



Model 480B21

3-channel, Battery-powered, 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

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.

OPERATION MANUAL FOR MODEL 480B21 BATTERY POWERED SIGNAL CONDITIONER

1

1.0 INTRODUCTION

The Model 480B21 is a 3-channel ICP[®] Battery Power Signal Conditioner. The voltage gain switches offer amplification factors of 1, 10, and 100.

2.0 DESCRIPTION

Refer to Drawings and Specifications in the rear of this manual. Also see Figure 1 for Schematic Diagram.

The Model 480B21 operates from three self-contained 9-volt transistor radio batteries and supply constant-current power to the built-in sensor amplifier in ICP[®] sensors or in-line and adaptor amplifiers such as the 401-422 series. (See Guide G-0001 for a comprehensive coverage of the ICP[®] concept).

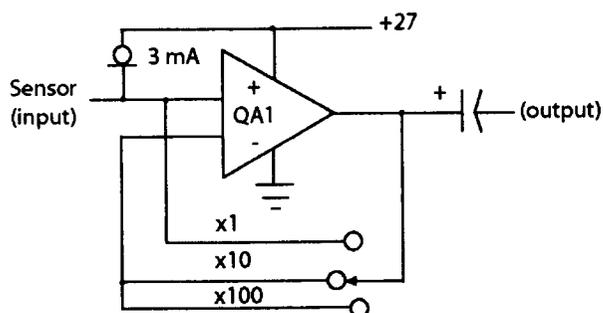


Figure 1
Schematic Diagram Model 480B21

A standard triax sensor jack is located on the front panel. This jack allows for a direct 3-channel cable connection to the input circuits. Use PCB Series 010D cable.

The unit is small enough to be easily carried in the field and, being battery operated, is especially noise-free and unaffected by ground loops. The low battery drain affords good battery life. An additional connector for an optional, DC power adapter is also included. Contact PCB for various adapters available.

Also, the gain amplifiers are "unpowered" in the gain of "1" position for extended battery life.

A notable feature is the unit's low-frequency response. (See Specification Sheets). Another feature is a front panel meter which serves as a fault monitor check for circuit connections, and when used in connection with a front panel momentary battery test rocker switch, can also check the condition of the batteries. Another refinement is a small jack on the top edge, which can be used for external, wide range, DC input (30-48 VDC).

The front panel meter referred to above is color-coded to monitor circuit faults and to check battery conditions. Subsequent sections of this manual will describe these functions in detail.

3.0 OPERATION

The fault monitor consists of a color-coded meter and a three-position selector switch. The switch selects the channel to be monitored.

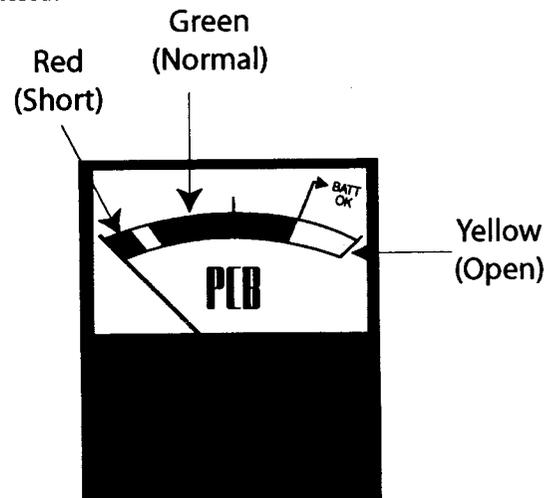


Figure 2
Fault Monitor Meter

When an ICP[®] sensor is connected to the input "SENSOR" jack, the meter will indicate approximately mid-scale (+13V nominal) if the sensor's built-in amplifier is functioning properly and cables are intact. (Certain special ICP[®] sensors such as low-noise or cryogenic units have lower turn-on voltage. Consult specification sheet).

In this manner, the meter can be used to continuously monitor the channel for normal operation.

Immediately after connecting a readout instrument (oscilloscope, meter, recorder, etc.) to the "output" jack the 47 μF coupling capacitor will begin charging through the input resistance of the readout instrument. This charging will cause an apparent "drifting" of the output signal until the capacitor is fully charged. Such drifting is perfectly normal.

3.1 OUTPUT VOLTAGE LIMITATIONS

Certain ICP[®] sensors are capable of a 10 volt output voltage swing. The Model 480B21 with a 27V supply will allow the signal to go to ±10 volts, assuming a 13 volt turn-on for the sensor.

3.2 CURRENT DRIVE LIMITATIONS

In the interest of battery life, the current output of Model 480B21 is fixed at 3 mA. This current will adequately handle high-frequency signals in cables up to approximately 100 ft. long. Longer cables can be driven, but with sacrifice of high-frequency response.

3.3 CHANGING THE BATTERIES

When the batteries require changing, as indicated by the front panel meter, proceed as follows:

Remove the cover on the rear panel of the 480B21. Lift each battery up, at the contact end, and remove batteries. Connect new 9-volt batteries in place and replace the rear cover. Notice the slots in case for proper cover placement, then slide into position.

In normal use, the life expectancy of the batteries is in excess of 25 hours of operation when gain is in the x10 or x100 position. When gain switch is in unity position, battery life is approximately 40 hours. Turn unit off when not in use to conserve battery life.

NOTE: Use Duracell® Mn 1604 or equivalent NEDA 1604A battery.

3.4 BATTERY TEST

The Models 480B21 incorporates a momentary battery test rocker switch as part of the ON/OFF switch.

Depressing this rocker, switches the meter from the "SENSOR" jack to the battery high side. Normal circuit operation is not affected by this action and releasing the rocker returns the meter to the sensor bias monitor function.

Replace batteries if meter pointer does not move to "BATT OK" mark on the meter when power is "ON", and "BATT TEST" rocker is depressed.

4.0 MAINTENANCE AND REPAIR

Aside from battery replacement, no Maintenance is required for these units. It is suggested, should trouble occur, that you contact the factory for assistance. A repair or replacement quotation is available at no charge. Before returning equipment for repair, it is recommended that the user confer with a factory application engineer (or international representative) to first troubleshoot the problem.

5.0 RETURN PROCEDURE

To expedite the repair process, contact a factory application engineer to obtain a RETURN MATERIAL AUTHORIZATION (RMA) number prior to sending equipment to the factory. Please have information, such as model number, serial number and description of the problem, available.

Customers outside the U.S. should consult their local PCB distributor for information on returning equipment. For exceptions to this guideline, please contact the International Sales department to request shipping instructions and an RMA.

For further assistance, please call the electronics Division Toll Free number: 888-828-8840 or fax us at (716) 684-0987. You may also receive assistance via e-mail at electronics@pcb.com or visit our web site at www.pcb.com.

6.0 CUSTOMER SERVICE / WARRANTY

The employees of PCB strive to provide superior, unmatched customer service. Should you at any time find yourself dissatisfied with any PCB product for any reason, consult a factory Application Engineer or local representative/distributor to discuss repair, refund, or exchange procedures.

When unexpected measurement problems arise, call our 24-hour Sensor Line to discuss your immediate dynamic instrumentation needs with a Factory Representative. Dial (716) 684-0001.

MANUAL NUMBER: 20176
MANUAL REVISION: NR

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ELE-480B21OPMAN-0601

	ENGLISH	SI	
Performance			
Channels	3	3	
Frequency Range(- 5 %)(x1, x10 Gain)	0.15 to 100,000 Hz	0.15 to 100,000 Hz	[1]
Frequency Range(- 10 %)(x100 Gain)	0.15 to 50,000 Hz	0.15 to 50,000 Hz	[1]
Voltage Gain(± 2 %)	1:1	1:1	
Voltage Gain(± 2 %)	1:10	1:10	
Voltage Gain(± 2 %)	1:100	1:100	
Fault/Bias Monitor/Meter(± 2 V)(midscale)	13 VDC	13 VDC	
Environmental			
Temperature Range	32 to 122 °F	0 to 50 °C	
Electrical			
Excitation Voltage(To Sensor)	25 to 29 VDC	25 to 29 VDC	[2]
Constant Current Excitation(± 0.25)(To Sensor)	2.0 to 3.2 mA	2.0 to 3.2 mA	
Discharge Time Constant	> 7 sec	> 7 sec	[3][4]
DC Offset(Maximum)	< 30 mV	< 30 mV	[3]
Spectral Noise(1 Hz)(Gain 1)	0.4 µV/√Hz	-128 dB	
Spectral Noise(10 Hz)(Gain 1)	0.1 µV/√Hz	-140 dB	
Spectral Noise(100 Hz)(Gain 1)	.06 µV/√Hz	-144 dB	
Spectral Noise(1,000 Hz)(Gain 1)	.04 µV/√Hz	-147 dB	
Spectral Noise(10,000 Hz)(Gain 1)	.04 µV/√Hz	-148 dB	
Broadband Electrical Noise(1 to 10,000 Hz)(Gain x1)	3.54 µV rms	-110 dB/mms	
Spectral Noise(1 Hz)(Gain 10)	1.80 µV/√Hz	-115 dB	
Spectral Noise(10 Hz)(Gain 10)	1.3 µV/√Hz	-118 dB	
Spectral Noise(100 Hz)(Gain 10)	0.75 µV/√Hz	-122 dB	
Spectral Noise(1,000 Hz)(Gain 10)	0.70 µV/√Hz	-123 dB	
Spectral Noise(10,000 Hz)(Gain 10)	0.35 µV/√Hz	-129 dB	
Broadband Electrical Noise(1 to 10,000 Hz)(Gain x10)	50.1 µV/mms	-86 dB/mms	
Spectral Noise(1 Hz)(Gain 100)	17.0 µV/√Hz	-95 dB	
Spectral Noise(10 Hz)(Gain 100)	12.0 µV/√Hz	-98 dB	
Spectral Noise(100 Hz)(Gain 100)	8.4 µV/√Hz	-102 dB	
Spectral Noise(1,000 Hz)(Gain 100)	6.4 µV/√Hz	-104 dB	
Spectral Noise(10,000 Hz)(Gain 100)	2.0 µV/√Hz	-114 dB	
Broadband Electrical Noise(1 to 10,000 Hz)(Gain x100)	500 µV/mms	-66 dB/mms	
Power Required(Standard)	Internal Battery	Internal Battery	
Internal Battery(Type)	9V	9V	
Battery Life(Standard Alkaline)	25-40 hours	25-40 hours	[5]
Power Required(Alternate)	DC Power	DC Power	
DC Power	25 mA	25 mA	
Internal Battery(Quantity)	3	3	
DC Power	30 to 40 VDC	30 to 40 VDC	
Physical			
Electrical Connector(Input, sensor)	BNC Jack	BNC Jack	[6]
Electrical Connector(Output, scope)	BNC Jack	BNC Jack	
Electrical Connector(External Power, DC)	DIN Jack	DIN Jack	
Electrical Connector(Input, sensor)	4-Pin Jack	4-Pin Jack	[6]
Size (Depth x Width x Height)	2.0 in x 5.0 in x 7.5 in	5.0 cm x 13 cm x 19 cm	
Weight(Including Batteries)	1.1 lb	0.5 kg	

OPTIONAL VERSIONS

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

NOTES:

[1] Low frequency response specified into 1M ohm load.
 [2] Excitation voltage to sensor limited by optional DC power voltage.
 [3] With 1M ohm load.
 [4] Un-buffered output, read out device input impedance affects discharge time constant and low frequency response of unit.
 [5] Alkaline type recommended for longest service life.
 [6] Use BNC's or Triax connector, not both at once. Cover all unused connectors with black ESD protective caps.
 [7] See PCB Declaration of Conformance PS024 for details.

OPTIONAL ACCESSORIES:

Model 488A12 Auto lighter adaptor 6-pin mini din
 Model 488B10 Power Supply, 100 to 125 VAC or 200 to 250 VAC input, 27 VDC @ 20 mA output.

Entered: RB	Engineer: CPH	Sales: KK	Approved: DY	Spec Number:
Date: 03/02/2020	Date: 03/02/2020	Date: 03/02/2020	Date: 03/02/2020	15125

Phone: 716-684-0001
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E-Mail: info@pcb.com

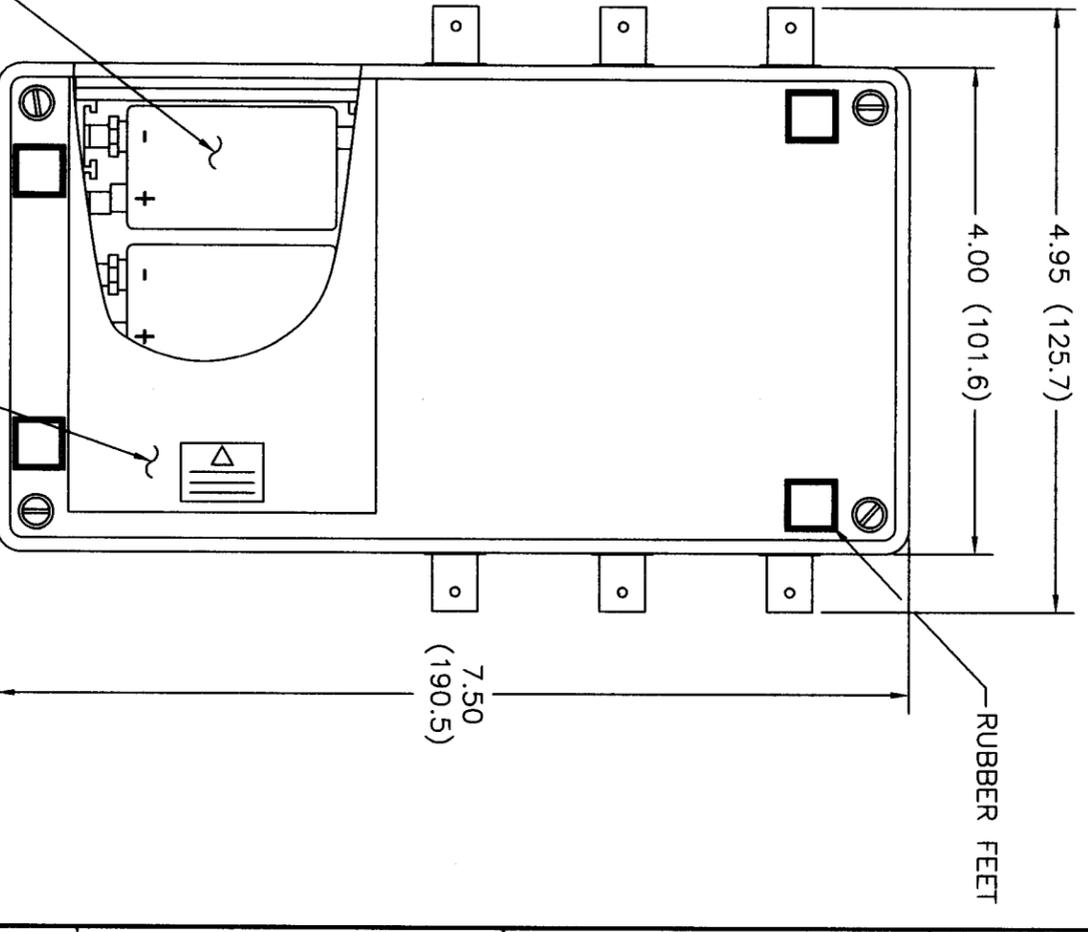
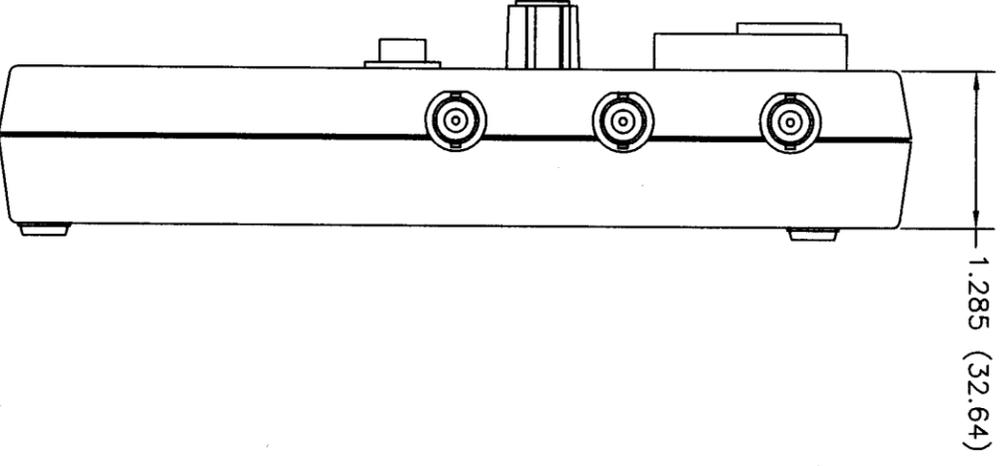
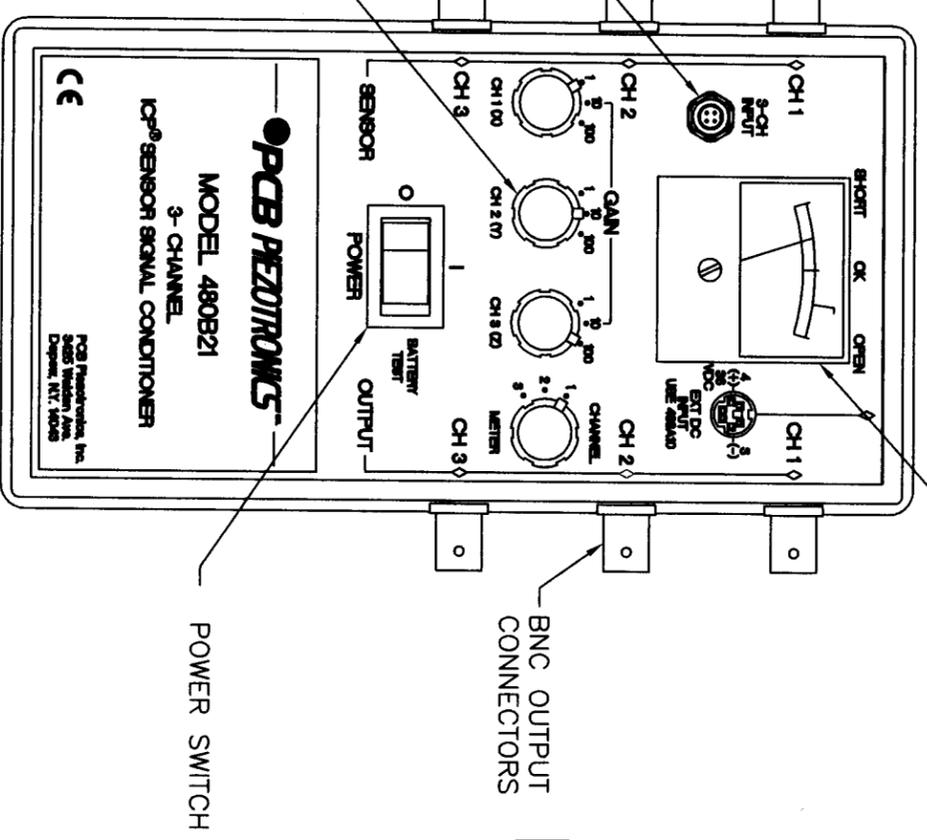
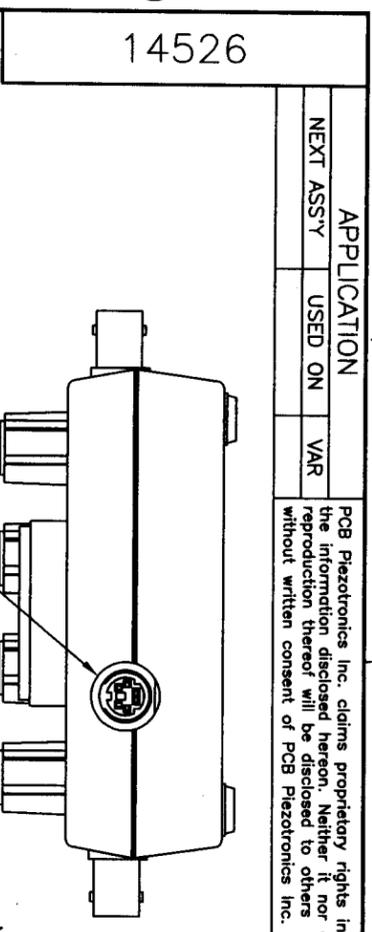
3425 Walden Avenue, Depew, NY 14043



All specifications are at room temperature unless otherwise specified.
 In the interest of constant product improvement, we reserve the right to change specifications without notice.
 ICP® is a registered trademark of PCB Piezotronics, Inc.

APPLICATION			
NEXT ASS'Y	USED ON	VAR	
PCB Piezotronics Inc. claims proprietary rights in the information disclosed hereon. Neither it nor any reproduction thereof will be disclosed to others without written consent of PCB Piezotronics Inc.			

REVISIONS					
ZONE	REV	DESCRIPTION	ECN	DATE	APP'D



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

DRAWN	10/11/00	16	001	MFG	10/16/00	PCB PIEZOTRONICS
CHK'D	10/11/00	ENGR	10/16/00	3425 WALDEN AVE. DEPEN, NY 14043		
APP'D	10/16/00	ESTR	10/16/00	(716) 684-0001 EMAIL: SALES@PCB.COM		
TITLE: OUTLINE DRAWING						
MODEL: 480B21						
ICP SENSOR SIGNAL CONDITIONER						
SCALE: 1=1.5	SHEET 1 OF 1		14526			

