



Model 070M69

**Computational ICP® sensor signal cond. module, 8-channels, 4 differenced
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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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.

COMPUTATIONAL SIGNAL CONDITIONER MODULE

Model 070M69

OPERATING MANUAL

MANUAL NUMBER: 61056
MANUAL REVISION: NR
ECN NUMBER: 43917



Table of Contents

1.0	Chassis and Power Supply.....	1
1.1	Introduction: Safety Considerations.....	1
1.2	Description.....	2
1.2.1	Chassis (Models 441A33, 441A35, 441A38, 441A42, 441A43, 441A45, and 441A49).....	2
1.2.2	AC Power Supply (Model 441A101).....	2
1.2.3	DC Power Supply (Model 441A102).....	3
1.2.4	441A38 with Built-In AC Power Supply.....	3
1.3	Maintenance and Repair.....	3
2.0	Product Overview.....	3
3.0	Description.....	3
4.0	Operation.....	4
4.1	Grounding.....	4
5.0	Maintenance and Repair.....	4

Appendix A: Photo of 070M69 Module

1.0 Chassis and Power Supply

1.1 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 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 2000 meters. The pollution degree for operation of the 440 Series 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 441A101 requires 100 to 240 VAC with 1.3 amps to operate. It gets its power via an AC line cord that plugs into the receptacle on the rear panel. *(The Model 441A102 – DC supply does not use this receptacle.)*

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. See Figure 1.

Slot – carefully pry to expose fuse drawers

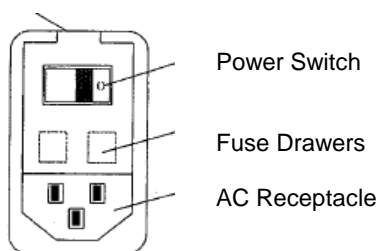


Figure 1. Fuse Replacement

1.2 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 module (customer specified). This power supply is either AC or battery power, depending on customer requirements. It should be noted, however, that the AC and DC power supplies are separate units, having differing part numbers. See Section 1.2.3 and 1.2.4 for a more detailed description of the power supplies.

1.2.1 Chassis (Model 441A33, 441A35, 441A38, 441A42, 441A43, 441A45, and 441A49)

The chassis configuration varies, ranging from two slots to nine; one of these slots (extreme right) is reserved for the power supply. 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. See Figure 1.

Eurocard-style plug-in modules occupy the remaining slots.

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

The Models 441A33, 441A35, and 441A38 are the computer-controlled versions of the standard

chassis. The back panel of this chassis has one RS-232 connector and two RS-485 connectors marked “in” and “out”. Also located on the rear panel is a cooling fan.

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.

Models 441A42, 441A43, 441A45, and 441A49 are “slave” racks designed to be controlled by a “master” rack (441A33, 441A35, and 441A38). These racks do not have an RS-232 connector, but only two RS-485 connectors, which may be connected to either a master, or another slave in a daisy chain fashion. At least one master must be in the system if it is desired to use computer control.

Located on the rear panel of these racks is a cooling fan, which normally is on. If it is desired to turn off the 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 now 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.

1.2.2 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.

The power unit supplies a maximum of 45 watts of power. Please note that while this unit is rated for a maximum power of 45 W, CE requirements mandate that the load not exceed 30 Watts.

Power requirements are found on the Specification Sheet for the individual module. To determine the total power of your particular set-up, add the powers for all modules. The total must be \leq 30 watts.

1.2.3 DC Power Supply (Model 441A102)

Model 441A102 is a single width, CE marked, rechargeable DC battery power supply designed to fit only the extreme right slot of the PCB Series Modular chassis. It supplies a maximum of 30 watt/hrs 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.

It can also be used with an external 12VDC supply like a car battery by using the supplied DC power cord Model 017A22. Alternatively, it may be line powered using the optional Model 488A09 AC power adaptor. Both these external power sources plug into the EXT DC jack located on the front panel. Refer attached operation guide for the Model 441A102 in appendix A.

1.2.4 441A38 with Built-In AC Power Supply

The Model 441A38 is an 8-slot chassis that has a built-in power supply. This chassis does not require the use of the 441A101 or 441A102 power supply modules. This chassis requires AC-line power. It supplies a maximum of 100 watts of power and may be used to operate single or multiple signal conditioning modules.

1.3 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 chassis with a soft cloth when dusty. If you have trouble with your particular unit, contact the factory for assistance. Because of the sophisticated nature of PCB instrumentation, **field repair is not recommended**. Any field repairs on this unit will void 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 service, 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.

2.0 Product Overview

Model 070M69 Computational Signal Conditioner is an ICP[®] / voltage signal conditioner module. It is intended for use with piezoelectric, force sensors. This module is particularly useful for measurements of force and moments in Force Limited Vibration Testing systems.

The Computational Signal Conditioner features eight inputs for ICP[®] sensors. Optionally, the constant current can be turned off (set to 0 mA) and the inputs can be used for voltage signals.

The unit has four Difference Outputs and one Summed Output. The Summed Output also has gain available with x0.1, x1, x10 settings.

3.0 Description

The Model 070M69 Computation Signal Conditioner module is a 2-wide (two slots) module designed for use in PCB's 440 Series of modular signal conditioners. The model is an 8-channel ICP[®] sensor signal conditioner that provides five output signals that are mathematical functions of the eight input signals.

The eight input channels all have BNC jack connectors and they are labeled as +V1, -V1, +V2, -V2, +V3, -V3, +V4, and -V4,

The output signals all have BNC jack connectors and include the following:

Four Difference Outputs that are each generated from a set of two input channel signals. These outputs are labeled as $\Delta V1$, $\Delta V2$, $\Delta V3$, and $\Delta V4$ and they are mathematically equal to the following:

$$\begin{aligned}\Delta V1 &= (+V1) - (-V1) \\ \Delta V2 &= (+V2) - (-V2) \\ \Delta V3 &= (+V3) - (-V3) \\ \Delta V4 &= (+V4) - (-V4)\end{aligned}$$

The fifth Summed Output is labeled as $\Sigma \Delta V$ and it is generated from the four Difference Outputs and a gain function. The equation for this output is as follows:

$$\Sigma \Delta V = \text{Gain} * (\Delta V1 + \Delta V2 + \Delta V3 + \Delta V4)$$

The gain switch allows for gain values of x0.1, x1, or x10 in the equation above.

This computational signal conditioner is used to get moment measurements in Force Limited Vibration Testing.

This unit can also be used to just sum four input channels by applying signals to the +Vx channels only, leaving the -Vx channels open. This would result in the following Summed Output equation:

$$\Sigma \Delta V = \text{Gain} * ((+V1) + (+V2) + (+V3) + (+V4))$$

Eight red LED fault monitors, one per channel, are located on the front panel to provide the user a means to check circuit continuity and operation. Input faults, short or open, are indicated by the fault LED being solid red.

Additionally, one yellow LED is located in the upper right-hand corner of the front panel. This is the Overload LED and it is on whenever any input, any Difference Output, or the Summed Output exceed 10 Volts. This LED will remain on for as long as one of these signals is above 10 Volts.

4.0 Operation

The Model 070M69 is designed to fit into the PCB Modular Signal Conditioning System. It may be used in any size chassis in combination with any other modular series models. For further information on the PCB Modular System, consult

the PCB Modular Signal Conditioning System sales sheet.

The Model 070M69 can be powered from the 441A101 AC Power Module or the 441A102 DC Power Module. Additionally it can be used in the 441A38 chassis that includes a built in AC Power Module.

Please note that use of the 070M69 module with the 441A102 DC Power Module will cause an increase in the ICP® Excitation Voltage and Current supplied to the sensors. This is due to the higher 30 VDC Supply Voltage of this power module compared to the other power sources. The higher ICP® Excitation Voltage and Current will not have any adverse affects on the operation of this unit or the sensors attached to it. Please see the specification sheet for more details.

4.1 Grounding

Indiscriminate grounding of instruments can introduce ground loop interference. To prevent this, it is necessary to insure that the signal ground lines of the 070M69 and other instruments used with this unit are grounded at one point only in the measurement system.

If an instrument with a mains socket chassis terminal is used in the measurement system, check that a) that only one of the instruments has its signal ground connected via the chassis to mains ground, (b) that the housing of the transducer is isolated from grounded measurement sources.

If the measurement set-up is mounted in a metal instrumentation rack, ensure that only one of the instruments has its signal ground connected to the chassis (and chassis connected to mains ground if the unit has a mains socket chassis terminal).

5.0 Maintenance and Repair

No maintenance is required for this modular unit, other than wiping the exterior of the enclosure with a soft cloth when dusty. If you have trouble with your particular unit, contact the factory for assistance. Because of the sophisticated nature of PCB instrumentation, **field repair is not recommended.** Any field repairs on this unit will

void 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's 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 service, 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.

Appendix A:



Photo of the 070M69 Module

ELECTRICAL

Sensor Excitation Voltage (for ICP @ sensors)
 Sensor Excitation Current
 AC Mode Coupling Time Constant
 Voltage Gain
 Frequency Response (-5%): 1 V pk output
 Frequency Response (-5%): 5 V pk output
 Spectral Noise - AC - Gain 1:
 1 Hz
 10 Hz
 100 Hz
 1 kHz
 10 kHz

VDC
 mA (selectable)
 sec
 VAC
 Hz
 Hz
 $\mu V/\sqrt{Hz}$
 $\mu V/\sqrt{Hz}$
 $\mu V/\sqrt{Hz}$
 $\mu V/\sqrt{Hz}$
 $\mu V/\sqrt{Hz}$
 μV
 $\mu V/\sqrt{Hz}$
 $\mu V/\sqrt{Hz}$
 $\mu V/\sqrt{Hz}$
 $\mu V/\sqrt{Hz}$
 μV
 V
 ohms
 LED
 Vpk
 watts
 watts
 VDC/watts
 VDC/watts
 VDC/watts
 VDC/watts
 $^{\circ}F$ [$^{\circ}C$]
 type
 type
 type
 in [mm]
 lb [kg]

25.5 (± 2.5)
 0, 2, 4, 8, 12, 20 ($\pm 30\%$) [2] [14]
 >10
 x0.1, x1, x10 ($\pm 3\%$)
 0.05-100,000 [3]
 0.05-20,000 [3] [4]
 0.69 [5]
 0.28
 0.25
 0.24
 0.23
 24.2 [5]
 0.89 [6]
 0.26
 0.25
 0.23
 0.23
 24.4 [6]
 > ± 10
 <100
 Overload, Fault [7]
 Open or Short
 >10 [8]
 5.76 [9] [11]
 1.28 [10]
 +26 to 31 at 177.5 mA/4.97 [9]
 +26 to 31 at 17.5 mA/0.49 [10]
 +15 at 30.4 mA/0.46
 -15 at 21.9 mA/0.33
 32 to +120 [0 to +50]
 BNC
 BNC
 BNC [12]
 5.05 x 3.6 [128,27 x 91,44] [13]
 0.865 [0,39]

OPTIONAL VERSIONS

Optional versions have identical specifications and accessories as listed for the standard model except where noted by the letter prefixes below. More than one option may be used.

-None-

Noise Broadband (1Hz - 10kHz)
 Spectral Noise - AC - Gain 1:

1 Hz
 10 Hz
 100 Hz
 1 kHz
 10 kHz

Noise Broadband (1Hz - 10kHz)
 Output Range

1 Hz
 10 Hz
 100 Hz
 1 kHz
 10 kHz

Output Impedance
 Sensor Status Display
 Fault Condition
 Overload Condition
 Maximum Power Required (ICP @ Mode)
 Maximum Power Required (Voltage Mode)
 Power Required:

24.4 [6]
 > ± 10
 <100
 Overload, Fault [7]
 Open or Short
 >10 [8]
 5.76 [9] [11]
 1.28 [10]
 +26 to 31 at 177.5 mA/4.97 [9]
 +26 to 31 at 17.5 mA/0.49 [10]
 +15 at 30.4 mA/0.46
 -15 at 21.9 mA/0.33
 32 to +120 [0 to +50]

ENVIRONMENTAL

Operating Temperature Range

$^{\circ}F$ [$^{\circ}C$]

PHYSICAL

Connectors:
 Input (8)
 Differenced Output (4)
 Summed Output (1)

BNC
 BNC
 BNC [12]
 5.05 x 3.6 [128,27 x 91,44] [13]
 0.865 [0,39]

Size (H x W)
 Weight

NOTES:

- [1] Computational Function = [(A-B) + (C-D) + (E-F) + (G-H)] x Gain; where A thru H are (8) individual inputs.
- [2] Rotary switch adjustable. Select 0 mA if voltage inputs are used.
- [3] Switch controls all channels.
- [4] Measured at Gain = 1.
- [5] Distortion occurs at upper frequency limit.
- [6] Tested in voltage mode (0 mA).
- [7] Tested in ICP @ mode (4 mA).
- [8] Sensor Status Display contains (1) overload indicator for the entire system, and (8) fault indicators. {(1) fault indicator per input.}
- [9] Overload condition is above 10 volts for any input, any differenced output or summer output.
- [10] Power consumption when unit is operating in ICP @ mode (20 mA).
- [11] Power consumption when unit is operating in voltage mode (0 mA).
- [12] Maximum number of 070M69 Computational Signal Conditioners that can be powered by (1) 441A101 is (5). Other modules must be calculated not to exceed total power of 30 watts.
- [13] Sum of the (4) differenced outputs.
- [14] Double width unit.

Values shown are when powered by a 441A101. When powered by a 441A102, the values change to 0, 2.5, 5, 10, 15, 25 ($\pm 30\%$).

All specifications are at room temperature unless otherwise specified.

ICP® is a registered trademark of PCB Piezotronics, Inc.	Drawn: LH	Engineer: RF	Sales: JIM	Approved: EB	Spec Number:
In the interest of constant product improvement, we reserve the right to change specifications without notice.	Date: 7/31/09	Date: 7/31/09	Date: 7/31/09	Date: 7/31/09	14090



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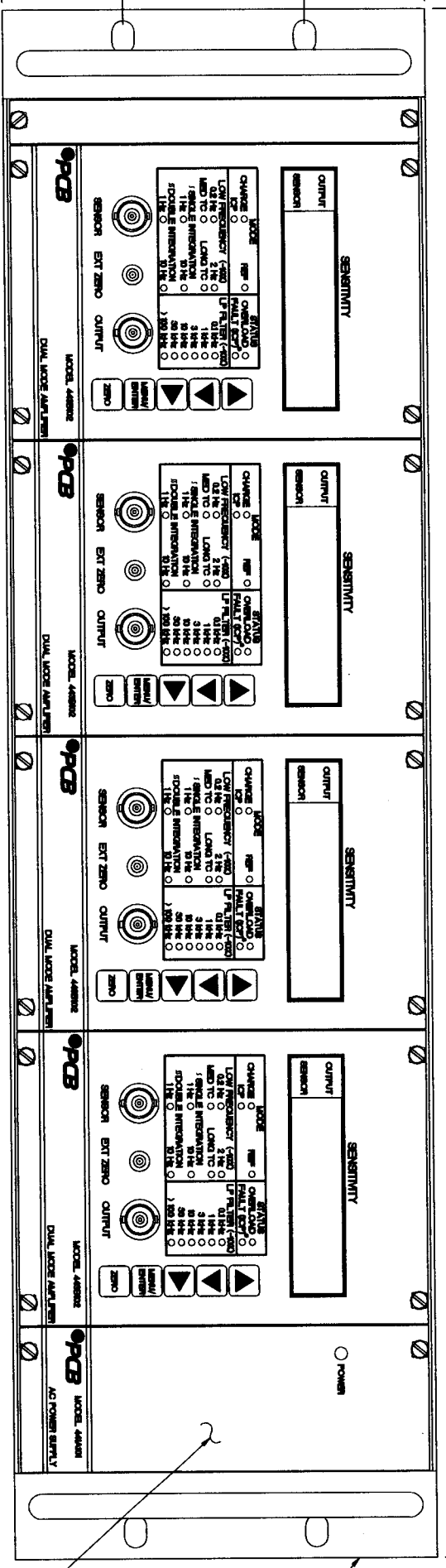
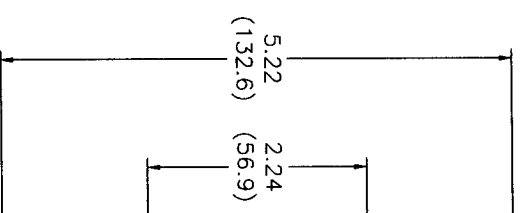
APPLICATION	USED ON	VAR
NEXT ASSY		

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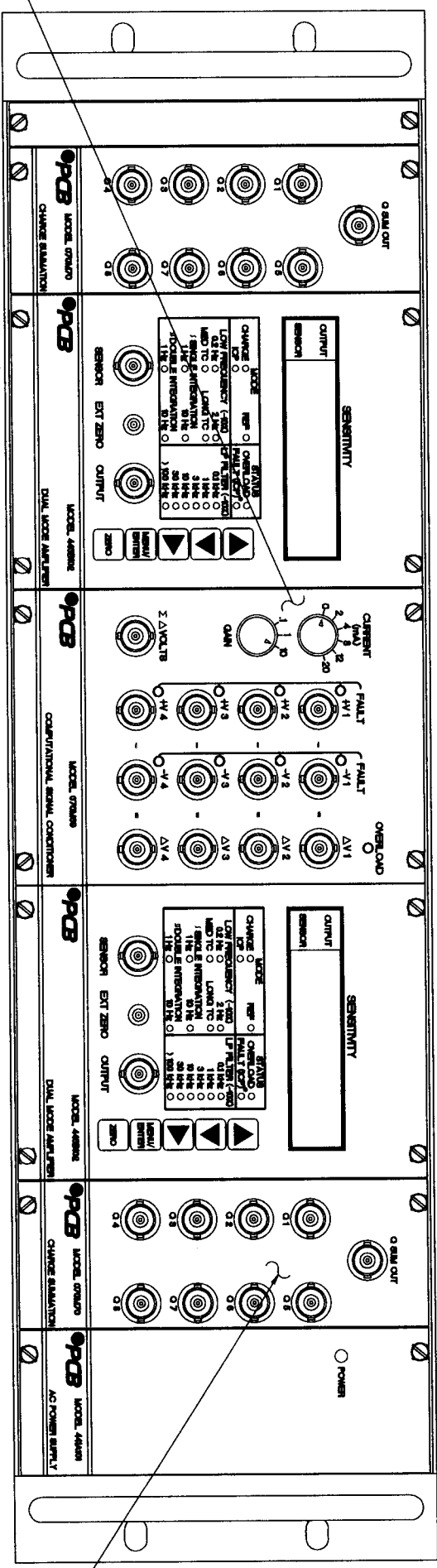
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REVISIONS	1				
ZONE	REV	DESCRIPTION	ECN	DATE	APP'D
B		"C" TO "D" SIZE DWG FOR BETTER REPRESENTATION.	10042	2/3/99	
C		CHANGED 070M70 TO BNC CONN 118715/16/00			Keyl

10205

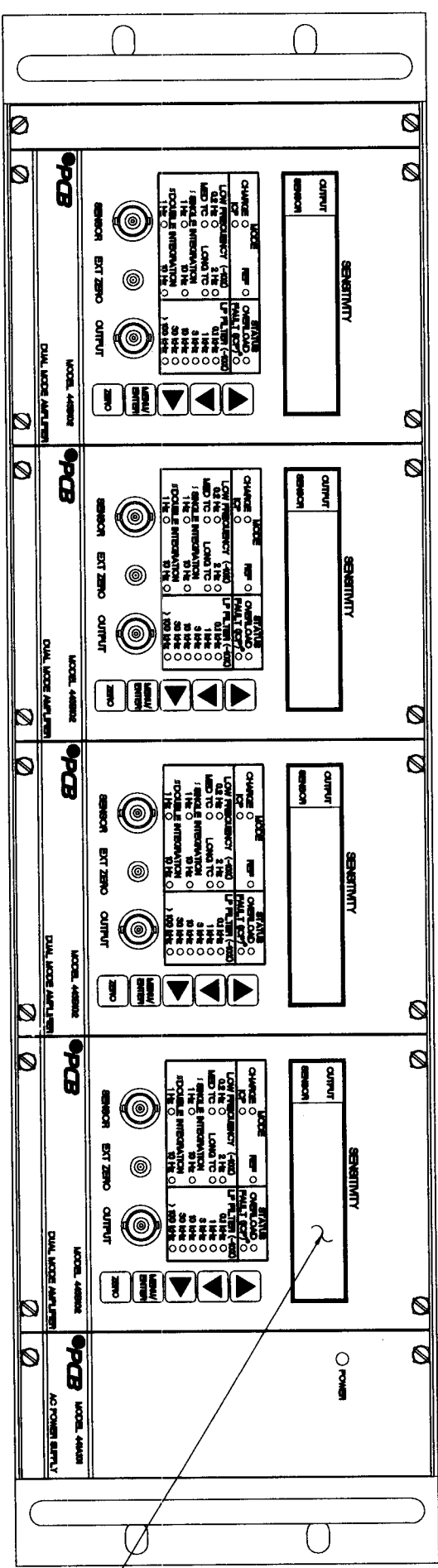


MODEL 441A101
AC POWER SUPPLY



MODEL 441A101
AC POWER SUPPLY

MODEL 441A101
AC POWER SUPPLY



MODEL 070M70
CHARGE SUMMATION

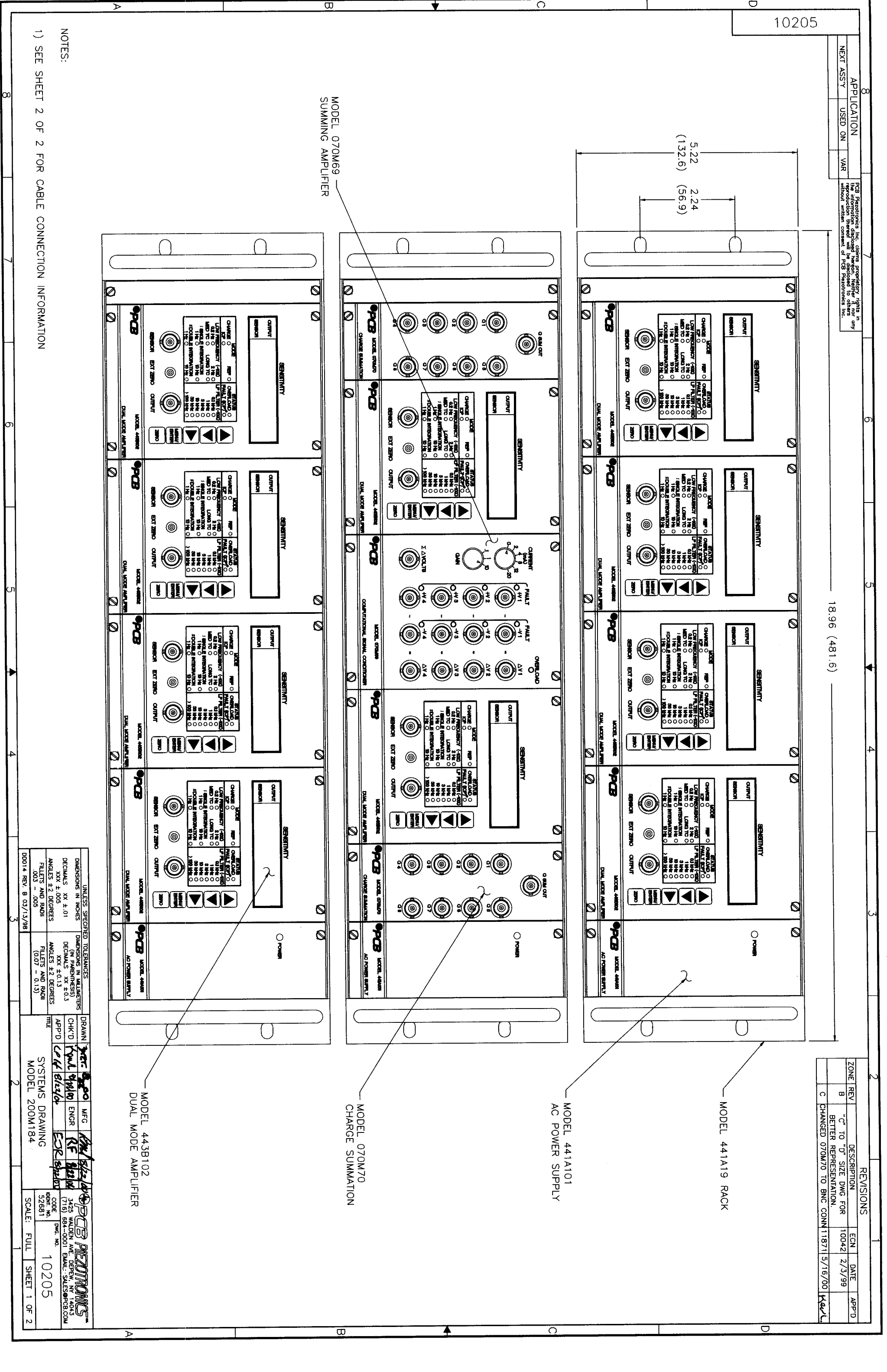
MODEL 443B102
DUAL MODE AMPLIFIER

MODEL 070M69
SUMMING AMPLIFIER

NOTES:
1) SEE SHEET 2 OF 2 FOR CABLE CONNECTION INFORMATION

UNLESS SPECIFIED TOLERANCES	
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS
DECIMALS XX ±.01	DECIMALS XX ±0.3
XXX ±.005	XXX ±0.13
ANGLES ±2 DEGREES	ANGLES ±2 DEGREES
FILLETS AND RADI	FILLETS AND RADI
.003 - .005	(0.07 - 0.13)

DRAWN	DATE	MFG	CHK'D	ENGR
Keyl	1/14/99	RF	Keyl	RF
APP'D				
Keyl				
SYSTEMS DRAWING				
MODEL 200M184				
SCALE: FULL	SHEET 1 OF 2			



APPLICATION	USED ON	VAR
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REVISIONS

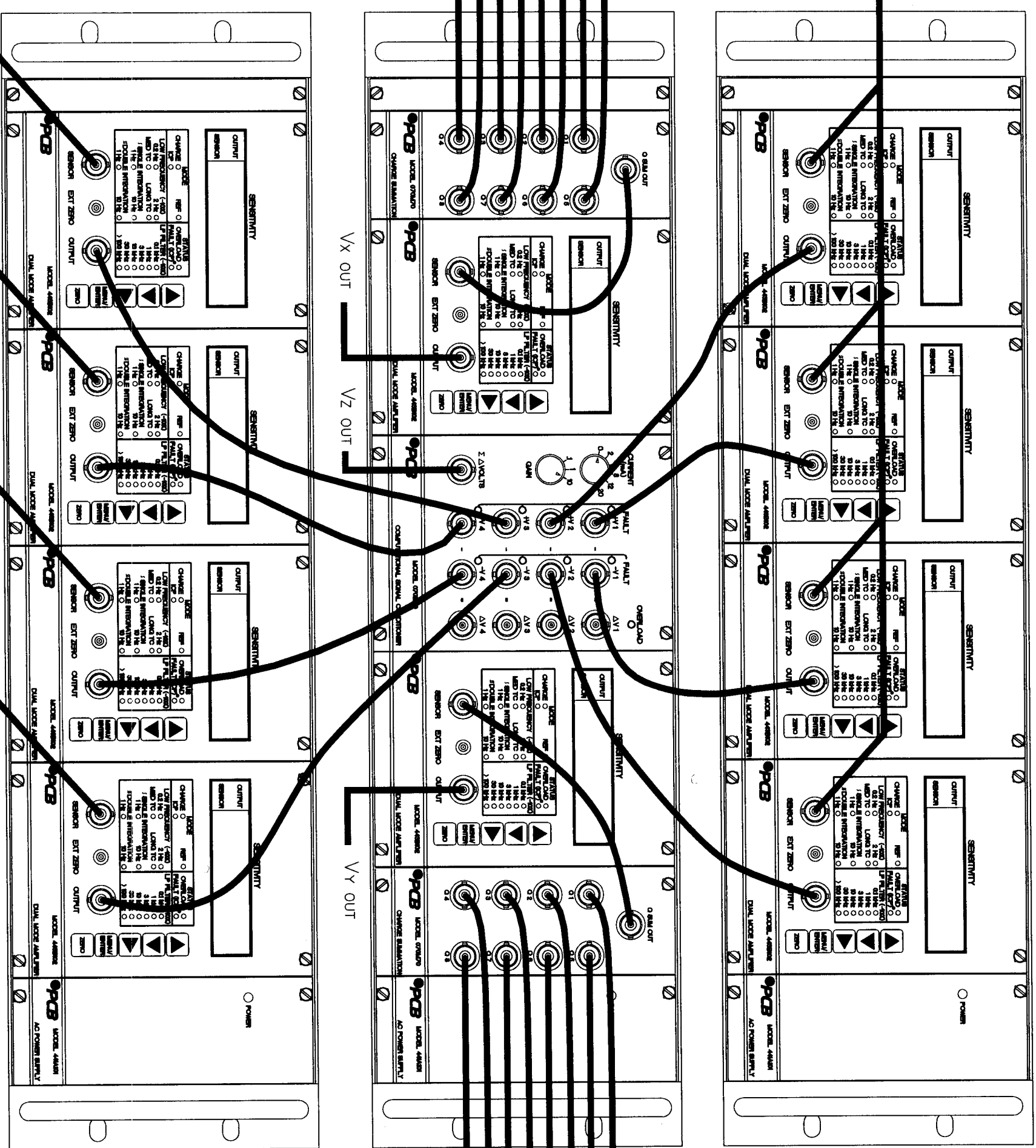
ZONE	REV	DESCRIPTION	ECN	DATE	APP'D
		SEE SHEET 1 OF 2			

10205

QZ 1 THRU QZ 4
(SEPARATE CABLES BUT NOT SHOWN)

Q X 1
THRU
Q X 8

Q Y 1
THRU
Q Y 8



QZ 5 THRU QZ 8
(SEPARATE CABLES BUT NOT SHOWN)

UNLESS SPECIFIED TOLERANCES DIMENSIONS IN INCHES (IN PARENTHESES) DIMENSIONS IN MILLIMETERS

DECIMALS XX ±.01
XXX ±.005
ANGLES ±2 DEGREES
FILLET RADIUS .003 - .005

DRAWN: *W. J. ...* MFG: *PCB Piezotronics*
CHK'D: *W. J. ...* ENGR: *W. J. ...*
APP'D: *W. J. ...* DATE: *...*

SYSTEMS DRAWING
MODEL 200M184

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SCALE: FULL SHEET 2 OF 2