



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**





Service, Repair, and Return Policies and Instructions
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The information contained in this document supersedes all similar information that may be found elsewhere in this manual.

Service – Due to the sophisticated nature of the sensors and associated instrumentation provided by PCB Piezotronics, user servicing or repair is not recommended and, if attempted, may void the factory warranty. Routine maintenance, such as the cleaning of electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the physical material of construction, is acceptable. Caution should be observed to ensure that liquids are not permitted to migrate into devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth and never submerged or have liquids poured upon them.

Repair – In the event that equipment becomes damaged or ceases to operate, arrangements should be made to return the equipment to PCB Piezotronics for repair. User servicing or repair is not recommended and, if attempted, may void the factory warranty.

Calibration – Routine calibration of sensors and associated instrumentation is recommended as this helps build confidence in measurement accuracy and acquired data. Equipment calibration cycles are typically established by the users own quality regimen. When in doubt about a calibration cycle, a good “rule of thumb” is to recalibrate on an annual basis. It is

also good practice to recalibrate after exposure to any severe temperature extreme, shock, load, or other environmental influence, or prior to any critical test.

PCB Piezotronics maintains an ISO-9001 certified metrology laboratory and offers calibration services, which are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to the normally supplied calibration, special testing is also available, such as: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For information on standard recalibration services or special testing, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment – *Following these procedures will ensure that your returned materials are handled in the most expedient manner.* Before returning any equipment to PCB Piezotronics, contact your local distributor, sales representative, or factory customer service representative to obtain a Return **Warranty, Service, Repair, and Return Policies and Instructions** Materials Authorization (RMA) Number. This RMA number should be clearly marked on the outside of all package(s) and on the packing

list(s) accompanying the shipment. A detailed account of the nature of the problem(s) being experienced with the equipment should also be included inside the package(s) containing any returned materials.

A Purchase Order, included with the returned materials, will expedite the turn-around of serviced equipment. It is recommended to include authorization on the Purchase Order for PCB to proceed with any repairs, as long as they do not exceed 50% of the replacement cost of the returned item(s). PCB will provide a price quotation or replacement recommendation for any item whose repair costs would exceed 50% of replacement cost, or any item that is not economically feasible to repair. For routine calibration services, the Purchase Order should include authorization to proceed and return at current pricing, which can be obtained from a factory customer service representative.

Contact Information – International customers should direct all inquiries to their local distributor or sales office. A

complete list of distributors and offices can be found at www.pcb.com. Customers within the United States may contact their local sales representative or a factory customer service representative. A complete list of sales representatives can be found at www.pcb.com. Toll-free telephone numbers for a factory customer service representative, in the division responsible for this product, can be found on the title page at the front of this manual. Our ship to address and general contact numbers are:

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
Toll-free: (800) 828-8840
24-hour SensorLineSM: (716) 684-0001
Website: www.pcb.com
E-mail: info@pcb.com



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	○	○	○	○	○	○
PCB板	X	○	○	○	○	○
电气连接器	○	○	○	○	○	○
压电晶体	X	○	○	○	○	○
环氧	○	○	○	○	○	○
铁氟龙	○	○	○	○	○	○
电子	○	○	○	○	○	○
厚膜基板	○	○	X	○	○	○
电线	○	○	○	○	○	○
电缆	X	○	○	○	○	○
塑料	○	○	○	○	○	○
焊接	X	○	○	○	○	○
铜合金/黄铜	X	○	○	○	○	○
本表格依据 SJ/T 11364 的规定编制。						
○：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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DOCUMENT REVISION: **D**

ECN: 46162

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).

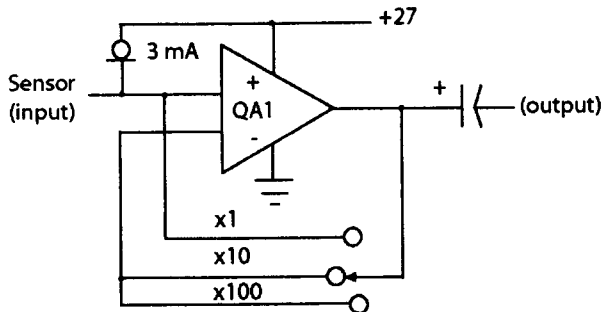


Figure 1
Schematic Diagram Model 480B21

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.

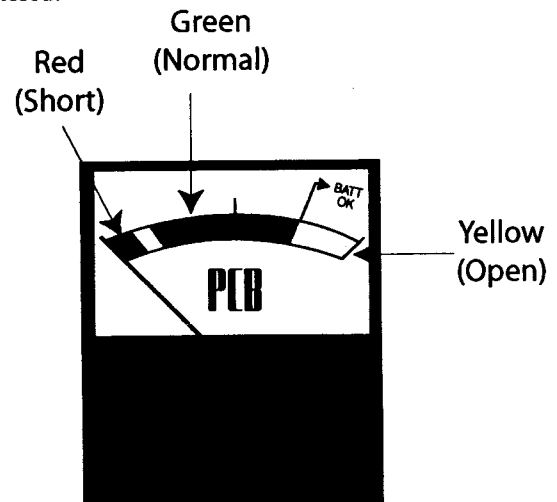


Figure 2
Fault Monitor Meter

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 μ F 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

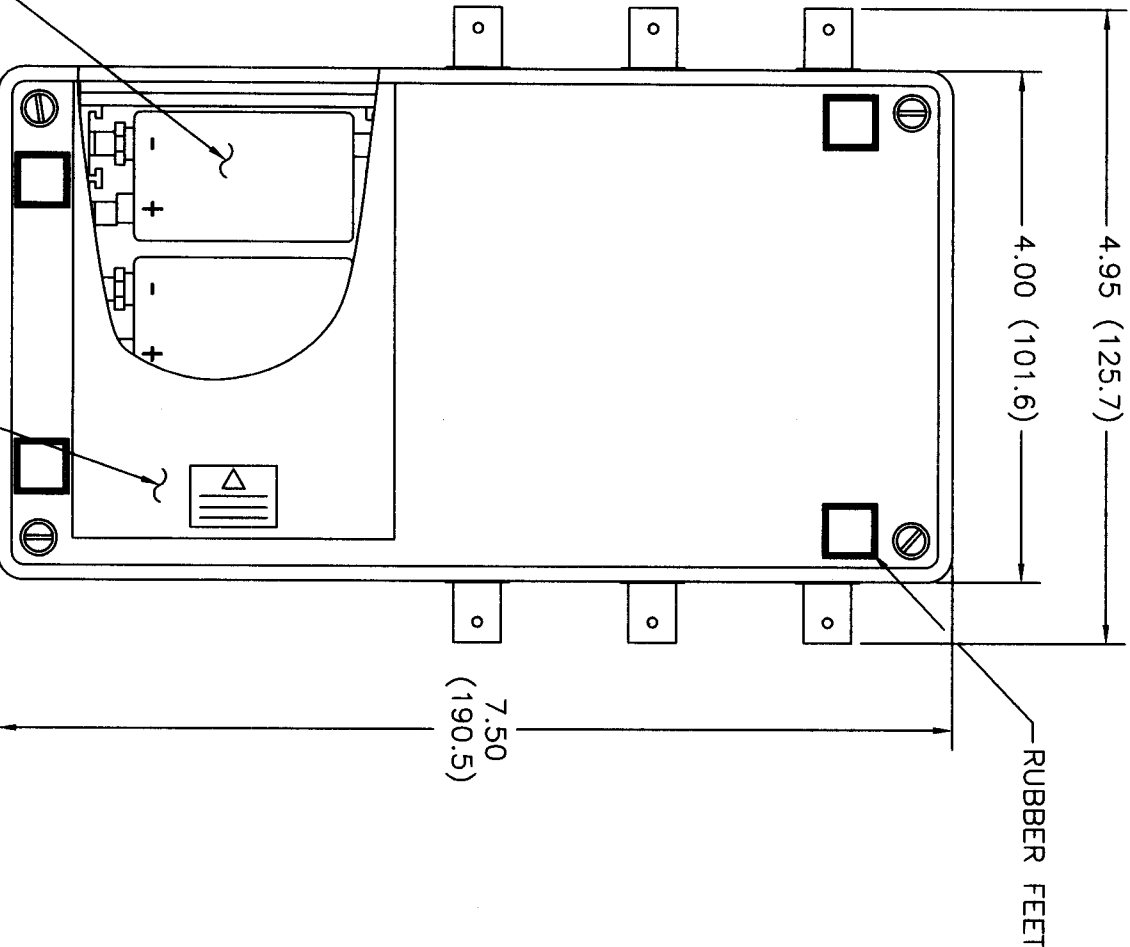
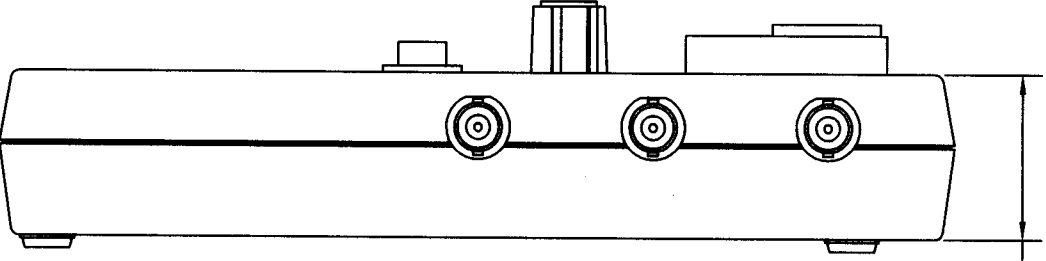
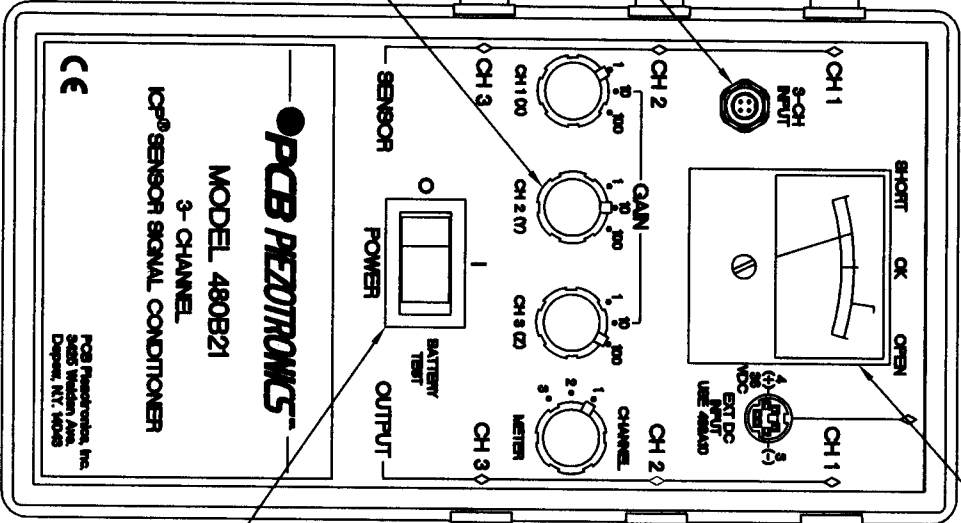
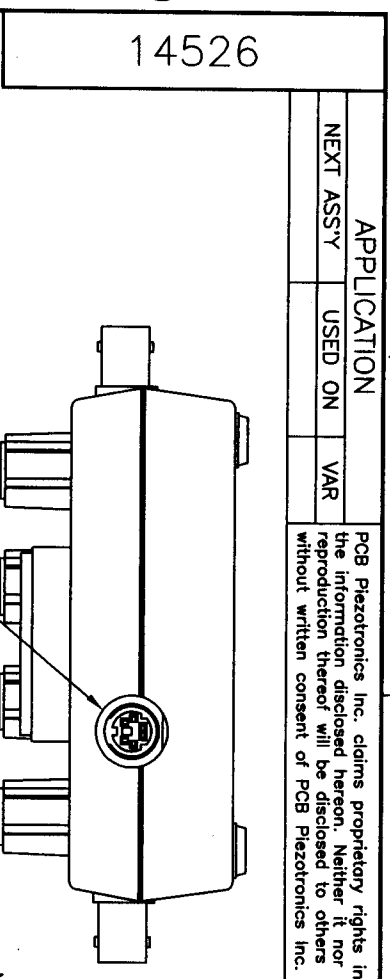
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ELE-480B21OPMAN-0601

Model Number 480B21	3-CHANNEL, BATTERY-POWERED, ICP® SENSOR SIGNAL CONDITIONER			Revision: T ECN #: 49634
Performance	ENGLISH	SI		OPTIONAL VERSIONS
Channels	3	3		Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.
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		

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 (IN PARENTHESES)
DECIMALS XX ±.01	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	3425 WALDEN AVE. DEPEN, NY 14043
CHK'D	10/11/00	ENGR	10/16/00	10/16/00		(716) 884-0001 EMAIL: SALES@PCB.COM
APP'D	10/16/00	ESTR	10/16/00			
TITLE	OUTLINE DRAWING					
	MODEL 480B21					
	ICP SENSOR SIGNAL CONDITIONER					
SCALE:	1=1.5		SHEET	1 OF 1		

