



Model 441A101
MODULAR AC LINE POWER SUPPLY
Installation and Operating Manual

**For assistance with the operation of this product,
contact PCB Piezotronics, Inc.**

Toll-free: 800-828-8840
24-hour SensorLine: 716-684-0001
Fax: 716-684-0987
E-mail: info@pcb.com
Web: www.pcb.com



Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its “Lifetime Warranty Plus” on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty.**

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

PCB Piezotronics, Inc.
3425 Walden Ave.
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General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:



DANGER

Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

**CAUTION**

Refers to hazards that could damage the instrument.

**NOTE**

Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

The following symbols may be found on the equipment described in this manual:



This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.



This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.



This symbol indicates safety, earth ground.



PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

| 部件名称 | 有害物质 | | | | | |
|--|--------|--------|--------|--------------|------------|--------------|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr(VI)) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 住房 | 0 | 0 | 0 | 0 | 0 | 0 |
| PCB板 | X | 0 | 0 | 0 | 0 | 0 |
| 电气连接器 | 0 | 0 | 0 | 0 | 0 | 0 |
| 压电晶体 | X | 0 | 0 | 0 | 0 | 0 |
| 环氧 | 0 | 0 | 0 | 0 | 0 | 0 |
| 铁氟龙 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电子 | 0 | 0 | 0 | 0 | 0 | 0 |
| 厚膜基板 | 0 | 0 | X | 0 | 0 | 0 |
| 电线 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电缆 | X | 0 | 0 | 0 | 0 | 0 |
| 塑料 | 0 | 0 | 0 | 0 | 0 | 0 |
| 焊接 | X | 0 | 0 | 0 | 0 | 0 |
| 铜合金/黄铜 | X | 0 | 0 | 0 | 0 | 0 |
| 本表格依据 SJ/T 11364 的规定编制。 | | | | | | |
| 0：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。 | | | | | | |
| X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。 | | | | | | |
| 铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。 | | | | | | |

CHINA RoHS COMPLIANCE

| Component Name | Hazardous Substances | | | | | |
|------------------------|----------------------|--------------|--------------|--------------------------------|--------------------------------|---------------------------------------|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Chromium VI Compounds (Cr(VI)) | Polybrominated Biphenyls (PBB) | Polybrominated Diphenyl Ethers (PBDE) |
| Housing | O | O | O | O | O | O |
| PCB Board | X | O | O | O | O | O |
| Electrical Connectors | O | O | O | O | O | O |
| Piezoelectric Crystals | X | O | O | O | O | O |
| Epoxy | O | O | O | O | O | O |
| Teflon | O | O | O | O | O | O |
| Electronics | O | O | O | O | O | O |
| Thick Film Substrate | O | O | X | O | O | O |
| Wires | O | O | O | O | O | O |
| Cables | X | O | O | O | O | O |
| Plastic | O | O | O | O | O | O |
| Solder | X | O | O | O | O | O |
| Copper Alloy/Brass | X | O | O | O | O | O |

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.

Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.



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Chassis: Models 441A33, 441A35, 441A42, 441A43, 441A45 and 441A49

The PCB Series 440 Modular Chassis is the enclosure into which the modules of the PCB Modular Signal Conditioning System are inserted. Its configuration varies by model, ranging from two slots to nine; one slot is reserved for the power supply, while Eurocard-style plug-in modules occupy the remaining slots and are secured to the inside frame using mechanical fasteners. A circuit board assembly in the rear of the chassis distributes power to the modules and provides the means by which modules communicate with each other, the rest of the system, and a personal computer.

Models 441A33, 441A35 and 441A38 are the computer-controlled, master versions of the standard chassis. The back panel of these master chassis have two RS-485 connectors marked IN and OUT and one RS-232 connector. Models 441A45 and 441A49 are slave chassis designed to be controlled by the masters. Slave chassis also have two RS-485 connectors, but no RS-232 connector. In a multiple chassis system, the master controller communicates to the other modules via the common RS-485 network and to the computer via the RS-232 connection.

Equipment Ratings

This equipment operates at 104°F (40°C), in an environment having 93% relative humidity. Its frequency range is 50/60 Hz. Operation of this unit is limited to environments having an altitude of less than 2 000 meters. The pollution degree for operation of the Model 440 is two (2), meaning that normally, only non-conductive pollution occurs. The over voltage category is II, indicating the transient voltage levels that may be tolerated by the equipment.

Multiple Chassis Configuration



High voltage electrostatic discharge (ESD) can damage electrical devices. To avoid triboelectric transfer:

1. Connect the cables only with the AC power off.
2. Temporarily “short” the end of the cable before attaching it to any signal input or output.

Each master controller can control up to four chassis filled with modules. Each chassis (or rack) must, however, be uniquely defined. This is accomplished by setting rack addresses. There are two jumpers on the upper right

portion of the backplane labeled RAD1 and RAD0, as shown on Figure 1 in Appendix A. The settings are as follows:

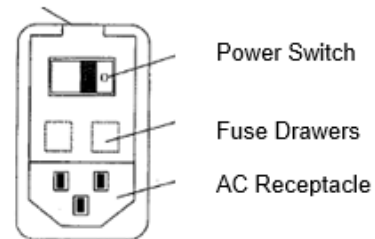
| | RAD1 | RAD0 |
|--------|------|------|
| Rack 1 | Low | Low |
| Rack 2 | Low | High |
| Rack 3 | High | Low |
| Rack 4 | High | High |

Refer to Figure 2 in Appendix A for a four-rack configuration. Notice on the drawing that the RS-485 IN connection on Rack 1 requires termination, as does the 485 OUT connection on Rack 4. The 485 IN is terminated with the TER1, TER2 and TER3 terminators on the backplane. The termination settings are also shown.

Changing the Fuse

Two rear panel fuses, located below switch in the AC receptacle, protect the power line inputs of the instrument. The fuse type is a T 1.6A, L 250 V. To change the fuse, disconnect the power cord. Find the slot just above the power switch and pull forward to open the door that exposes the fuse drawers. Pull the individual drawer forward and insert a new fuse.

Slot – Carefully pry to expose fuse drawers.



Disabling Cooling Fan

If it is necessary to turn off the cooling fan in order to reduce acoustical noise, a jumper “J2,” located on the motherboard, must be removed. In order to access this jumper, the rear panel must be taken off. The fan may then be disabled via a command from the host computer controlling the master. The fan should be disabled for as short a period as possible to ensure continuous cooling. Contact the factory for more details.

Available Modules

For more information on individual modules, please see the individual manual accompanying each of the following:



- Model 442A102: Single-channel, line powered ICP® sensor signal conditioner, unity gain.
- Model 442A103: Single-channel, line powered ICP® sensor signal conditioner, with gain of x1, x10, x100.
- Model 442B104: Four-channel, line powered ICP® sensor signal conditioner, with gain of x1, x10, x100. Optional 477A-type plugin filters available.
- Model 442A101: Single-channel, line powered ICP® sensor signal conditioner, with gain of x1, x10, x100, AC/DC coupled.
- Model 443B101: Dual-mode ICP/charge amplifier – vibration (2-slot).
- Model 443B102 Dual-mode ICP/charge amplifier – pressure or force (2-slot).

AC Power Supply: Model 441A101

The Model 441A01 is a single-slot, CE marked, AC-line power supply designed to fit only the extreme right slot of the PCB Series 440 Modular Chassis. It supplies a maximum of 45 watts of power and may be used to operate single or multiple signal conditioning modules housed in the two-, three-, or nine-wide standard chassis and optional auxiliary chassis. Please note that while this unit is rated for a maximum wattage of 45, CE requirements mandate that it be used only up to 30 watts.

For wattage calculations, refer to the specification sheet for the individual module. To determine power capability of your particular set-up, add all the powers for all modules. CE mandates that these totals must be ≤ 30 watts.

DC Power Supply: Model 441A102

Model 441A102 is a single width, CE marked, rechargeable DC battery power supply that can be used in place of the 441A101 AC Power. Standard accessories include:

- Model 017A22 power cord
- Model 488A08 battery charger
- Built-in 3.0 Ah NiMH rechargeable battery

The optional Model 488A09 is a 12VDC @3.4A AC Power Adaptor that allows the 441A102 to be used with any AC line power in the world. (100-240VAC 50/60Hz).

The 441A102 can be used to power up to 30 watts of PCB modular series units. For wattage calculations, refer to the specification sheet for the individual module. To determine power capability of your particular set-up, add all the powers

for all modules. CE mandates that these totals must be ≤ 30 watts.

Operation

To operate, slide into the power supply slot of the PCB Series 440 Modular Chassis, tighten up the two mounting screws and turn the power switch to ON.



The 441A102 has some components that will get hot under heavy loads.

Do not remove the module from the enclosures immediately after continuous heavy use. Let completely cool first.

Charging the Battery



It is not recommended to charge the 441A102 while the power switch is ON. No damage will occur, but charge time will increase.

To calculate the estimated battery life, divide 30 by the total number of watts of all the modules being used. Refer to module specification sheets for the number of watts to use in your calculation. To charge the battery:

1. Turn power off on the front panel of the 441A102.
2. Plug the Model 488A08 into the charger input jack.
3. The yellow charge light on the charger will light solid during fast charge as indicated on the charger. Typical charge time for a totally depleted battery is 1.5 to 2 hours.
4. After the battery is charged about 90%, the charge light will begin to blink (1/8 sec blink). If possible, leave charger on with charge light blinking for another few hours to get maximum charge.



Remove the charger plug by pulling on the body of the connector, not the cord. This is a locking feature to ensure a good connection while charging.



Appendix A: Figures

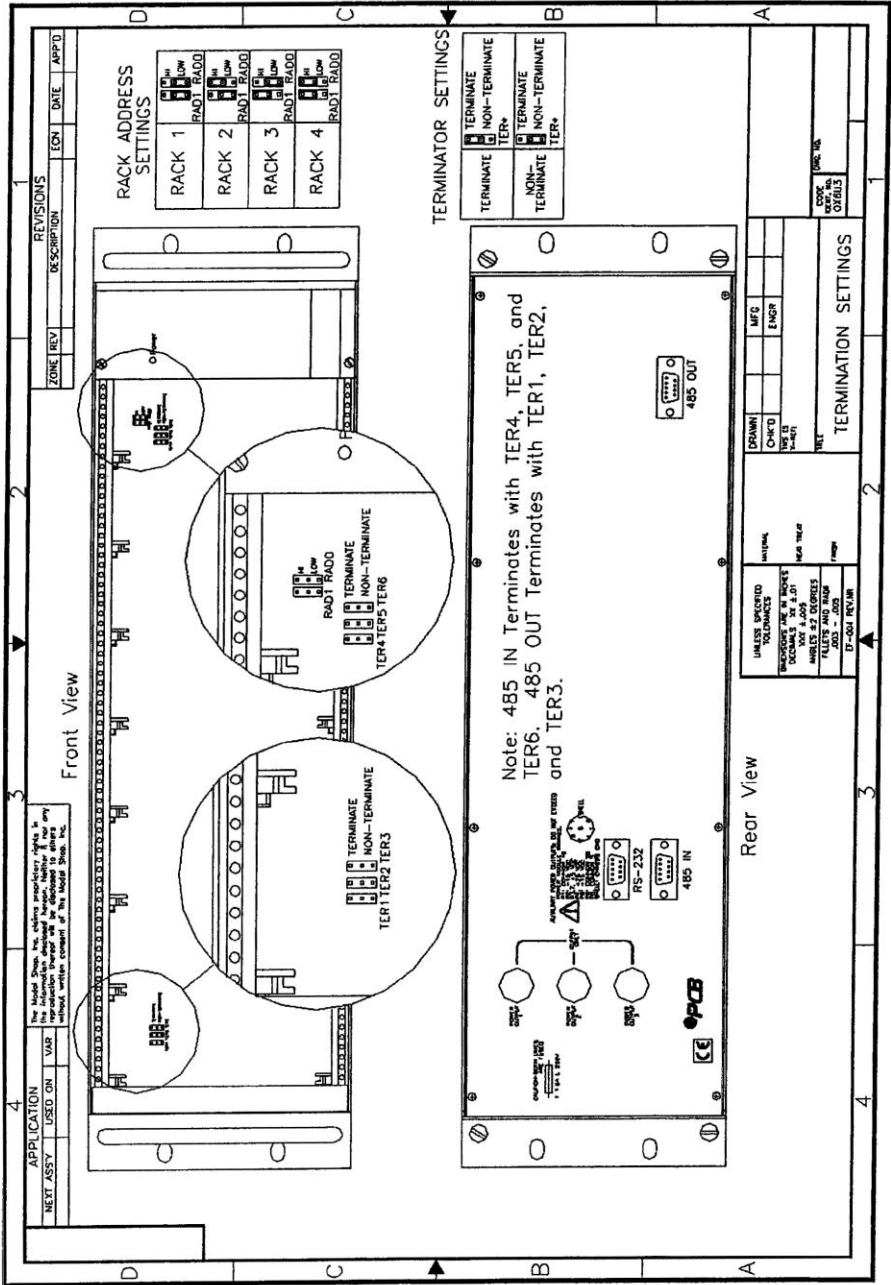


Figure 1: TERMINATION SETTINGS

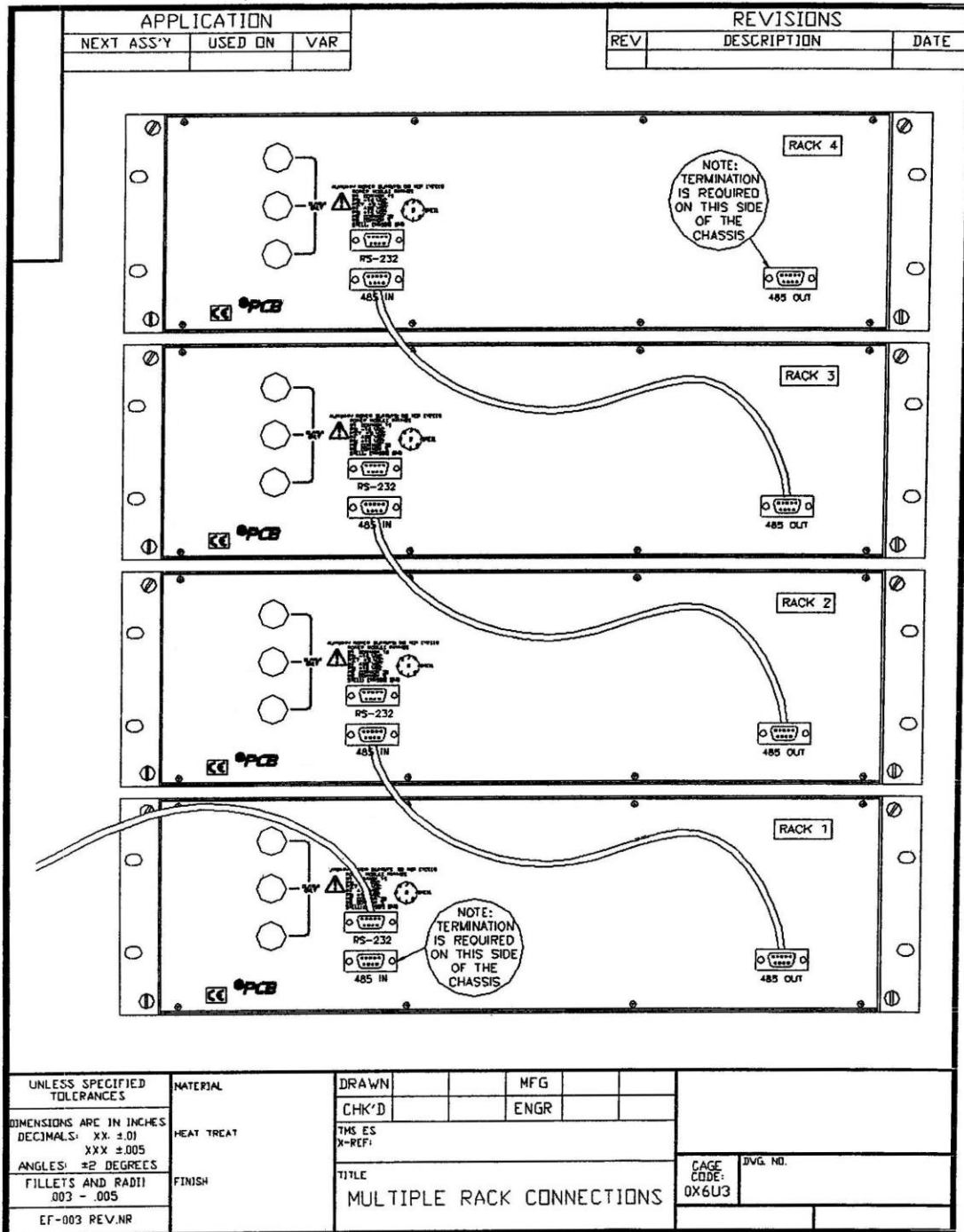


Figure 2: MULTIPLE CHASSIS CONFIGURATION



Model 442C04

Line Powered Signal Conditioner for ICP® Sensors

Installation and Operating Manual

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Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

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For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:



DANGER

Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

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Refers to hazards that could damage the instrument.

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Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

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| 住房 | 0 | 0 | 0 | 0 | 0 | 0 |
| PCB板 | X | 0 | 0 | 0 | 0 | 0 |
| 电气连接器 | 0 | 0 | 0 | 0 | 0 | 0 |
| 压电晶体 | X | 0 | 0 | 0 | 0 | 0 |
| 环氧 | 0 | 0 | 0 | 0 | 0 | 0 |
| 铁氟龙 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电子 | 0 | 0 | 0 | 0 | 0 | 0 |
| 厚膜基板 | 0 | 0 | X | 0 | 0 | 0 |
| 电线 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电缆 | X | 0 | 0 | 0 | 0 | 0 |
| 塑料 | 0 | 0 | 0 | 0 | 0 | 0 |
| 焊接 | X | 0 | 0 | 0 | 0 | 0 |
| 铜合金/黄铜 | X | 0 | 0 | 0 | 0 | 0 |
| 本表格依据 SJ/T 11364 的规定编制。 | | | | | | |
| 0：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。 | | | | | | |
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| 铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。 | | | | | | |

CHINA RoHS COMPLIANCE

| Component Name | Hazardous Substances | | | | | |
|------------------------|----------------------|--------------|--------------|--------------------------------|--------------------------------|---------------------------------------|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Chromium VI Compounds (Cr(VI)) | Polybrominated Biphenyls (PBB) | Polybrominated Diphenyl Ethers (PBDE) |
| Housing | O | O | O | O | O | O |
| PCB Board | X | O | O | O | O | O |
| Electrical Connectors | O | O | O | O | O | O |
| Piezoelectric Crystals | X | O | O | O | O | O |
| Epoxy | O | O | O | O | O | O |
| Teflon | O | O | O | O | O | O |
| Electronics | O | O | O | O | O | O |
| Thick Film Substrate | O | O | X | O | O | O |
| Wires | O | O | O | O | O | O |
| Cables | X | O | O | O | O | O |
| Plastic | O | O | O | O | O | O |
| Solder | X | O | O | O | O | O |
| Copper Alloy/Brass | X | O | O | O | O | O |

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

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Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.

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1.0 INTRODUCTION: SAFETY CONSIDERATIONS

WARNING 1: *The power supply/signal conditioner should not be opened by anyone other than qualified service personnel.* This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid injury.

WARNING 2: This equipment is designed with user safety in mind; however, the protection provided by the equipment may be impaired if the equipment is used in a manner not specified by PCB Piezotronics, Inc.

Caution 1: *Cables can kill your equipment.* High voltage electrostatic discharge can damage electrical devices. Similar to a capacitor, a cable can hold a charge caused by triboelectric transfer, such as that which occurs in the following:

- Laying on and moving across a rug.
- Any movement through air.
- The action of rolling out a cable.
- Contact to a non-grounded person.

The solution for product safety: 1) Connect the cables only with the AC power off. 2) Temporarily “short” the end of the cable before attaching it to any signal input or output.

Caution 2: *ESD considerations should be made prior to performing any internal adjustments on the equipment.* Any piece of electronic equipment is vulnerable to ESD when opened for adjustments. Internal adjustments should therefore be done ONLY in an ESD-safe work area. Many products have ESD protection, but the level of protection may be exceeded by extremely high voltage.

WARNING SYMBOLS AND TERMS

The following symbols and terms may be found on the equipment described in this manual.



This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.



This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.



This symbol indicates safety, earth ground.

The **WARNING** heading used in this manual explains dangers that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure. The **Caution** heading used in this manual explains hazards that could damage the instrument.

EQUIPMENT RATINGS

For complete specifications, please refer to the enclosed Specification Sheet. This equipment operates at 120 °F (+50 °C), in an environment having 85% relative humidity. Operation of this unit is limited to environments having an altitude of less than 2000 meters. The pollution degree for operation of the Model 440 is two (2), meaning that normally, only non-conductive pollution occurs. The overvoltage category is II, indicating the transient voltage levels that may be tolerated by the equipment.

The Model 442C04 requires 100 to 240 VAC. It gets its power via an AC line cord that plugs into the receptacle on the rear panel.

Two rear panel fuses, located below the switch in the AC receptacle, protect the power line inputs of the instrument. The fuse type is a T 1.6A, L 250 V. To change the fuse, disconnect the power cord. Find the slot just above the power switch and pull open the door that exposes the fuse drawers. Pull the individual drawer forward and insert a new fuse. See Figure 1.1.

Slot - carefully pry to expose fuse drawers

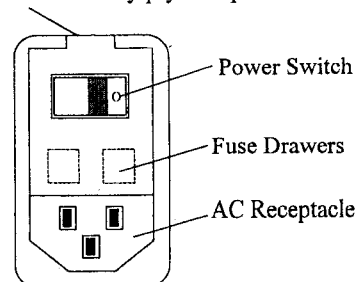


Figure 1.1 Fuse Replacement

2.0 SYSTEM CHASSIS

2.1 General Description

The PCB Modular Signal Conditioning System is a flexible, compact means of coordinating and customizing the signal conditioning needs of vibration, pressure, or force sensing instrumentation. At its most basic level, the system consists of a rectangular chassis with a single-slot power supply on the right side of the chassis and one plug-in module (customer specified) on the left side. This power supply is either AC or battery powered, depending on customer requirements. It should be noted, however, that the AC and DC power supplies are separate units, having differing part numbers. At its most complex level, the system consists of a rectangular chassis with a single-slot power supply on the right side of the chassis and eight *slots* of customer-specified, plug-in modules. These eight slots may be eight single-slot modules, four double-slot modules, or a combination of the two to add up to eight slots. See Section 2.5 and 2.6 for a more detailed description of the power supplies and Figure 2.1 for a representation. For a complete listing of available modules, see Section 6.0.

The standard chassis is constructed of molded plastic with molded ventilation slots. The 19-inch rack-mounted unit is constructed of metal.

A back plane on the inside rear of the unit unifies the circuitry, routing it to the power supply. Individual modules slide into the unit via the slot divisions and are secured to the inside frame using mechanical fasteners.

2.2 Model 441A12/441A42 Chassis

The Model 441A12/441A42 is a two-slot (18 HP) chassis with the right slot solely reserved for the AC-line or DC-battery power supply. A back plane on the inside rear unifies the circuitry, routing to the power supply. Single-slot signal conditioning modules slide into an available slot in the chassis, connect to the back plane, and are secured using mechanical fasteners. Situated on the rear panel behind the power supply slot is a power entry module that includes an on/off switch, fuses, and a power filter for use with the AC power supply only. The 441A12 chassis also has three DC output connectors for supplying DC power to the optional auxiliary chassis

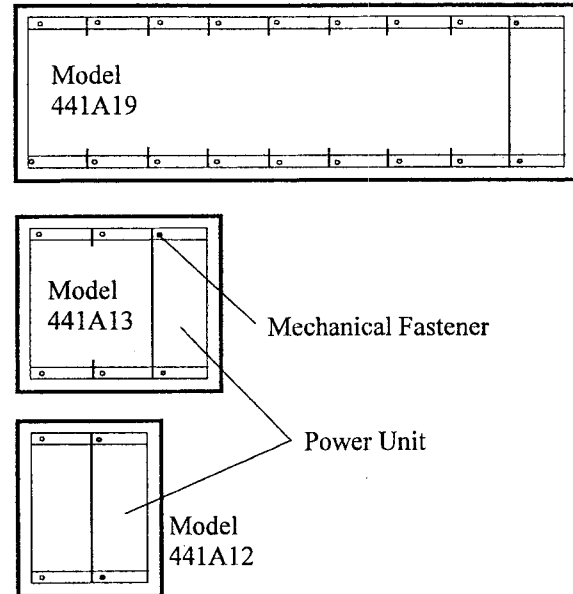


Figure 2.1 Basic Enclosure Configuration

2.3 Model 441A13/441A43 Chassis

The Model 441A13/441A43 is a three-slot (27 HP) chassis with the right slot solely reserved for the AC-line or DC-battery power supply. A back plane on the inside rear unifies the circuitry, routing to the power supply. Single-slot or two-slot (18 HP) signal conditioning modules slide into an available slot in the chassis, connect to the back plane, and are secured using mechanical fasteners. Situated on the rear panel behind the power supply slot is a power entry module that includes an on/off switch, fuses, and a power filter for use with the AC power supply only. The 441A13 chassis also has three DC output connectors for supplying DC power to the optional auxiliary chassis.

2.4 Model 441A19 Chassis

The Model 441A19 is a nine-slot (81 HP) chassis with the right slot solely reserved for the AC-line or DC-battery power supply. A back plane on the inside rear unifies the circuitry, routing to the power supply. Single-slot or two-slot (18 HP) signal conditioning modules slide into an available slot in the chassis, connect to the back plane, and are secured using mechanical fasteners. Situated on the rear panel behind the power supply slot is a power entry module that includes an on/off switch, fuses, and a power filter for use with the AC power supply only. The chassis also

has three DC output connectors for supplying DC power to the optional auxiliary chassis.

2.5 AC Power Supply (Model 441A101)

The Model 441A101 is a single-slot, CE marked, AC-line power supply designed to fit only in the extreme right slot of the PCB Series 440 modular chassis. It supplies a maximum of 45 watts of power and may be used to operate single or multiple signal conditioning modules housed in the two-, three-, or nine-slot standard chassis and optional auxiliary chassis.

The power unit supplies a maximum of 45 watts of power. Please note that while this unit is rated for a maximum wattage of 45, CE requirements mandate that it be used only up to 30 watts. When auxiliary chassis are attached to it through the DC output connectors, that 30 watts must be **shared** by the auxiliary units. On the power unit, the following output pin table appears:

| Pin Number | Output Voltages |
|------------|-----------------|
| P1 | Common 15 |
| P2 | -15 VDC |
| P3, 7 | +5 VDC |
| P4 | +28 VDC |
| P5 | +15 VDC |
| P6 | Common 28 |
| P8 | Common 5 |
| Shell | Chassis ground |

These pins are configured as shown in Figure 2.2.

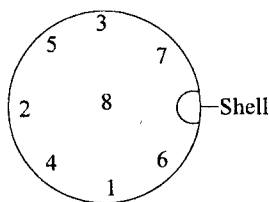


Figure 2.2 Pin-Out Configuration on DC Output Connectors

CAUTION

When using auxiliary units, do not exceed power supply ratings.

Wattage calculations are found on the Specification Sheet for the individual module. To determine power capability of your particular set-up, use the following procedure:

1. Add the powers used for the 5 VDC supply by all modules. The totals must be ≤ 20 watts.

2. Add the powers used for the 15 VDC supply by all modules. The totals must be ≤ 10.5 watts.
3. Add the powers used for the -15 VDC supply by all modules. The totals must be ≤ 10.5 watts.
4. Add the powers used for the 28 VDC supply by all modules. The totals must be ≤ 24 watts.
5. Add all the powers for all voltages. CE mandates that these totals must be ≤ 30 watts.
6. Verify that no back-panel DC output pin exceeds 2 amps.

CAUTION

Do not exceed two (2) amps per pin.

2.6 DC Power Supply (Model 441A102)

Model 441A102 is a single slot, CE marked, rechargeable DC battery power supply designed to fit only the extreme right slot of the PCB Series modular enclosures. It supplies a maximum of 30 watts and may be used to operate single or multiple signal conditioning modules housed in the two-, three-, or nine-slot standard chassis and optional auxiliary chassis.

2.7 Auxiliary Chassis

Three chassis are available for use with the modular system. No power supply is included; the auxiliary chassis are intended for use in a daisy-chain arrangement with other PCB Modular System chassis having integral power supplies. The rear of the auxiliary chassis has one input connector to power the modules it holds. Model numbers for the auxiliary chassis are 441A22 (two slot), 441A23 (three slot), and 442A20 (nine slot).

3.0 PRODUCT OVERVIEW

The Model 442C04 is a four-channel ICP-Sensor Signal Conditioner. It consists of the 441A42 two-slot chassis, 441A101 AC-line power supply, and the 442B104 ICP four-channel sensor signal conditioning module. (See System Drawing at the end of the manual.) The module 442B104 features an AC-coupled output and incremental gain of x1, x10, and x100 per channel.

The 442B104 also features the ability to plug in optionally available Low Pass filters in each channel. The filters to be used are the Model 477A series. Several standard cut offs are available. (contact PCB for further information)

If you wish to learn more about sensors with built-in microelectronic circuitry, known as ICP sensors, consult PCB's "General Operating Guide for use with Piezoelectric ICP Accelerometers," a brochure outlining the technical specifics associated with piezoelectric sensors. Topics covered include charge versus voltage mode systems, sensor time constants, effect of discharge time constant on low-frequency response, and power requirements.

4.0 DESCRIPTION

The Model 442C04 supplies a sensor excitation voltage of +24-volt DC and a constant sensor excitation current adjustable from 0.5 to 20 mA to four ICP sensors simultaneously. Refer to Figure 5.1 (Model 442B104 front panel).

The output signal is AC coupled and is compatible with standard readout instruments. The coupling time constant in the AC mode is greater than 10 seconds and is independent of output load.

The front panel contains four BNC Sensor input jacks (SENSOR) and four BNC output jacks (OUTPUT). Individual channel menu buttons set the gain at x1, x10, or x100. The ICP constant current adjust access hole is also located on the front panel

Four LED fault monitors, one per channel, are located on the front panel to provide the user a means to check circuit continuity and operation. These LEDs indicate the gain selected for each channel. Input faults, such as overload, open, and short, are indicated by the LEDs.

5.0 OPERATION

Turn the power on using the rocker switch located on the back panel. When first powered on, the gain LEDs will flash three times.

Connect each sensor to the SENSOR jack of the Model 442C04 using the appropriate cable.

Connect the readout to the OUTPUT jack using a BNC-to-BNC cable. Wait for 1-3 minutes to allow the system to settle out before taking data.

Note: Many types of connector adaptors are available from PCB to simplify difficult installation situations. Consult the factory for details.

Input faults are indicated by individual channel LEDs. With an ICP sensor connected to the input jack, no

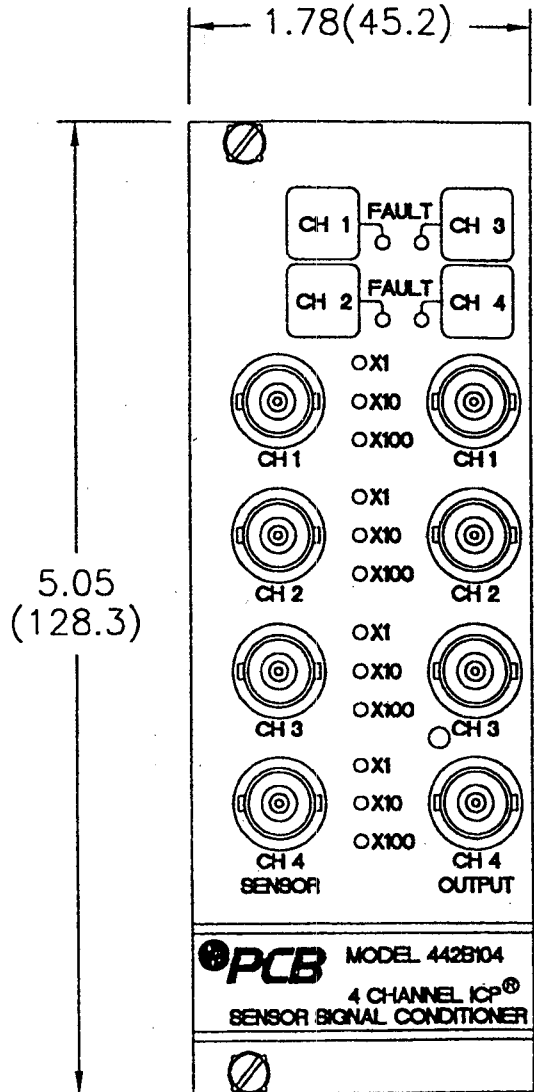


Figure 5.1 Model 442C04 Front Panel

input fault lights are illuminated. However, if the sensor or cable is open, the LED is a solid red. If the cable or sensor is shorted, the LED blinks. Finally, if

the input signal exceeds ± 10 volts, the LED enlightens until the overload is removed.

5.1 Coupling

A coupling capacitor AC couples the system internally with a greater-than-10-second coupling time constant (TC). This gives a low-frequency response as follows:

| | | |
|-------------|---------|---------|
| 1% | down at | .11 Hz |
| 5% | down at | .05 Hz |
| 30% (-3 dB) | down at | .016 Hz |

NOTE: This table applies to a sensor system where the discharge TC of the sensor is greater than 100 seconds. Shorter TC sensors shorten the overall system TC accordingly.

This coupling is desirable for standard operation since long-term thermal drifting of long TC sensors is nullified by the internal AC coupling. The DC offset at the output is, at the maximum, ± 50 mV.

5.2 Setting the Constant Current

The Model 442C04 is normally supplied with the constant-current output set at four mA nominal. This is adequate for most laboratory and field applications. Special situations, such as driving extra long (beyond 1000 ft) cables having high frequency or fast rise-time pulses, may require increasing the sensor drive current above four mA.

CAUTION

To avoid permanent damage to the sensor, DO NOT EXCEED 20 mA.

When driving fast rise-time pulses over long lines, system performance can be optimized by "tuning" the drive current to the line. Find the best current setting for the particular set of physical parameters (line length, line termination, or pulse rise time) established by the sensor. The optimum current setting is best determined by experimentation with your particular test setup. A good rule of thumb is to use the lowest current consistent with satisfactory results to minimize sensor self-heating and noise.

Optionally available, PCB Model 401A04 ICP Sensor Simulator consists of a unity gain, non-inverting, impedance-converting voltage amplifier similar to those found in many ICP sensors. When used in conjunction

with a signal generator, the electrical characteristics of long cables can be easily determined.

To set the constant current adjustment locate the constant current adjust hole on the front panel of the Model 442B104. Hook a 0-30mA meter to the sensor input of any channel. Put a small screwdriver through the hole, and carefully turn the pot clockwise to increase current or counterclockwise to decrease current. The current level may be read on the meter. Note that this sets the current on all four channels simultaneously to the same value.

5.3 Installing the Filters

To install the filters, first unscrew and slide out the Module 442B104. Locate the filter socket fil101, fil102, fil103 and fil104 located behind the BNC connectors on the board. Plug the optional series 477A into these sockets. Located above these sockets is 1 selectable shunts per filter fil1, fil2, fil3 and fil4. Move the shunt from pin 1 and 2 to cover pin 2 and 3. Pin 1 is uncovered in filter mode. Contact PCB for assistance if necessary.

6.0 AVAILABLE MODULES

For more information on individual modules, please see the individual manual accompanying each of the following:

- Single-channel ICP sensor signal conditioner, unity gain, Model 442B01
- Single-channel ICP sensors signal conditioner with gain of x1, x10, x100, Model 442B02
- Single-channel ICP sensors signal conditioner with gain of x1, x10, x100, AC/DC coupled, Model 442B06
- Battery module for 440 series, Model 441A102
- Dual-mode ICP/charge amplifier -vibration (double slot), Model 443A01
- Dual-mode ICP/charge amplifier - pressure or force (double slot), Model 443A02.

7.0 MAINTENANCE AND REPAIR

Aside from battery replacement on units so equipped, no maintenance is required for this modular unit, other

than wiping the exterior of the enclosure with a soft cloth when dusty. If you experience difficulty with your particular unit, contact the factory for assistance. Because of the sophisticated nature of PCB instrumentation, **field repair is typically not recommended** and voids the warranty. If factory service is required, return the instrument to PCB. A free quotation is provided prior to servicing.

To expedite the repair process, contact a PCB Customer Service Representative for a Return Materials Authorization (RMA) number prior to sending equipment to the factory. Please have pertinent information available, such as model and serial numbers, application information, what instruments are connected to the equipment, and so forth. Also, to insure efficient service, be sure to include a brief written description of the problem. International customers should return equipment to a local distributor, or contact PCB if no distributors are available.

PCB is an ISO 9001 certified company that has embraced its company mission of TOTAL CUSTOMER SATISFACTION. These two factors assure that if at any time you are not satisfied with any of our products or services, let us know and we will correct the problem. If you have any questions or concerns on the use of any PCB product or the aforementioned policies, please contact PCB at 716-684-0001.

MANUAL NUMBER: 19178
MANUAL REVISION: NR



Model 441A42
2-slot chassis (for Series 440 modules)
Installation and Operating Manual

**For assistance with the operation of this product,
contact PCB Piezotronics, Inc.**

Toll-free: 800-828-8840
24-hour SensorLine: 716-684-0001
Fax: 716-684-0987
E-mail: info@pcb.com
Web: www.pcb.com



Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its “Lifetime Warranty Plus” on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty.**

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
Toll-free: (800) 828-8840
24-hour SensorLine: (716) 684-0001
General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:



DANGER

Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

**CAUTION**

Refers to hazards that could damage the instrument.

**NOTE**

Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

The following symbols may be found on the equipment described in this manual:



This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.



This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.



This symbol indicates safety, earth ground.



PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

| 部件名称 | 有害物质 | | | | | |
|--|--------|--------|--------|--------------|------------|--------------|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr(VI)) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 住房 | 0 | 0 | 0 | 0 | 0 | 0 |
| PCB板 | X | 0 | 0 | 0 | 0 | 0 |
| 电气连接器 | 0 | 0 | 0 | 0 | 0 | 0 |
| 压电晶体 | X | 0 | 0 | 0 | 0 | 0 |
| 环氧 | 0 | 0 | 0 | 0 | 0 | 0 |
| 铁氟龙 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电子 | 0 | 0 | 0 | 0 | 0 | 0 |
| 厚膜基板 | 0 | 0 | X | 0 | 0 | 0 |
| 电线 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电缆 | X | 0 | 0 | 0 | 0 | 0 |
| 塑料 | 0 | 0 | 0 | 0 | 0 | 0 |
| 焊接 | X | 0 | 0 | 0 | 0 | 0 |
| 铜合金/黄铜 | X | 0 | 0 | 0 | 0 | 0 |
| 本表格依据 SJ/T 11364 的规定编制。 | | | | | | |
| 0：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。 | | | | | | |
| X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。 | | | | | | |
| 铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。 | | | | | | |

CHINA RoHS COMPLIANCE

| Component Name | Hazardous Substances | | | | | |
|------------------------|----------------------|--------------|--------------|--------------------------------|--------------------------------|---------------------------------------|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Chromium VI Compounds (Cr(VI)) | Polybrominated Biphenyls (PBB) | Polybrominated Diphenyl Ethers (PBDE) |
| Housing | O | O | O | O | O | O |
| PCB Board | X | O | O | O | O | O |
| Electrical Connectors | O | O | O | O | O | O |
| Piezoelectric Crystals | X | O | O | O | O | O |
| Epoxy | O | O | O | O | O | O |
| Teflon | O | O | O | O | O | O |
| Electronics | O | O | O | O | O | O |
| Thick Film Substrate | O | O | X | O | O | O |
| Wires | O | O | O | O | O | O |
| Cables | X | O | O | O | O | O |
| Plastic | O | O | O | O | O | O |
| Solder | X | O | O | O | O | O |
| Copper Alloy/Brass | X | O | O | O | O | O |

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.

Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.



- CHASSIS: MODELS 441A33, 441A35, 441A42, 441A43, 441A45 AND 441A49 2
 - EQUIPMENT RATINGS 2
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 - DISABLING COOLING FAN 2

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- AC POWER SUPPLY: MODEL 441A101 3

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 - CHARGING THE BATTERY 3

- APPENDIX A: FIGURES 4



Chassis: Models 441A33, 441A35, 441A42, 441A43, 441A45 and 441A49

The PCB Series 440 Modular Chassis is the enclosure into which the modules of the PCB Modular Signal Conditioning System are inserted. Its configuration varies by model, ranging from two slots to nine; one slot is reserved for the power supply, while Eurocard-style plug-in modules occupy the remaining slots and are secured to the inside frame using mechanical fasteners. A circuit board assembly in the rear of the chassis distributes power to the modules and provides the means by which modules communicate with each other, the rest of the system, and a personal computer.

Models 441A33, 441A35 and 441A38 are the computer-controlled, master versions of the standard chassis. The back panel of these master chassis have two RS-485 connectors marked IN and OUT and one RS-232 connector. Models 441A45 and 441A49 are slave chassis designed to be controlled by the masters. Slave chassis also have two RS-485 connectors, but no RS-232 connector. In a multiple chassis system, the master controller communicates to the other modules via the common RS-485 network and to the computer via the RS-232 connection.

Equipment Ratings

This equipment operates at 104°F (40°C), in an environment having 93% relative humidity. Its frequency range is 50/60 Hz. Operation of this unit is limited to environments having an altitude of less than 2 000 meters. The pollution degree for operation of the Model 440 is two (2), meaning that normally, only non-conductive pollution occurs. The over voltage category is II, indicating the transient voltage levels that may be tolerated by the equipment.

Multiple Chassis Configuration



High voltage electrostatic discharge (ESD) can damage electrical devices. To avoid triboelectric transfer:

1. Connect the cables only with the AC power off.
2. Temporarily "short" the end of the cable before attaching it to any signal input or output.

Each master controller can control up to four chassis filled with modules. Each chassis (or rack) must, however, be uniquely defined. This is accomplished by setting rack addresses. There are two jumpers on the upper right

portion of the backplane labeled RAD1 and RAD0, as shown on Figure 1 in Appendix A. The settings are as follows:

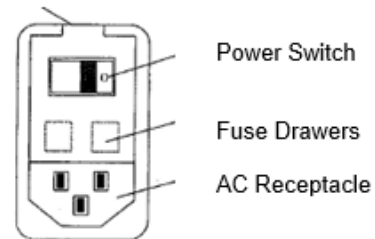
| | RAD1 | RAD0 |
|--------|------|------|
| Rack 1 | Low | Low |
| Rack 2 | Low | High |
| Rack 3 | High | Low |
| Rack 4 | High | High |

Refer to Figure 2 in Appendix A for a four-rack configuration. Notice on the drawing that the RS-485 IN connection on Rack 1 requires termination, as does the 485 OUT connection on Rack 4. The 485 IN is terminated with the TER1, TER2 and TER3 terminators on the backplane. The termination settings are also shown.

Changing the Fuse

Two rear panel fuses, located below switch in the AC receptacle, protect the power line inputs of the instrument. The fuse type is a T 1.6A, L 250 V. To change the fuse, disconnect the power cord. Find the slot just above the power switch and pull forward to open the door that exposes the fuse drawers. Pull the individual drawer forward and insert a new fuse.

Slot – Carefully pry to expose fuse drawers.



Disabling Cooling Fan

If it is necessary to turn off the cooling fan in order to reduce acoustical noise, a jumper "J2," located on the motherboard, must be removed. In order to access this jumper, the rear panel must be taken off. The fan may then be disabled via a command from the host computer controlling the master. The fan should be disabled for as short a period as possible to ensure continuous cooling. Contact the factory for more details.

Available Modules

For more information on individual modules, please see the individual manual accompanying each of the following:



- Model 442A102: Single-channel, line powered ICP® sensor signal conditioner, unity gain.
- Model 442A103: Single-channel, line powered ICP® sensor signal conditioner, with gain of x1, x10, x100.
- Model 442B104: Four-channel, line powered ICP® sensor signal conditioner, with gain of x1, x10, x100. Optional 477A-type plugin filters available.
- Model 442A101: Single-channel, line powered ICP® sensor signal conditioner, with gain of x1, x10, x100, AC/DC coupled.
- Model 443B101: Dual-mode ICP/charge amplifier – vibration (2-slot).
- Model 443B102 Dual-mode ICP/charge amplifier – pressure or force (2-slot).

AC Power Supply: Model 441A101

The Model 441A01 is a single-slot, CE marked, AC-line power supply designed to fit only the extreme right slot of the PCB Series 440 Modular Chassis. It supplies a maximum of 45 watts of power and may be used to operate single or multiple signal conditioning modules housed in the two-, three-, or nine-wide standard chassis and optional auxiliary chassis. Please note that while this unit is rated for a maximum wattage of 45, CE requirements mandate that it be used only up to 30 watts.

For wattage calculations, refer to the specification sheet for the individual module. To determine power capability of your particular set-up, add all the powers for all modules. CE mandates that these totals must be ≤ 30 watts.

DC Power Supply: Model 441A102

Model 441A102 is a single width, CE marked, rechargeable DC battery power supply that can be used in place of the 441A101 AC Power. Standard accessories include:

- Model 017A22 power cord
- Model 488A08 battery charger
- Built-in 3.0 Ah NiMH rechargeable battery

The optional Model 488A09 is a 12VDC @3.4A AC Power Adaptor that allows the 441A102 to be used with any AC line power in the world. (100-240VAC 50/60Hz).

The 441A102 can be used to power up to 30 watts of PCB modular series units. For wattage calculations, refer to the specification sheet for the individual module. To determine power capability of your particular set-up, add all the powers

for all modules. CE mandates that these totals must be ≤ 30 watts.

Operation

To operate, slide into the power supply slot of the PCB Series 440 Modular Chassis, tighten up the two mounting screws and turn the power switch to ON.



The 441A102 has some components that will get hot under heavy loads. Do not remove the module from the enclosures immediately after continuous heavy use. Let completely cool first.

Charging the Battery



It is not recommended to charge the 441A102 while the power switch is ON. No damage will occur, but charge time will increase.

To calculate the estimated battery life, divide 30 by the total number of watts of all the modules being used. Refer to module specification sheets for the number of watts to use in your calculation. To charge the battery:

1. Turn power off on the front panel of the 441A102.
2. Plug the Model 488A08 into the charger input jack.
3. The yellow charge light on the charger will light solid during fast charge as indicated on the charger. Typical charge time for a totally depleted battery is 1.5 to 2 hours.
4. After the battery is charged about 90%, the charge light will begin to blink (1/8 sec blink). If possible, leave charger on with charge light blinking for another few hours to get maximum charge.



Remove the charger plug by pulling on the body of the connector, not the cord. This is a locking feature to ensure a good connection while charging.



Appendix A: Figures

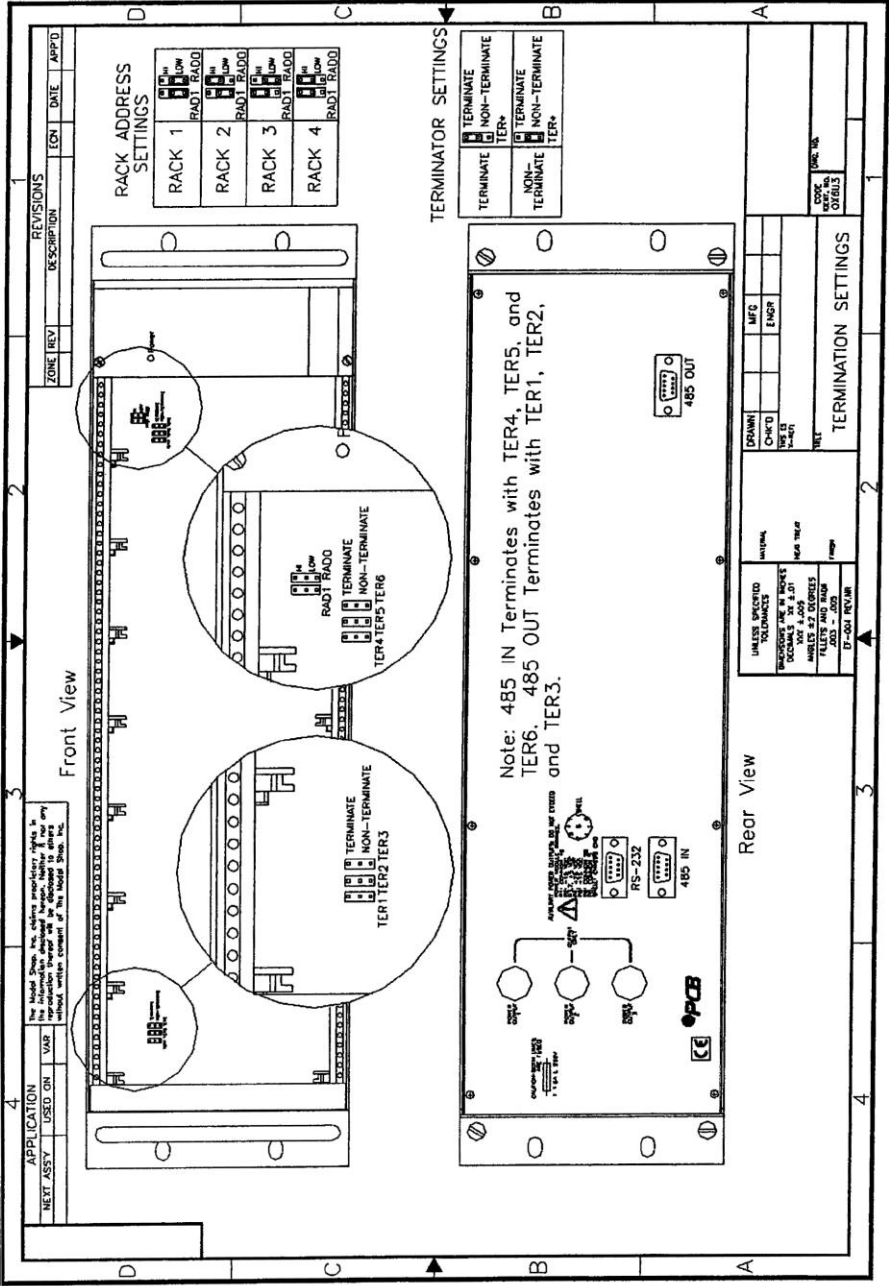


Figure 1: TERMINATION SETTINGS

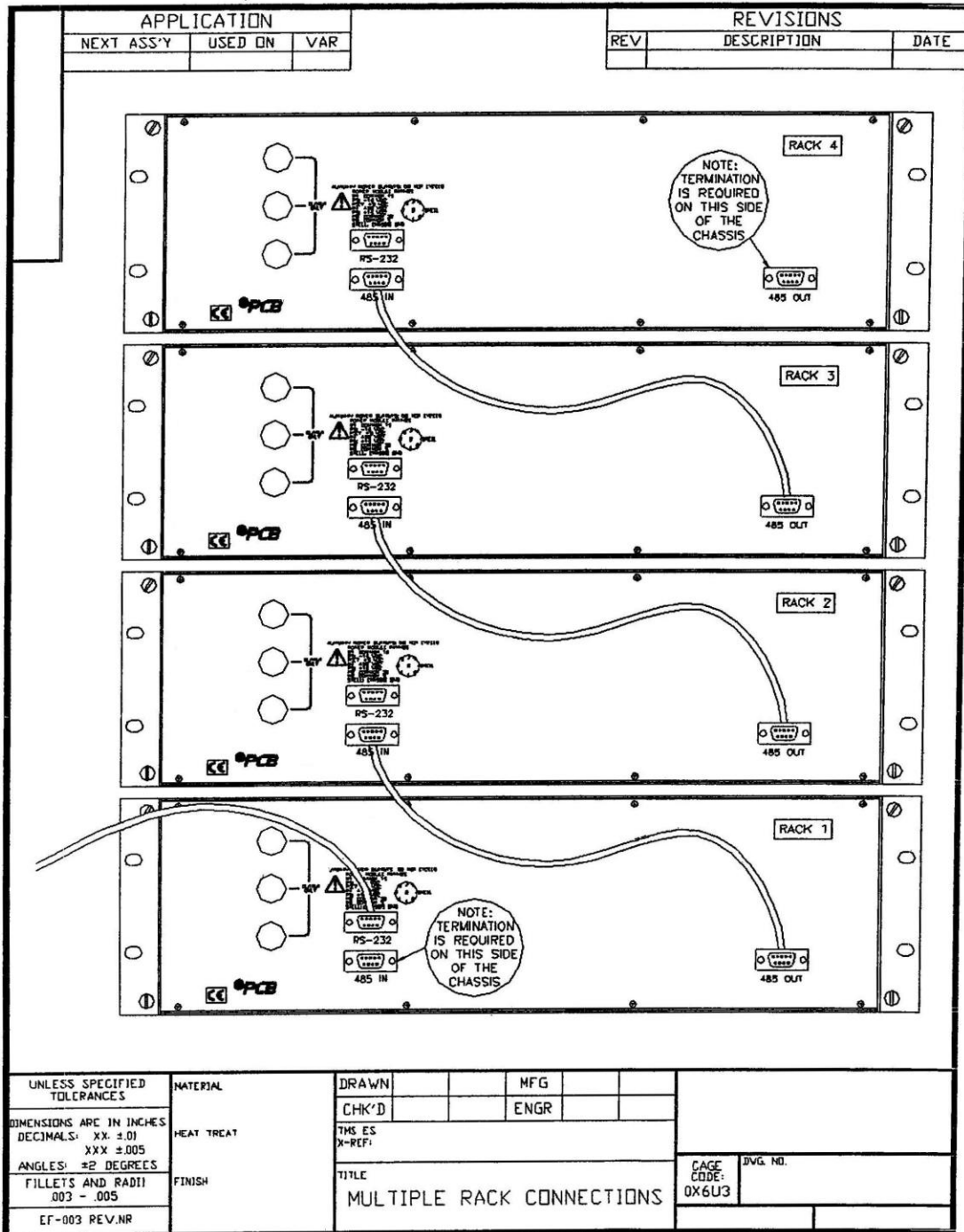


Figure 2: MULTIPLE CHASSIS CONFIGURATION



Model 442B104

4 CHANNEL ICP® SENSOR SIGNAL CONDITIONER

Installation and Operating Manual

**For assistance with the operation of this product,
contact PCB Piezotronics, Inc.**

**Toll-free: 800-828-8840
24-hour SensorLine: 716-684-0001
Fax: 716-684-0987
E-mail: info@pcb.com
Web: www.pcb.com**



Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its “Lifetime Warranty Plus” on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty.**

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
Toll-free: (800) 828-8840
24-hour SensorLine: (716) 684-0001
General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:



DANGER

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**CAUTION**

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**NOTE**

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PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

| 部件名称 | 有害物质 | | | | | |
|--|--------|--------|--------|--------------|------------|--------------|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr(VI)) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 住房 | 0 | 0 | 0 | 0 | 0 | 0 |
| PCB板 | X | 0 | 0 | 0 | 0 | 0 |
| 电气连接器 | 0 | 0 | 0 | 0 | 0 | 0 |
| 压电晶体 | X | 0 | 0 | 0 | 0 | 0 |
| 环氧 | 0 | 0 | 0 | 0 | 0 | 0 |
| 铁氟龙 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电子 | 0 | 0 | 0 | 0 | 0 | 0 |
| 厚膜基板 | 0 | 0 | X | 0 | 0 | 0 |
| 电线 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电缆 | X | 0 | 0 | 0 | 0 | 0 |
| 塑料 | 0 | 0 | 0 | 0 | 0 | 0 |
| 焊接 | X | 0 | 0 | 0 | 0 | 0 |
| 铜合金/黄铜 | X | 0 | 0 | 0 | 0 | 0 |
| 本表格依据 SJ/T 11364 的规定编制。 | | | | | | |
| 0：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。 | | | | | | |
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CHINA RoHS COMPLIANCE

| Component Name | Hazardous Substances | | | | | |
|------------------------|----------------------|--------------|--------------|--------------------------------|--------------------------------|---------------------------------------|
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| Housing | O | O | O | O | O | O |
| PCB Board | X | O | O | O | O | O |
| Electrical Connectors | O | O | O | O | O | O |
| Piezoelectric Crystals | X | O | O | O | O | O |
| Epoxy | O | O | O | O | O | O |
| Teflon | O | O | O | O | O | O |
| Electronics | O | O | O | O | O | O |
| Thick Film Substrate | O | O | X | O | O | O |
| Wires | O | O | O | O | O | O |
| Cables | X | O | O | O | O | O |
| Plastic | O | O | O | O | O | O |
| Solder | X | O | O | O | O | O |
| Copper Alloy/Brass | X | O | O | O | O | O |

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5.0 Model 442B104

The module 442B104 features an AC-coupled output and incremental gain of x1, x10, and x100 per channel.

The 442B104 also features the ability to plug in optionally available Low Pass filters in each channel. The filters to be used are the Model 477A series. Several standard cut offs are available. (contact PCB for further information)

If you wish to learn more about sensors with built-in microelectronic circuitry, known as ICP sensors, consult PCB's "General Operating Guide for use with Piezoelectric ICP Accelerometers," a brochure outlining the technical specifics associated with piezoelectric sensors. Topics covered include charge versus voltage mode systems, sensor time constants, effect of discharge time constant on low-frequency response, and power requirements.

5.1 DESCRIPTION

The Model 442B104 supplies a sensor excitation voltage of +24-volt DC and a constant sensor excitation current adjustable from 0.5 to 20 mA to four ICP sensors simultaneously. Refer to Figure 5.1 (Model 442B104 front panel).

The output signal is AC coupled and is compatible with standard readout instruments. The coupling time constant in the AC mode is greater than 10 seconds and is independent of output load.

The front panel contains four BNC Sensor input jacks (SENSOR) and four BNC output jacks (OUTPUT). Individual channel menu buttons set the gain at x1, x10, or x100. The ICP constant current adjust access hole is also located on the front panel

Four LED fault monitors, one per channel, are located on the front panel to provide the user a means to check circuit continuity and operation. These LEDs indicate the gain selected for each channel. Input faults, such as overload, open, and short, are indicated by the LEDs.

5.2 OPERATION

Turn the power on using the rocker switch located on the back panel. When first powered on, the gain LEDs will flash three times.

Connect each sensor to the SENSOR jack of the Model 442B104 using the appropriate cable.

Connect the readout to the OUTPUT jack using a BNC-to-BNC cable. Wait for 1-3 minutes to allow the system to settle out before taking data.

Note: Many types of connector adaptors are available from PCB to simplify difficult installation situations. Consult the factory for details.

Input faults are indicated by individual channel LEDs. With an ICP sensor connected to the input jack, no

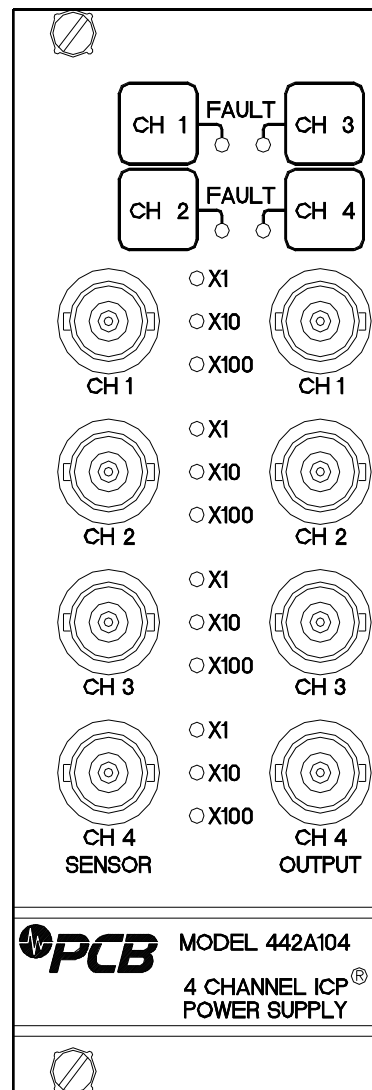


Figure 5.1 Model 442B104 Front Panel

input fault lights are illuminated. However, if the sensor or cable is open, the LED is a solid red. If the cable or sensor is shorted, the LED blinks. Finally, if the input signal exceeds ± 10 volts, the LED enlightens until the overload is removed.

5.3 Coupling

A coupling capacitor AC couples the system internally with a greater-than-10-second coupling time constant (TC). This gives a low-frequency response as follows:

| | | |
|-------------|---------|---------|
| 1% | down at | .11 Hz |
| 5% | down at | .05 Hz |
| 30% (-3 dB) | down at | .016 Hz |

NOTE: This table applies to a sensor system where the discharge TC of the sensor is greater than 100 seconds. Shorter TC sensors shorten the overall system TC accordingly.

This coupling is desirable for standard operation since long-term thermal drifting of long TC sensors is nullified by the internal AC coupling. The DC offset at the output is, at the maximum, ± 50 mV.

5.4 Setting the Constant Current

The Model 442B104 is normally supplied with the constant-current output set at four mA nominal. This is adequate for most laboratory and field applications. Special situations, such as driving extra long (beyond 1000 ft) cables having high frequency or fast rise-time pulses, may require increasing the sensor drive current above four mA.

CAUTION

To avoid permanent damage to the sensor, DO NOT EXCEED 20 mA.

When driving fast rise-time pulses over long lines, system performance can be optimized by “tuning” the drive current to the line. Find the best current setting for the particular set of physical parameters (line length, line termination, or pulse rise time) established by the sensor. The optimum current setting is best determined by experimentation with your particular test setup. A good rule of thumb is to use the lowest current consistent with satisfactory results to minimize sensor self-heating and noise.

Optionally available, PCB Model 401A04 ICP Sensor Simulator consists of a unity gain, non-inverting, impedance-converting voltage amplifier similar to those found in many ICP sensors. When used in conjunction with a signal generator, the electrical characteristics of long cables can be easily determined.

To set the constant current adjustment locate the constant current adjust hole on the front panel of the Model 442B104. Hook a 0-30mA meter to the sensor input of any channel. Put a small screwdriver through the hole, and carefully turn the pot clockwise to increase current or counterclockwise to decrease current. The current level may be read on the meter. Note that this sets the current on all four channels simultaneously to the same value.

5.5 Installing the Filters

To install the filters, first unscrew and slide out the Module 442B104. Locate the filter socket fil101, fil102, fil103 and fil104 located behind the BNC connectors on the board. Plug the optional series 477A into these sockets. Located above these sockets is 1 selectable shunts per filter fil1, fil2, fil3 and fil4. Move the shunt from pin 1 and 2 to cover pin 2 and 3. Pin 1 is uncovered in filter mode. Contact PCB for assistance if necessary.

MANUAL NUMBER: 19176

MANUAL REVISION: NR



Model 441A101
MODULAR AC LINE POWER SUPPLY
Installation and Operating Manual

**For assistance with the operation of this product,
contact PCB Piezotronics, Inc.**

Toll-free: 800-828-8840
24-hour SensorLine: 716-684-0001
Fax: 716-684-0987
E-mail: info@pcb.com
Web: www.pcb.com



Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its “Lifetime Warranty Plus” on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty.**

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

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Depew, NY14043 USA
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General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

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| 电气连接器 | 0 | 0 | 0 | 0 | 0 | 0 |
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| 铁氟龙 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电子 | 0 | 0 | 0 | 0 | 0 | 0 |
| 厚膜基板 | 0 | 0 | X | 0 | 0 | 0 |
| 电线 | 0 | 0 | 0 | 0 | 0 | 0 |
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| 塑料 | 0 | 0 | 0 | 0 | 0 | 0 |
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| Electrical Connectors | O | O | O | O | O | O |
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| Thick Film Substrate | O | O | X | O | O | O |
| Wires | O | O | O | O | O | O |
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| Plastic | O | O | O | O | O | O |
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Model Number
441A101

MODULAR AC LINE POWER SUPPLY

Revision: E
ECN #: 23396

AC POWER SUPPLY

| | | | |
|-----------------|------|--------------------|-----|
| Input Power: | VAC | 100-240 | |
| | Hz | 50/60 | |
| | amps | 1.3 | |
| Output Power | W | 30 | |
| Output Voltage: | VDC | +5 +0.025V, -0.00V | [2] |
| | VDC | +27 +3V, -.5V | [2] |
| | VDC | +15 ±0.45V | [2] |
| | VDC | -15 ±0.45V | [2] |

ENVIRONMENTAL

Operating Temperature Range °F [°C] 32 to +120 [0 to +50]

PHYSICAL

Size (H x W): in [mm] 5.05 x 1.8 [128 x 46] [1]
Weight lb [kg] 1.4 [0,64]



All specifications are at room temperature unless otherwise specified.

NOTES:

- [1] Single width unit.
- [2] Per OEM specification.
- [3] Consult Certificate of Conformance PS024.

ICP® is a registered trademark of PCB Group, Inc.

In the interest of constant product improvement, we reserve the right to change specifications without notice.

| | | | | |
|--------------|---------------|---------------|---------------|--------------|
| Drawn: | Engineer: | Sales: | Approved: | Spec Number: |
| Date: 1-6-06 | Date: 1/20/06 | Date: 1/20/06 | Date: 1/24/06 | 7939 |



3425 Walden Avenue, Depew, NY 14043

716-684-0001 Fax (716) 684-0987

E-Mail: electronics@pcb.com



Model 442B104

4 CHANNEL ICP® SENSOR SIGNAL CONDITIONER

Installation and Operating Manual

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Repair and Maintenance

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| PCB板 | X | 0 | 0 | 0 | 0 | 0 |
| 电气连接器 | 0 | 0 | 0 | 0 | 0 | 0 |
| 压电晶体 | X | 0 | 0 | 0 | 0 | 0 |
| 环氧 | 0 | 0 | 0 | 0 | 0 | 0 |
| 铁氟龙 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电子 | 0 | 0 | 0 | 0 | 0 | 0 |
| 厚膜基板 | 0 | 0 | X | 0 | 0 | 0 |
| 电线 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电缆 | X | 0 | 0 | 0 | 0 | 0 |
| 塑料 | 0 | 0 | 0 | 0 | 0 | 0 |
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| PCB Board | X | O | O | O | O | O |
| Electrical Connectors | O | O | O | O | O | O |
| Piezoelectric Crystals | X | O | O | O | O | O |
| Epoxy | O | O | O | O | O | O |
| Teflon | O | O | O | O | O | O |
| Electronics | O | O | O | O | O | O |
| Thick Film Substrate | O | O | X | O | O | O |
| Wires | O | O | O | O | O | O |
| Cables | X | O | O | O | O | O |
| Plastic | O | O | O | O | O | O |
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ICP® SIGNAL CONDITIONER

| | | | |
|------------------------------------|-------------|---------------------------------|-----|
| Sensor Excitation Voltage | VDC | 25.5V ±1.5V | |
| Sensor Excitation Current | mA | 0.5-20 (factory set at 4; ±0.5) | |
| AC Coupling Time Constant | sec | >10 | |
| DC Offset (maximum) | mV | <50 | |
| Voltage Gain | VAC | X1, X10, X100 ±1% | |
| Frequency Response: (x1, x10 Gain) | Hz/kHz | 0.05/100 (-5%) | [1] |
| (x100 Gain) | Hz/kHz | 0.05/50 (-5%) | [5] |
| Spectral Noise - AC - Gain 1: | µV/√Hz [dB] | 0.57 [-124] | [2] |
| 1 Hz | µV/√Hz [dB] | 0.18 [-134] | |
| 10 Hz | µV/√Hz [dB] | 0.14 [-137] | |
| 100 Hz | µV/√Hz [dB] | 0.10 [-140] | |
| 1 kHz | µV/√Hz [dB] | 0.10 [-140] | |
| 10 kHz | µV [dB] | 9.98 [-100] | |
| Noise Broadband (1 Hz - 10 kHz) | µV [dB] | 4.7 [-106] | |
| Spectral Noise - AC - Gain 10: | µV/√Hz [dB] | 0.77 [-122] | |
| 1 Hz | µV/√Hz [dB] | 0.43 [-127] | |
| 10 Hz | µV/√Hz [dB] | 0.30 [-130] | |
| 100 Hz | µV/√Hz [dB] | 0.29 [-130] | |
| 1 kHz | µV [dB] | 31.28 [-90] | |
| 10 kHz | µV/√Hz [dB] | 53 [-85] | |
| Noise Broadband (1 Hz - 10 kHz) | µV/√Hz [dB] | 8.9 [-101] | |
| Spectral Noise - AC - Gain 100: | µV/√Hz [dB] | 3.00 [-110] | |
| 1 Hz | µV/√Hz [dB] | 2.1 [-113] | |
| 10 Hz | µV/√Hz [dB] | 1.8 [-114] | |
| 100 Hz | µV [dB] | 200 [-74] | |
| 1 kHz | µV [dB] | >96 | |
| 10 kHz | V | >±10 | |
| Noise Broadband (1 Hz-10 kHz) | ohms | 50 | |
| Channel Separation (Gain 1) | watts | 5.50 | [3] |
| Output Range | VDC/watts | +28 at 80 mA/1.92 | |
| Output Impedance | VDC/watts | +5 at 115 mA/0.575 | |
| Total Power Required (maximum) | VDC/watts | +15 at 100 mA/1.5 | |
| Power Required: | VDC/watts | -15 at 100 mA/1.5 | |

ENVIRONMENTAL

| | | |
|-----------------------------|---------|-----------------------|
| Operating Temperature Range | °F [°C] | 32 to +120 [0 to +50] |
|-----------------------------|---------|-----------------------|

PHYSICAL

| | | | |
|--------------|---------|-----------------------------|-----|
| Connectors: | Input | type | BNC |
| | Output | type | BNC |
| Size (H x W) | in [mm] | 5.05 x 1.8 [128,27 x 45,72] | [4] |
| Weight | lb [kg] | 0.89 [0,40] | |

NOTES:

- [1] Unfiltered response frequency may be limited by low pass plug-in filter (PCB Model 477A).
- [2] All noise specifications, typical.
- [3] Maximum number of 442B104 ICP® Sensor Signal Conditioners that can be powered by (1) 441A101/441A102 is 5. Other combinations of modules must be calculated not to exceed total power of 30 watts.
- [4] Single slot unit (9 HP).
- [5] After Serial Number 789.
- [6] See PCB Declaration of Conformance PS024 for details



All specifications are at room temperature unless otherwise specified.

ICP® is a registered trademark of PCB Group, Inc.

In the interest of constant product improvement, we reserve the right to change specifications without notice.

| | | | | |
|-------------------|---------------------|-------------------|---------------------|--------------|
| Drawn: <i>Let</i> | Engineer: <i>JD</i> | Sales: <i>JGM</i> | Approved: <i>ML</i> | Spec Number: |
| Date: 6/29/06 | Date: 6-29-06 | Date: 6/29/06 | Date: 6/30/06 | 11047 |



Model 441A42
2-slot chassis (for Series 440 modules)
Installation and Operating Manual

**For assistance with the operation of this product,
contact PCB Piezotronics, Inc.**

Toll-free: 800-828-8840
24-hour SensorLine: 716-684-0001
Fax: 716-684-0987
E-mail: info@pcb.com
Web: www.pcb.com



Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its “Lifetime Warranty Plus” on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty.**

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
Toll-free: (800) 828-8840
24-hour SensorLine: (716) 684-0001
General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:



DANGER

Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

**CAUTION**

Refers to hazards that could damage the instrument.

**NOTE**

Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

The following symbols may be found on the equipment described in this manual:



This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.



This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.



This symbol indicates safety, earth ground.



PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

| 部件名称 | 有害物质 | | | | | |
|--|--------|--------|--------|--------------|------------|--------------|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr(VI)) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 住房 | 0 | 0 | 0 | 0 | 0 | 0 |
| PCB板 | X | 0 | 0 | 0 | 0 | 0 |
| 电气连接器 | 0 | 0 | 0 | 0 | 0 | 0 |
| 压电晶体 | X | 0 | 0 | 0 | 0 | 0 |
| 环氧 | 0 | 0 | 0 | 0 | 0 | 0 |
| 铁氟龙 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电子 | 0 | 0 | 0 | 0 | 0 | 0 |
| 厚膜基板 | 0 | 0 | X | 0 | 0 | 0 |
| 电线 | 0 | 0 | 0 | 0 | 0 | 0 |
| 电缆 | X | 0 | 0 | 0 | 0 | 0 |
| 塑料 | 0 | 0 | 0 | 0 | 0 | 0 |
| 焊接 | X | 0 | 0 | 0 | 0 | 0 |
| 铜合金/黄铜 | X | 0 | 0 | 0 | 0 | 0 |
| 本表格依据 SJ/T 11364 的规定编制。 | | | | | | |
| 0：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。 | | | | | | |
| X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。 | | | | | | |
| 铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。 | | | | | | |

CHINA RoHS COMPLIANCE

| Component Name | Hazardous Substances | | | | | |
|------------------------|----------------------|--------------|--------------|--------------------------------|--------------------------------|---------------------------------------|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Chromium VI Compounds (Cr(VI)) | Polybrominated Biphenyls (PBB) | Polybrominated Diphenyl Ethers (PBDE) |
| Housing | O | O | O | O | O | O |
| PCB Board | X | O | O | O | O | O |
| Electrical Connectors | O | O | O | O | O | O |
| Piezoelectric Crystals | X | O | O | O | O | O |
| Epoxy | O | O | O | O | O | O |
| Teflon | O | O | O | O | O | O |
| Electronics | O | O | O | O | O | O |
| Thick Film Substrate | O | O | X | O | O | O |
| Wires | O | O | O | O | O | O |
| Cables | X | O | O | O | O | O |
| Plastic | O | O | O | O | O | O |
| Solder | X | O | O | O | O | O |
| Copper Alloy/Brass | X | O | O | O | O | O |

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.

Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.

Model Number
441A42

MODULAR SERIES TWO WIDE ENCLOSURE

Revision: D
ECN #: 21237

PHYSICAL

| | | | |
|------------------------------|---------|------------------|-----|
| Size (H x W x L): | in | 6.2 x 4.3 x 10.2 | |
| | [cm] | [16 x 11 x 26] | |
| Available Module Space | width | 18 HP | [1] |
| Weight | lb [kg] | 2.6 [1,2] | [2] |
| Electrical Power Connectors: | | | |
| Input AC (line) | type | IEC 320 | [3] |

NOTES:

- [1] Requires one 9 HP wide power module, leaving 9 HP available for signal conditioning modules. (Typical signal conditioners are either 9 HP or 18 HP wide. Consult appropriate specification.)
- [2] Empty weight with no modules.
- [3] Not used when operated with Model 441A102 Battery Power Module.
- [4] See PCB Declaration of Conformance PS024 for details.

SUPPLIED ACCESSORIES:

Series 017 Power Cord
100-2973-30 Ferrite Bead



All specifications are at room temperature unless otherwise specified.

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In the interest of constant product improvement, we reserve the right to change specifications without notice.

| | | | | |
|----------------------|-----------------------|-----------------------|-----------------------|--------------|
| Drawn: <i>BLS</i> | Engineer: <i>BJA</i> | Sales: <i>BJA</i> | Approved: <i>FEJ</i> | Spec Number: |
| Date: <i>12-8-04</i> | Date: <i>12-16-04</i> | Date: <i>12-20-04</i> | Date: <i>12/28/04</i> | 11600 |

**PCB PIEZOTRONICS**^{INC}
ELECTRONICS DIVISION

3425 Walden Avenue, Depew, NY 14043

800-828-8840

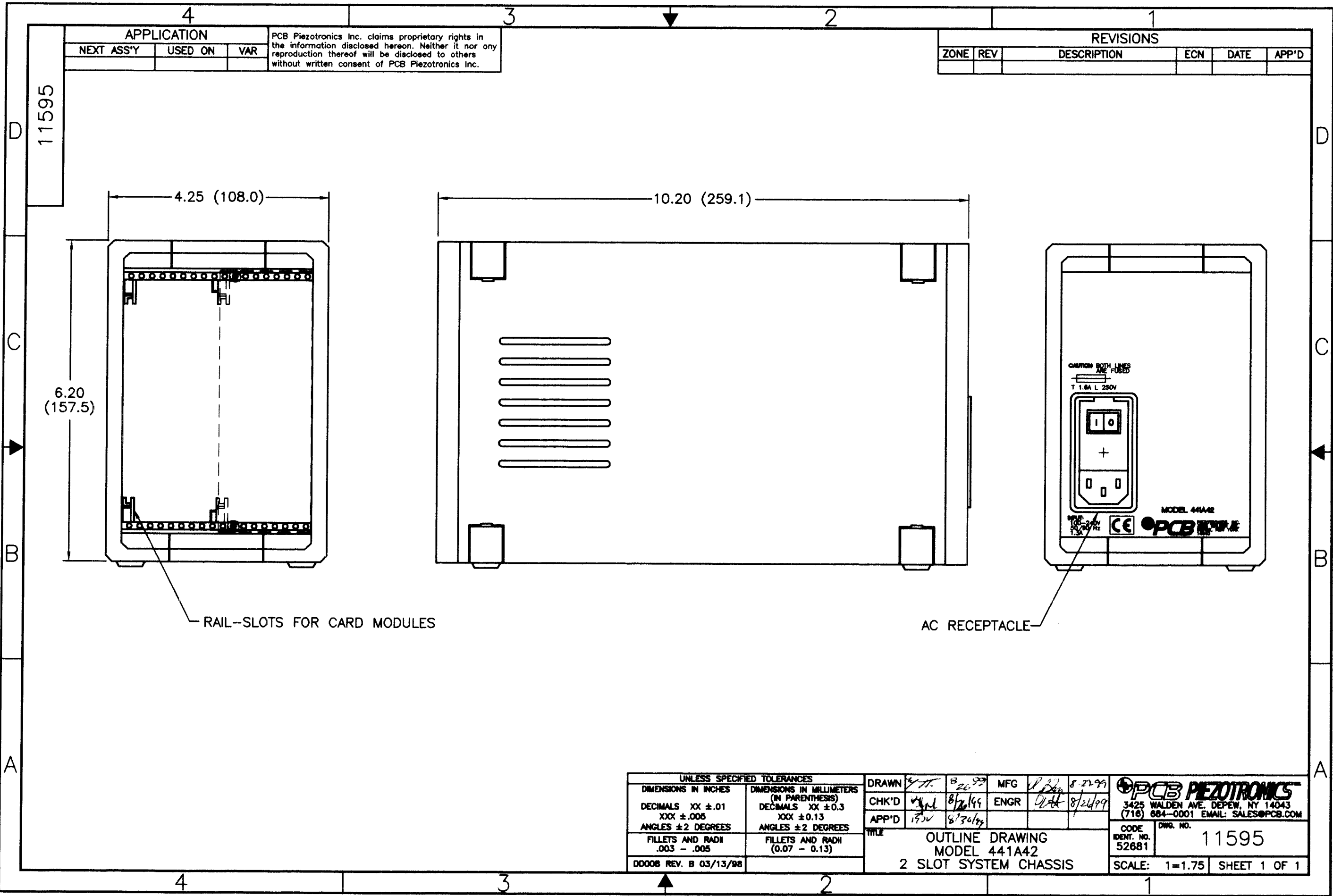
Fax (716) 684-0987

E-Mail: sales@pcb.com

| APPLICATION | | |
|-------------|---------|-----|
| NEXT ASS'Y | USED ON | VAR |
| | | |

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| REVISIONS | | | | | |
|-----------|-----|-------------|-----|------|-------|
| ZONE | REV | DESCRIPTION | ECN | DATE | APP'D |
| | | | | | |



RAIL-SLOTS FOR CARD MODULES

AC RECEPTACLE

| UNLESS SPECIFIED TOLERANCES | | | | DRAWN | | MFG | | PCB PIEZOTRONICS |
|-------------------------------|-------------------------------|--|-------------------------------|---------|---------|----------------------------|---------|-----------------------|
| DIMENSIONS IN INCHES | | DIMENSIONS IN MILLIMETERS (IN PARENTHESIS) | | 8/26/99 | 8/27/99 | 8/26/99 | 8/27/99 | |
| DECIMALS XX ±.01 XXX ±.006 | DECIMALS XX ±0.3 XXX ±0.13 | DECIMALS XX ±.01 XXX ±.006 | DECIMALS XX ±0.3 XXX ±0.13 | 8/26/99 | 8/27/99 | 8/26/99 | 8/27/99 | |
| ANGLES ±2 DEGREES | | ANGLES ±2 DEGREES | | APP'D | | | | CODE IDENT. NO. 52681 |
| FILLETS AND RADII .003 - .005 | | FILLETS AND RADII (0.07 - 0.13) | | TITLE | | | | DWG. NO. 11595 |
| D0008 REV. B 03/13/98 | | OUTLINE DRAWING MODEL 441A42 2 SLOT SYSTEM CHASSIS | | | | SCALE: 1=1.75 SHEET 1 OF 1 | | |