supplied by on-board regulator for PCI Bus Cards

1.3 SPECIFICATIONS

- **Size** 12.5" wide x 9.8" deep x 4.4" high (318 x 249 x 112 mm).
  6.75" (172 mm) high with shipping cover attached.
- **Power** **Input**—90-132/180-264 VAC, switch selectable, 47 - 64 Hz
  Outputs—shown in Table 1–.

Table 1–2 Standard PC Power Supply

Volts	Amps
+5V, ±5%	18A minimum
-5V, ± 10%	0.3A maximum
+12V, ± 5%	4A minimum
-12V, ±5%	0.3A maximum

Environmental

- **Temperature** +10°C to +45°C (+50°F to +113°F)
- **Storage Temperature** -40°C to +60°C (-40°F to +140°F)
- **Relative Humidity:** 10% to 85%, non-condensing

Expansion Busses

- Compatible with PC/104 Version 2, stackthrough bus.
- Compatible with PC/104-*Plus*, stackthrough bus. (On '-*Plus*' Platforms)
- One expansion stack location.
- Two 32-bit PCI expansion slots. (On '-*Plus*' Platforms)

- Two 16-bit ISA expansion slots.

Peripherals

- **IDE hard disk drive** > 1 G Byte.
- **Floppy disk drive** 3.5” 1.44M Byte.
- **PC speaker** 2 inch 8 ohm permanent magnet speaker. LED display option.
- Front-panel reset button.
- Standard PC connectors for all peripheral interfaces.
- Empty 5.25” drive bay for an additional peripheral.

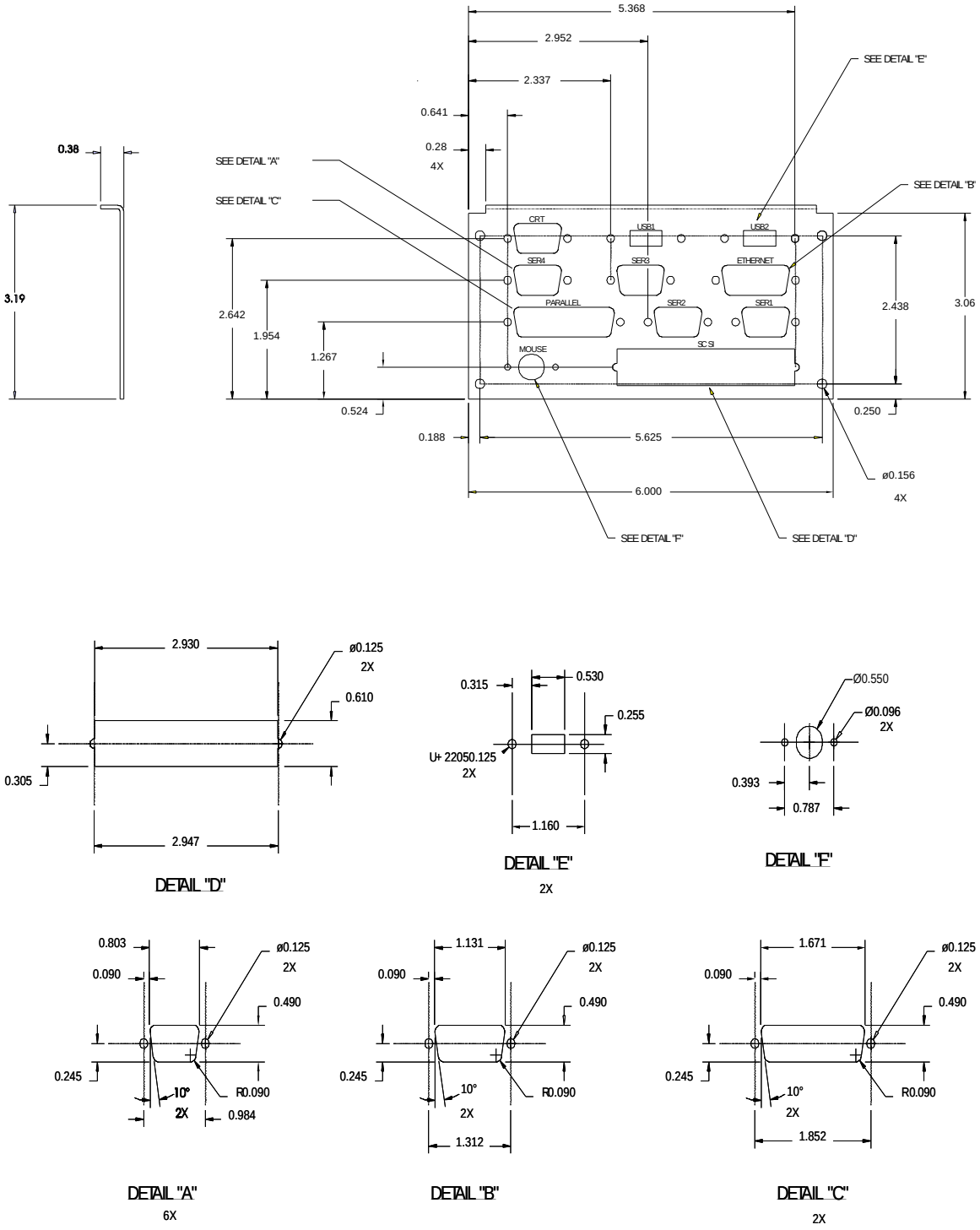

Figure 1–1 Dimensions, Connector Panel

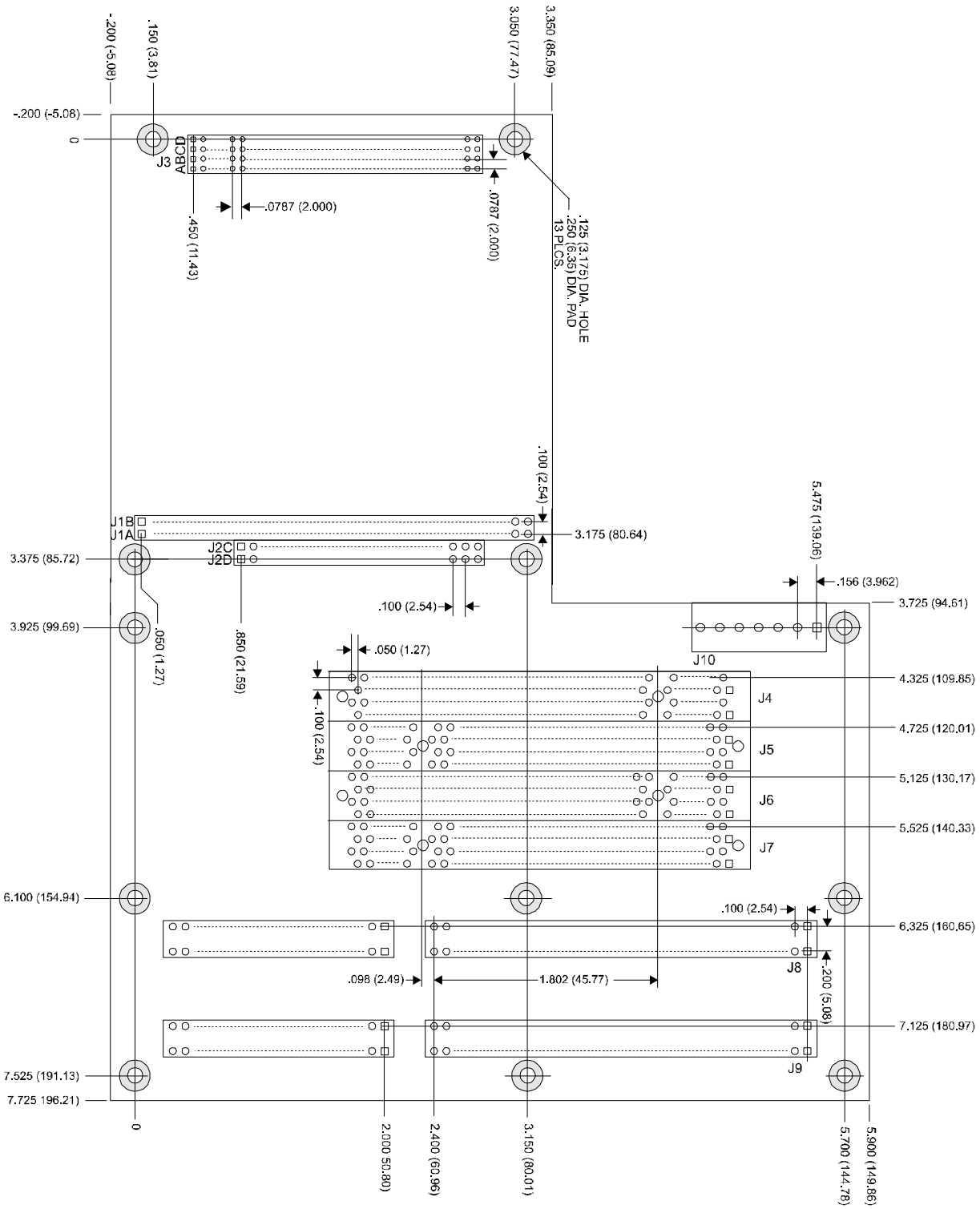

Figure 1–2 Dimensions, Expansion Backplane, '-*Plus*' Platforms

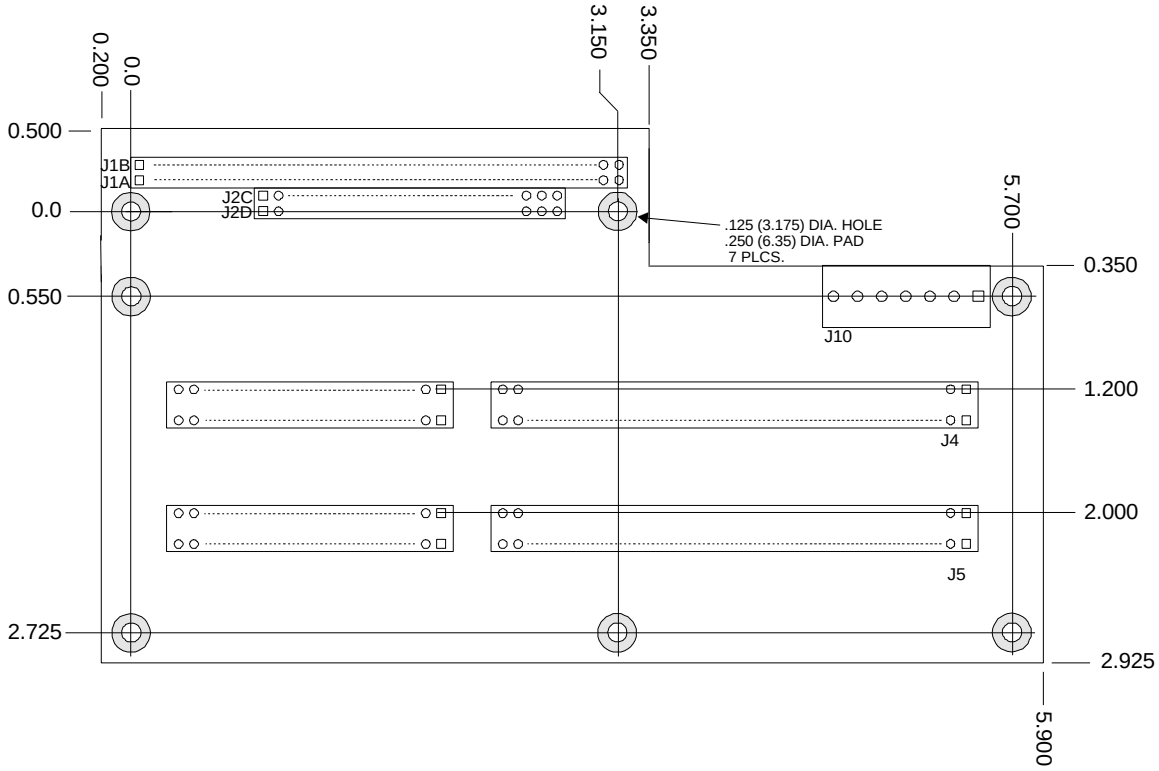

Figure 1–3 Dimensions, ISA Expansion Backplane

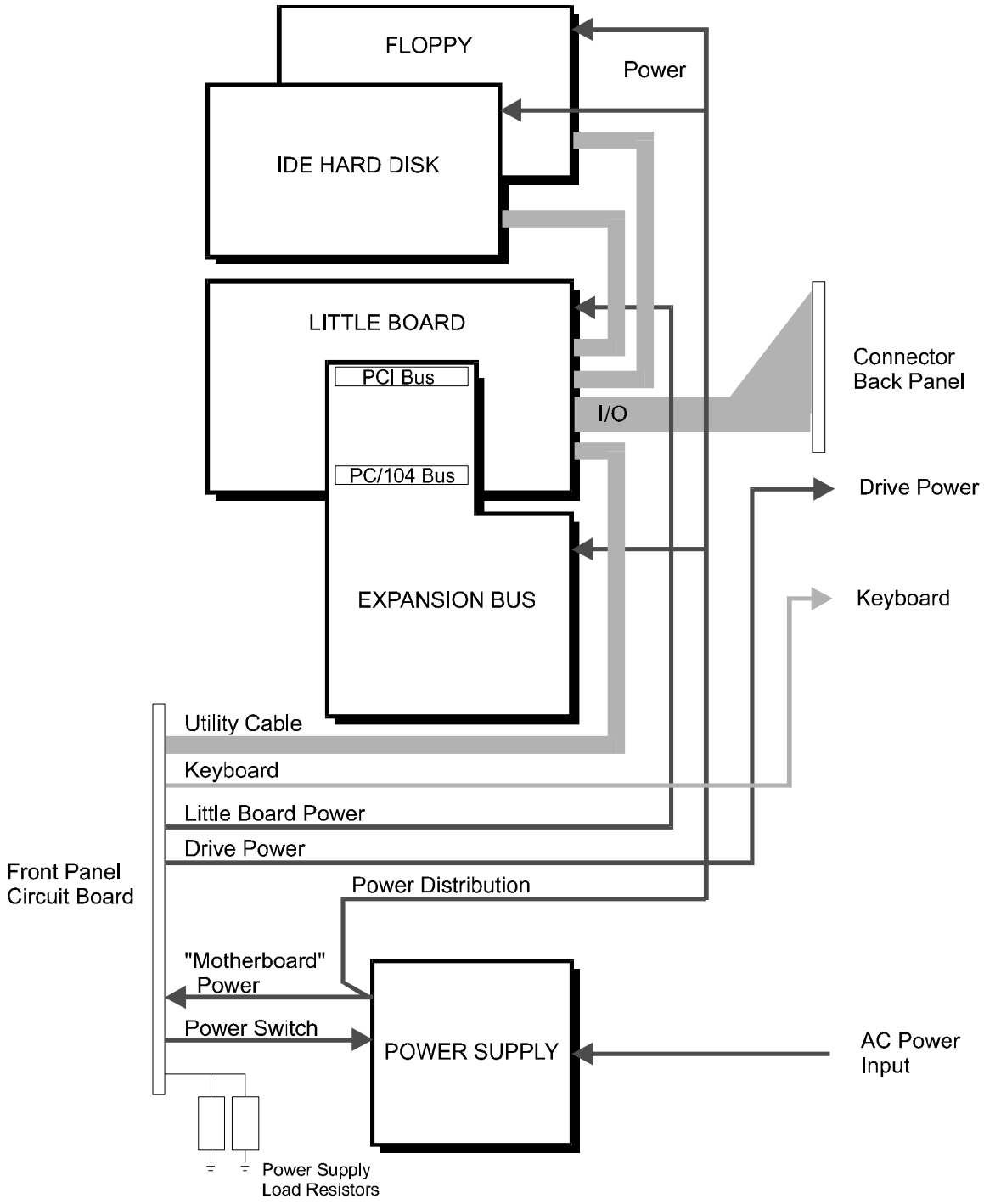

Figure 1–4 System Block Diagram, Little Board-*Plus* Platforms

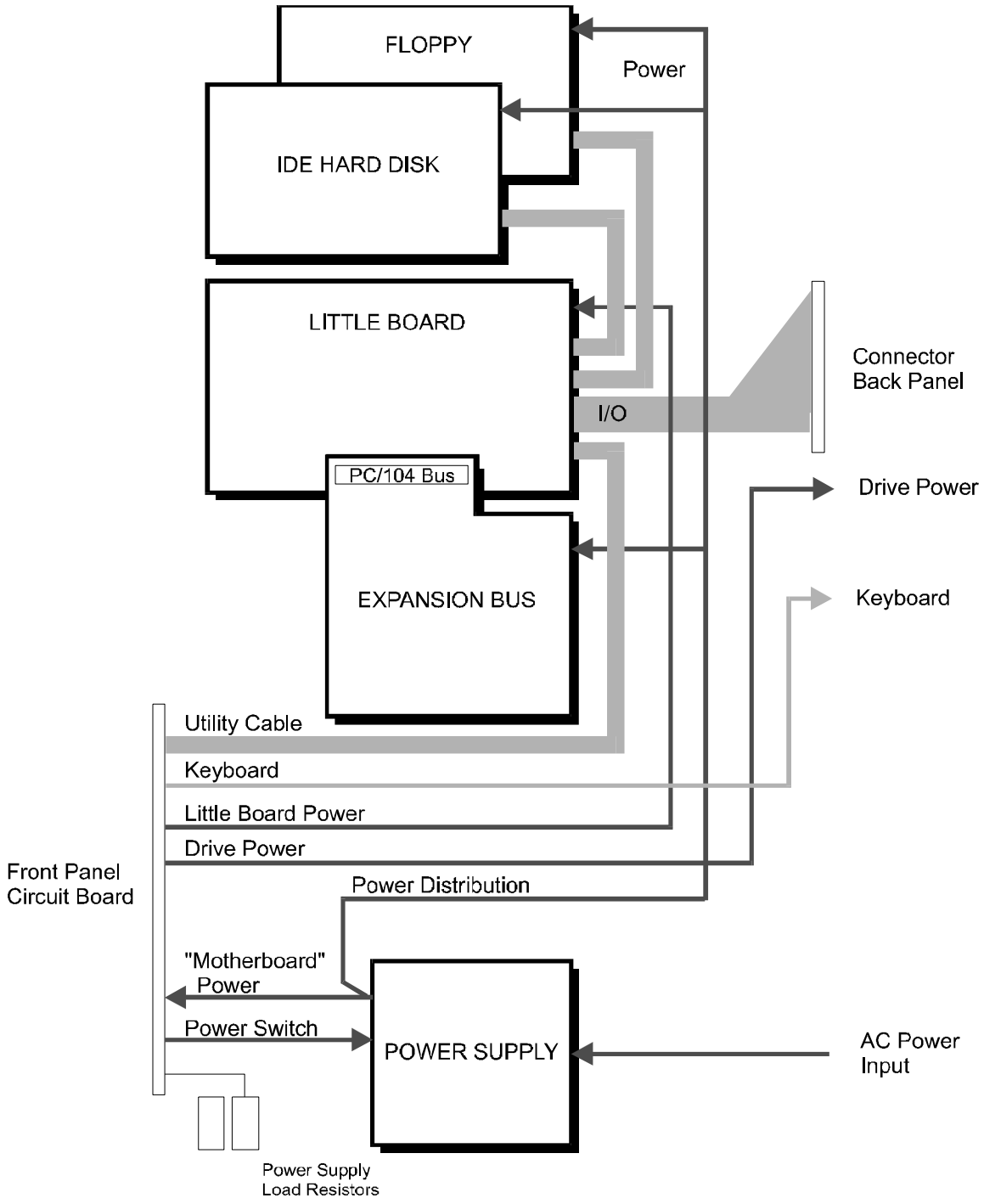

Figure 1–5 System Block Diagram, Little Board Platforms

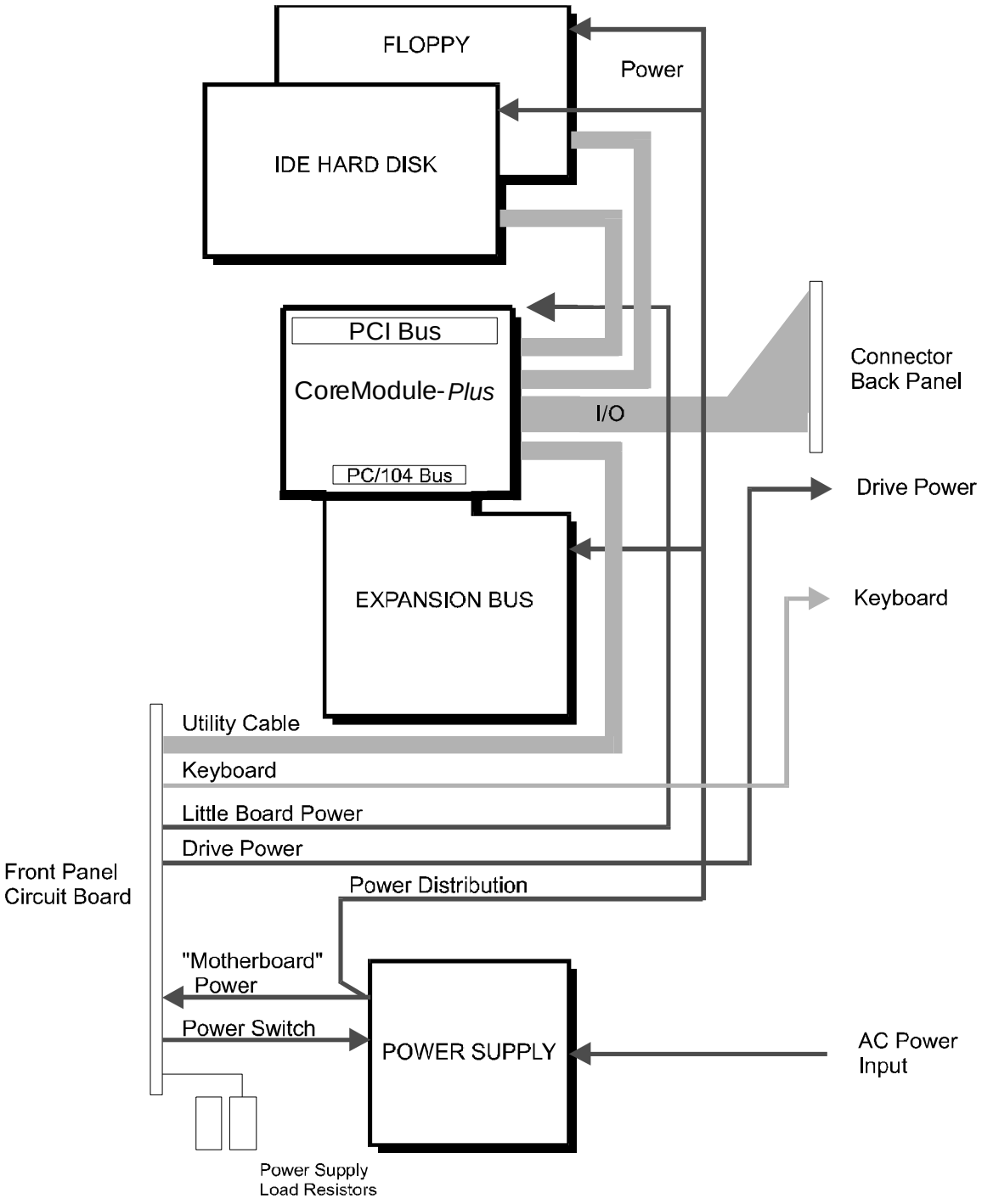

Figure 1–6 System Block Diagram, CoreModule-*Plus* Platforms

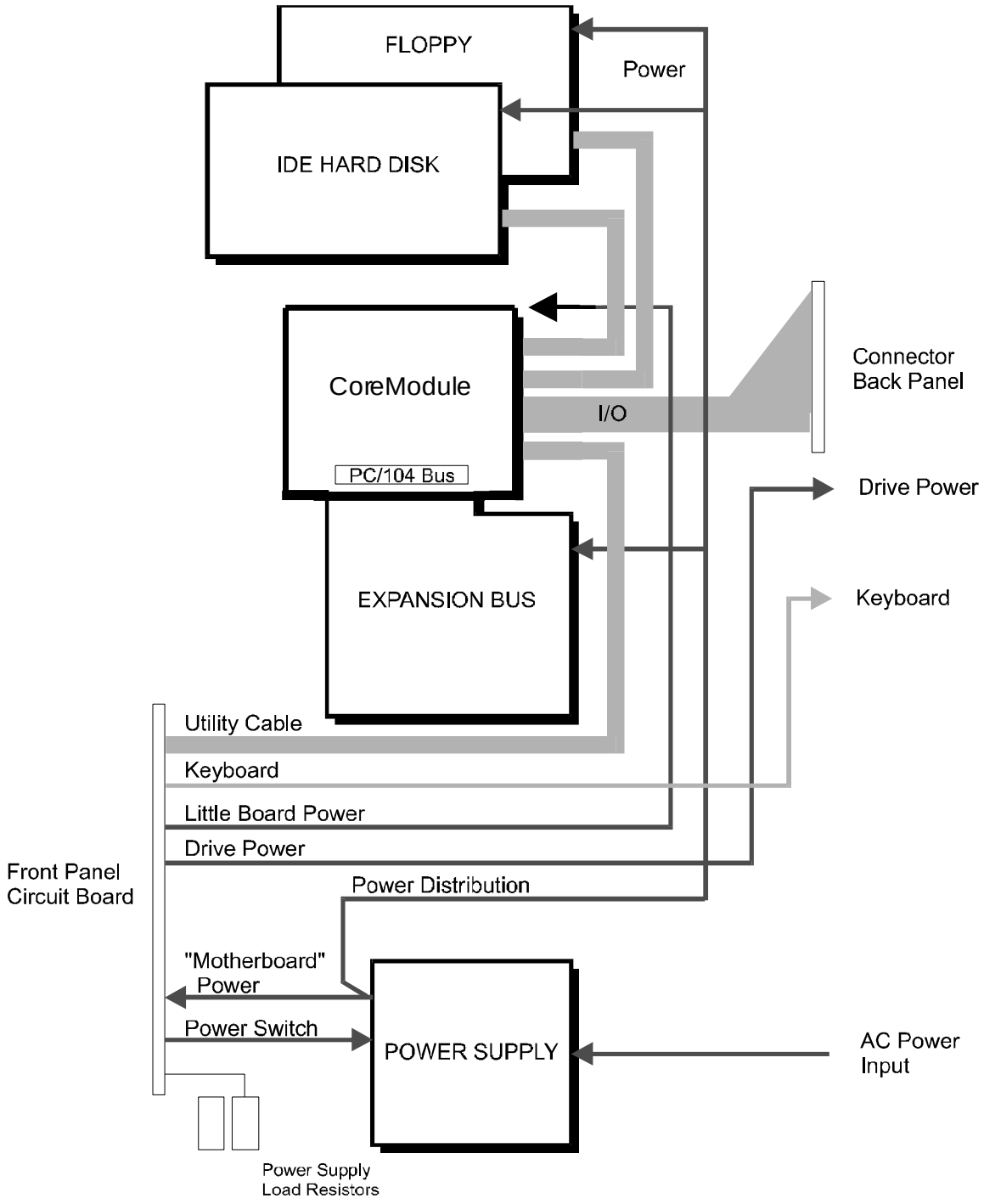

Figure 1–7 System Block Diagram, CoreModule Platforms

CHAPTER 2

CONFIGURATION AND INSTALLATION

2.1 INTRODUCTION

This chapter describes how to use the Development Platform. This includes a discussion of the front panel controls, rear panel connectors, internal front panel circuit board, Expansion Bus board, and other components. It also includes instructions about mounting and connecting the Ampro CPUs to the Development Platform.

2.2 FRONT PANEL CONTROLS

This section describes the front panel controls on the Development Platform. Figure 2–1 shows the front panel controls and the following sections describe each one.

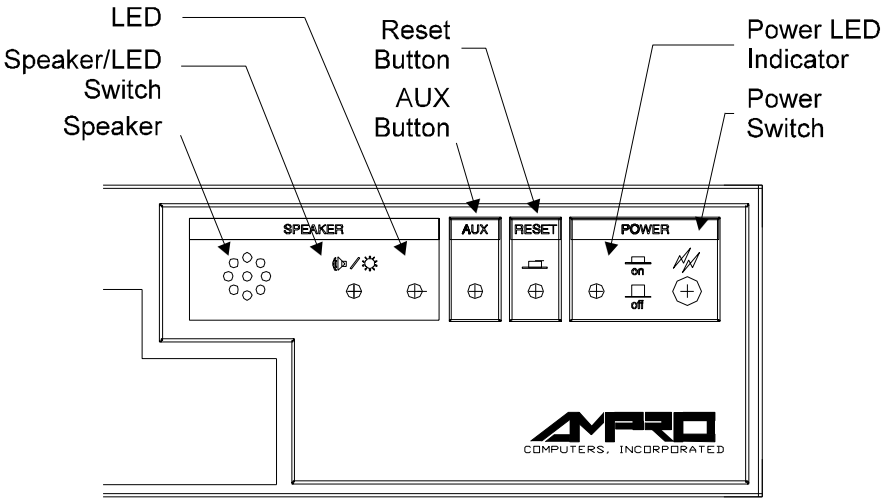

Figure 2–1 Front Panel Controls

2.2.1 Speaker, LED, Speaker/LED Switch

The speaker output of the Ampro CPU can be routed to a small front-panel speaker or to an LED display. The LED is provided as a quiet alternative to the audible speaker signal. Select between the two with the toggle switch.

The speaker signal comes from the Ampro CPU through the Utility cable. When the speaker switch is positioned to the left , the speaker signal is directed to the front-panel speaker. When the speaker switch is positioned to the right, the speaker signal goes to the speaker LED.

2.2.2 Reset Button

The Reset button on the front panel is connected through the Utility cable to the CPU. Pressing the button supplies a ground to the Reset signal, providing a hard reset to the CPU.

2.2.3 Aux Button

The Aux button can be used for any purpose where a simple momentary switch closure is desired. The normally-open switch contacts appear on the Development Platform front panel circuit board at the two-pin connector J17.

2.2.4 Power Switch and Power LED Indicator

AC power is controlled by the indicated push button switch. The LED lamp glows when power is on.

2.3 BACK-PANEL CONNECTORS

This section describes the connectors on the unit's back panel.

System peripherals are brought out by ribbon cables to a set of standard connectors at the unit's back panel. Figure 2–2 shows the layout of the connector panel. The following sections give additional information about each connector. For details about the location and pinouts of each connector, refer to the Ampro CPU Technical Manual.

Each type of Development Platform is customized with the set of cables required for the supported CPUs. Cables for MiniModules you might add are available in the MiniModule QuickStart Kits. All necessary hardware for mounting these cables to the Back-Panel are also included with the QuickStart Kits.

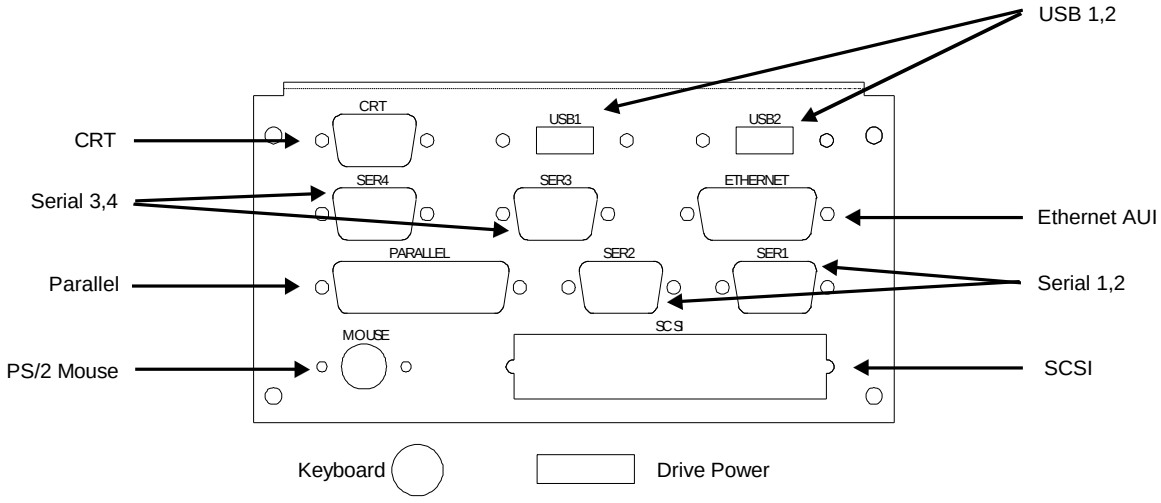

Figure 2–2 Back-Panel Connectors

2.3.1 CRT

The CRT connector is a 15-pin female D-SUB connector with a standard VGA pinout. You can connect a VGA or Super VGA monitor to this connector.

2.3.2 Serial Ports

Serial ports Serial 1, Serial 2, Serial 3, and Serial 4 are male 9-pin D-SUB connectors with standard serial pinouts

2.3.3 Parallel Port

The parallel port connector is a female 25-pin D-SUB with the standard parallel port pinout.

2.3.4 Ethernet AUI

If an Ethernet AUI is to be used, it is connected to the female 15-pin D-SUB connector on the back panel labeled "AUI."

2.3.5 SCSI Connector

The SCSI interface connector is a 50-pin Centronics-type D-SUB connector with the standard pinout for SCSI cables of this type.

2.3.6 Drive Power Connector

A four-pin female connector is provided beneath the I/O connector back panel. You can use this connector to distribute +5V and +12V DC power to an external disk drive or other similar device. The pinout of the connector is the same as that of standard floppy drives and hard disk drives.

2.3.7 Keyboard Connector

The 5-pin DIN keyboard connector on the back panel is connected to the front panel circuit board, connector J16.

2.3.8 USB Connectors

USB ports 1 and 2 are provided for CPUs that support this function.

2.4 OTHER CABLES

Several other cables are used internally to the Development Platform. These are listed here.

2.4.1 Floppy

The floppy cable is a 34-pin ribbon cable. Two female connectors are available on the cable so you can connect two drives.

2.4.2 IDE Drive

The IDE drive cable is a 40-pin ribbon cable. Two female connectors are available on the cable so you can connect two drives. An additional cable for connecting up to four drives is supplied with the Little Board-*Plus* Platform.

2.4.3 Utility Cable

The Utility cable is used to connect the Ampro CPU to the keyboard connector, power LED, speaker, reset push-button, and optional off-board backup battery. Refer to figure 2-3 to determine which connector on the Front Panel circuit board is used for each CPU type.

2.5 FRONT PANEL CIRCUIT BOARD

The Development Platform's front panel circuit board contains the front panel switches and indicator LEDs, and acts as a routing circuit for numerous power and signal cables in the system.

Figure 2–3 shows the location and function of the connectors, switches, and indicator LEDs on the front panel circuit board.

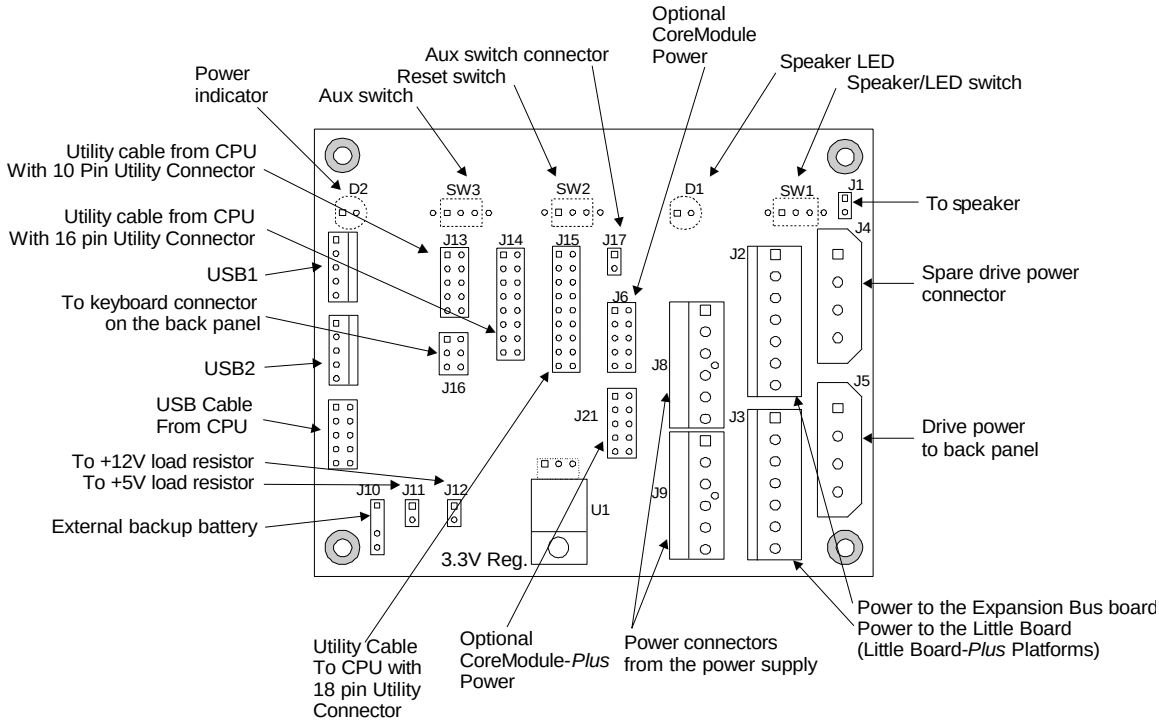

Figure 2–3 Connector and Switch Locations, Front Panel Circuit Board

2.5.1 Pinouts for the Power Connectors

Table 2–1 shows the pinout for the 7-pin power connectors J2 and J3.

Table 2–1 7-Pin Power Connectors (J2, J3)

Pin	Signal Name	Function
1, 7	+5VDC	+5VDC ±5%
2, 3, 6	Ground	Ground return
4	+12VDC	+12VDC ±5%
5	+3.3VDC	+3.3V ±5% (Only required 3.3V PCI expansion boards are used)

Table 2–2 shows the pinout for the 4-pin power connectors J4 and J5.

Table 2–2 4-Pin Power Connectors (J4, J5)

Pin	Signal Name	Function
1	+12VDC	+12VDC ±5%
2	Ground	Ground return
3	Ground	Ground return
4	+5VDC	+5VDC ±5%

Tables 2-3 and 2-4 show the pinouts of optional CoreModule Power Connectors. The CoreModule Stack can normally be supplied power from the backplane. However, these connectors are available to connect power directly to the CoreModule CPU if required. Both style CoreModule power connectors (CoreModule and CoreModule-*Plus*) are represented here.

Table 2-3 Optional CoreModule Power Connector (J6)

Pin	Signal Name	Function
1	GND	Ground Return
2	+5VDC	+5VDC ±5% Input
3	Key	No Connect
4	+12VDC	+12VDC ±5% Input
5	-5VDC	-5VDC ±5% Input
6	-12VCD	-12VDC ±5% Input
7	GND	Ground Return
8	GND	Ground Return
9	GND	Ground Return
10	GND	Ground Return

Table 2-4 Optional CoreModule-*Plus* Power Connector (J21)

Pin	Signal Name	Function
1	GND	Ground Return
2	+5VDC	+5VDC ±5% Input
3	GND	Ground Return
4	+12VDC	+12VDC ±5% Input
5	GND	Ground Return
6	+3.3VDC	+3.3VDC ±5% Input
7	KEY	No Connect
8	GND	Ground Return
9	GND	Ground Return
10	GND	Ground Return

J8 and J9 are connectors for the power cables from the power supply. The pinouts for these connectors match the standard for PC motherboard power connectors. Note that they are *not* identical.

Table 2–5 shows the pinout for J8, and Table 2–6 shows the pinout for J9.

Table 2–5 6-Pin Power Connector (J8)

Pin	Signal Name	Function
1	PG	Power Good signal
2	+5VDC	+5VDC ±5% input
3	+12VDC	+12VDC ±5% input
4	-12VDC	-12VDC, ±5% input
5	Ground	Ground return
6	Ground	Ground return

Table 2–6 6-Pin Power Connector (J9)

Pin	Signal Name	Function
1	Ground	Ground return
2	Ground	Ground return
3	-5VDC	-5VDC ±10% input
4	+5VDC	+5VDC ±5% input
5	+5VDC	+5VDC ±5% input
6	+5VDC	+5VDC ±5% input

2.6 INSTALLING LITTLE BOARD AND LITTLE BOARD-*PLUS* PLATFORMS

The following is a step-by-step procedure for installing a Little Board on the Development Platform.

1. Remove the chassis top by removing the six 6-32 screws.
2. Position the following cables to fit through the opening at the rear of the unit.
   - 7-Pin power cable used to power the Expansion Bus board. An additional (identical) cable is supplied to power a Little Board in a '*-Plus*' Platform.
   - I/O cables from the I/O back panel
   - Floppy and hard disk drive cables
   - Drive power cables (as required). These cables emanate from the power supply and are terminated with standard 4-pin drive connectors. Bring out the ones you will be using to power external devices.
3. Replace the chassis cover.
4. If you plan to use the CRT connector on the back panel, lay its ribbon cable under where the Little Board will mount before installing the board.
5. Mount the Little Board to the top of the Platform cover using 4-40 machine screws. Mount the board with its power connector oriented towards the rear of the Platform. Use the four mounting holes in the corners of the board.
6. Mount the Expansion Bus board on the Little Board and Platform cover. Use 4-40 machine screws in the holes provided. The Expansion Bus board is connected to the Little Board by inserting the pins of the expansion bus connectors in corresponding connectors on the Little Board. (The Expansion Bus board is described in the following section.)

Note

Be careful when plugging the Expansion Bus board into the PCI and PC/104 connectors on the Little Board. Watch for bent pins.

7. Connect the 7-pin power cable to the Expansion Bus board. For '*-Plus*' Platforms, connect the second 7-pin power cable to the Little Board.
8. Connect the I/O ribbon cables to the Little Board. Refer to the Little Board CPU Technical Manual for help in determining where to plug the cables.
9. Attach any expansion boards or external peripheral devices required for your system.

2.7 INSTALLING COREMODULE AND COREMODULE-*PLUS* PLATFORMS

The following is a step-by-step procedure for installing a CPU on the Development Platform.

1. Remove the chassis top by removing the six 6-32 screws.
2. Position the following cables to fit through the opening at the rear of the unit.
   - 7-Pin power cable. One cable is used power the Expansion Bus board.
   - I/O cables from the I/O back panel
   - Floppy and hard disk drive cables

- Drive power cables (as required). These cables emanate from the power supply and are terminated with standard 4-pin drive connectors. Bring out the ones you will be using to power external devices.

3. Replace the chassis cover.
4. Mount the CoreModule CPU to the Expansion Bus Board. Line the CPU Bus connectors up with the Expansion Bus connectors. Use the .6" standoffs provided in the Platform kit. This allows additional modules to be installed in the stack on top of the CPU.

Note

Be careful when plugging the CPU into the Expansion Bus board PC/104 connectors. Watch for bent pins.

5. Connect the I/O ribbon cables to the CPU. Refer to the CPU Technical Manual for help in determining where to plug the cables.
6. Attach any expansion boards or external peripheral devices required for your system.

2.8 EXPANSION BUS BOARD FOR '-*PLUS*' PLATFORMS

ISA and PCI bus expansion slots are provided by the Expansion Bus board. This board attaches to the PC/104 and PCI expansion bus connectors on the CPU. The Expansion Bus board provides two ISA bus slots and two PCI bus slots. It also provides a means for attaching Ampro MiniModules or other PC/104 expansion boards.

Figure 2–4 is a diagram of the Expansion Bus board showing the locations of various features.

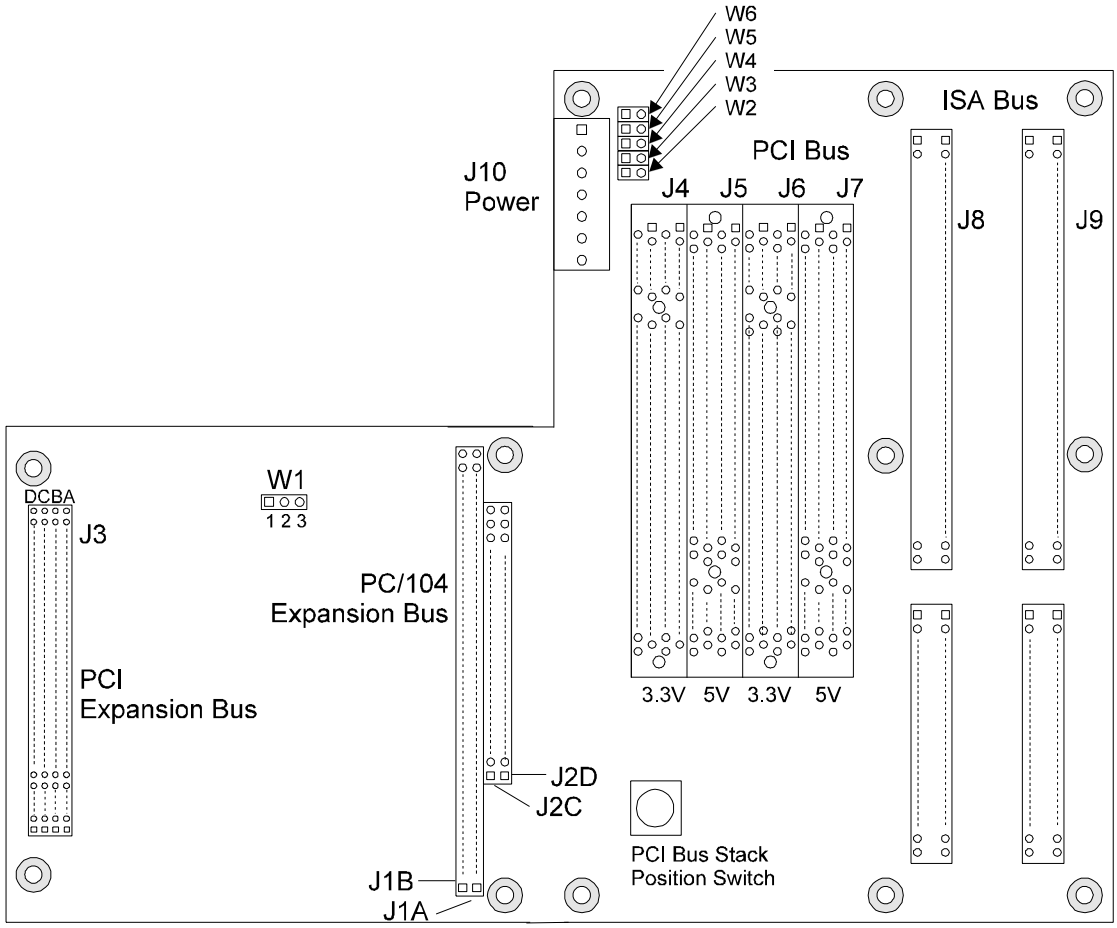

Figure 2–4 Expansion Bus Board

Normally, power to the Expansion Bus board is connected at J10 using cable from the Development Platform front panel circuit board connector J2. Power from J10 is connected to the Expansion Bus board's circuitry by means of jumpers W2 through W6. These jumpers are provided to allow power to be supplied when J10 is not connected.

Table 2–7 shows the function of each power jumper.

Table 2–7 Expansion Bus Power Jumpers (W2 - W6)

Jumper	Voltage
W2, W3	+3.3V DC
W4, W5	+5V DC
W6	+12V DC

Note: W2/W3 and W4/W5 are used in pairs to increase current carrying capacity.

2.8.1 Setting the Stack Position Switch

A 4-position rotary switch is provided to set the PCI bus stack position. Each PCI bus position has several signals unique to its position. The rotary switch defines where in the stack of PCI devices the Expansion Bus board resides, thus determining which of the unique signals is used at each stack position.

The default setting is 0 (zero). This is the proper setting for the Expansion Bus board as it is situated on the Development Platform. If you use the Expansion Bus board in a different position in the PCI bus stack, set the switch to the board's stack position.

2.8.2 Using 3.3V PCI Cards

The two PCI slots J5 and J7 are set for 5V PCI cards. This is the standard for PCI expansion boards. Some PCI expansion boards are designed to work in a 3.3V system. If you plan to use 3.3V PCI expansion cards:

1. Solder edge-card connectors into J4 and J6. These connector positions support the 3.3V PCI voltage levels. 3.3V power for these sockets is supplied from a voltage regulator on the front panel circuit board.
2. Set jumper W1 to W1-2/3.

Note that when you are using the PCI bus for 3.3V expansion cards, you cannot use J5 and J7 for 5V expansion cards, as the majority of signals on the PCI bus are common to all four connectors.

2.9 EXPANSION BUS BOARD FOR NON-*PLUS* PLATFORMS

ISA bus expansion slots are provided by the Expansion Bus board. This board attaches to the PC/104 expansion bus connectors on the CPU. The Expansion Bus board provides two ISA bus slots. It also provides a means for attaching Ampro MiniModules or other PC/104 expansion boards.

Figure 2–4 is a diagram of the Expansion Bus board showing the locations of various features.

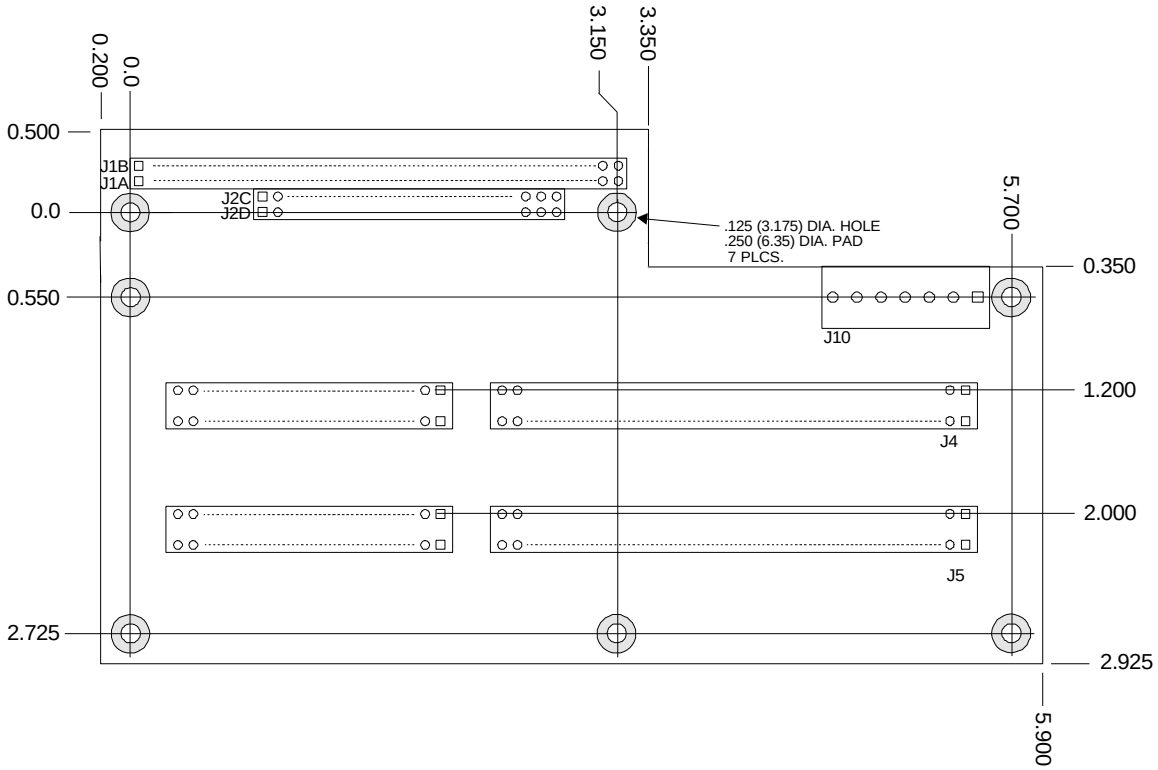

Figure 2–5 ISA Expansion Bus Board

Normally, power to the Expansion Bus board is connected at J10 using cable from the Development Platform front panel circuit board connector J4. Power from J10 is connected to the Expansion Bus board's circuitry by means of jumpers W2 through W6. These jumpers are provided to allow power to be supplied when J10 is not connected.

Table 2–8 shows the function of each power jumper.

Table 2–8 Expansion Bus Power Jumpers (W2 - W6)

Jumper	Voltage
W2, W3	+3.3V DC
W4, W5	+5V DC
W6	+12V DC

Note: W2/W3 and W4/W5 are used in pairs to increase current carrying capacity.

2.9.1 Bus Termination

The Expansion Bus board includes sockets (RC1 through RC10) for the addition of bus termination on the AT backplane sockets (ISA bus) that may be required to improve system reliability. Bus termination is used to lower the backplane signal impedance to match the impedance of the rest of the system.

The IEEE-P996 draft specification for the AT expansion bus recommends the use of "AC" termination rather than resistive termination. The PC/104 bus specification allows only AC termination. The bus expansion board provides ten sockets to accommodate single-in-line bus terminators. The termination is not normally installed in the sockets when shipped from the factory.

Warning

Do not use resistive bus termination, or system reliability may be degraded!

The AC terminators used on the AT backplane consist of eight signal terminators in a 9-pin single-in-line package (SIP). Pin 1 of the 9-pin SIP AC terminator package is connected to a common ground, and the remaining eight pins are for the bus signals. Typical manufacturer part numbers for 9-pin, eight-terminator devices containing 100 pF capacitors in series with 100 ohm resistors are shown in Table 2–9.

Table 2–9 AC Terminators

Manufacturer	Part Number
SPRAGUE	206CJ101X2TG
BOURNS	4609H701101/101
RCD	FA1316 9P R/C SIP 100R100PF
DALE	CSRC-09C30-101J-101M

Note

The actual requirements for signal termination depend on the system configuration, on the CPU and bus clock speeds, and on the number and type of expansion cards used. In all cases, it is the system engineer's responsibility to determine the need for termination by observing the signal quality in the system.

2.10 MINIMODULE INSTALLATION

In some cases, you may want to add one or more MiniModule expansion boards to your system. You may mount the MiniModules in the normal manner. Use .6 inch spacers and 4-40 machine screws to secure each MiniModule to its underlying board.

Caution

Carefully inspect the interface to be sure the boards are properly aligned relative to each other before applying power, otherwise damage to the boards may occur.

2.11 POWER SUPPLY

The Development Platform power supply provides power for the CPU, Expansion Bus board, floppy disk drive, hard disk drive, any installed MiniModules, keyboard, and expansion cards plugged into the Expansion Bus board's sockets.

The system's power supply provides all of the standard PC voltages, +5V, -5V, +12V, and -12V. Refer to the Specifications section in Chapter 1 for power supply ratings.

2.11.1 Power Supply Load Resistors

The power supply in the Development Platform requires a load to ensure proper voltage regulation. To ensure that the power supply is always properly loaded, two load resistors are provided. These resistors are mounted on the floor of the Development Platform and connect to the power supply by means of connectors on the front panel circuit board.

- The load resistor for the +5V supply is a 2.5 Ohm resistor connected to J11 on the front panel circuit board. It draws 2 Amps.
- The load resistor for the +12V supply is a 24 Ohm resistor connected to J12. (Some brands of power supplies used in the Development Platform do not require the +12V load. In such cases, it will not be connected.)

Note

Up to 16 Watts will be dissipated by the load resistors. Be careful, they might be hot to the touch.

If your system draws more than 10 Watts, it will not require the load resistors. You may disconnect them to reduce system power consumption if you wish. Note, however, that power management features can reduce power consumption substantially. Make sure that the lowest system power requirement is above 10 Watts before removing the load resistor(s).

2.11.2 External Backup Battery

An external backup battery for the Little Board is provided with the unit. It is connected to connector J10 on the front panel circuit board. Consult the CPU Technical Manual for details about the backup battery and its use.

2.12 SHIPPING COVER

A metal "shipping cover" is provided with the Development Platform. This cover is designed to help protect boards when traveling.

The cover provides enough space for one MiniModule positioned on the Expansion Bus connector stack.

Warning

Do not operate the system with the shipping cover installed. Excessive heat may be generated with the cover installed.

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