



**Model 137A**

**FREE FIELD BLAST PRESSURE PENCIL PROBE**

**Installation and Operating Manual**

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

**Toll-free: 716-684-0001**

**24-hour SensorLine: 716-684-0001**

**Fax: 716-684-0987**

**E-mail: [info@pcb.com](mailto:info@pcb.com)**

**Web: [www.pcb.com](http://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](mailto:info@pcb.com)  
Repair inquiries: [rma@pcb.com](mailto:rma@pcb.com)

For a complete list of distributors, global offices and sales representatives, visit our website, [www.pcb.com](http://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 FREE FIELD BLAST PRESSURE PROBE Model 137A

## 1.0 INTRODUCTION

The Model 137A Free Field Blast Pressure Probe, charge mode, is designed for measuring field blast and shock tunnel pressure time profiles.

This pressure probe incorporates the ST-2 element that is virtually free from mechanical noise frequently produced by shock, flying particles or sensor resonance.

For applications requiring measurements from a wide angle, a PCB-designed quartz-free field blast pressure sensor (Series 113B50) in the shape of a pancake or lollipop is recommended.

## 2.0 INSTALLATION

In field blast measurements, mount the Model 137A incident pressure probe in an axial direction to the blast source with the sensing surface of the probe in a vertical plane.

In some cases, where flash temperatures such as those generated by blasts and shock fronts are present, it may be necessary to thermally insulate the diaphragm to minimize signals generated by these effects.

Common black vinyl electrical tape has been found to be an effective insulating material in many cases. One or more layers may be used across the end of diaphragm and adaptor.

A silicone rubber coating approximately .010" thick has also been proven effective in many applications. General Electric RTV type 106 is recommended. Apply the rubber coating to the surface of the diaphragm and allow it to cure in accordance with the manufacturer's instructions. (If you have ordered the ablative coated models, further protection will not be necessary.)

## 3.0 OPERATION

Using suitable cable (low-noise coaxial cable, PCB Model 003A or equivalent), connect the sensor into an electrostatic charge amplifier such as the Model 462A.

NOTE: Keep the input cable to the charge amplifier as short as practicable because electrical noise at the output of any charge amplifier is directly related to the input cable length (capacitance).

Depress ground button of charge amplifier and adjust electrical zero if necessary.

Range the amplifier as desired to give the necessary full-scale voltage.

For normal, drift-free operation, switch charge amplifier time constant selector to "medium" or "short" during use.

## 4.0 POLARITY

When subjected to increasing pressure, the Model 137A produces a positive-going output voltage. Because most charge amplifiers are signal-inverting, the resulting system is negative-going.

## 5.0 CALIBRATION

Do not try to calibrate the Series 137A statically. The Series 137A is calibrated dynamically by PCB using a hydraulic pulse technique.

Use charge amplifier to "medium" time constant and allow sensor to thermally stabilize before attempting to calibrate. Several charge amplifiers are designed especially for use with ceramic pressure sensors for higher frequency measurements.

For best accuracy, use the calibration certificate supplied. Factory calibration is available for a nominal charge.

## 6.0 MAINTENANCE

If the Model 137A Pressure Sensor is used in extremely damp environments, it is advisable to protect the cable connections with shrink tubing. If the cable connections need cleaning, use Benzene on a lint-free cloth.

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Model 137A**

If stored for an extended period or used in a damp environment, the insulation resistance may degrade from the norm of  $10^{10}$  ohms.

It is well to observe the following precautions in using the sensor:

1. Do not exceed specified maximum range.
2. Do not subject sensor to temperatures exceeding 150 °F.

Field repair of the piezoelectric element of the Series 137A is not practical. Thus, should the sensor require servicing, refer to the warranty sheet.

**CAUTIONARY NOTE:** If sensors are left outside overnight they should be coated with silicone oil and covered. The protective silicone oil or grease coating should also be applied when the sensors are operated in a humid or rainy environment.

<b>Performance</b>	<b>ENGLISH</b>	<b>SI</b>	
Sensitivity(± 15 %)	0.40 pC/psi	0.058 pC/kPa	
Linearity	≤ 1 % FS	≤ 1 % FS	[1]
Measurement Range	500 psi	3,447 kPa	
Maximum Pressure	5 kpsi	37,474 kPa	
Resolution	10 mpsi	0.07 kPa	[2]
Resonant Frequency	≥ 500 kHz	≥ 500 kHz	
Rise Time(Incident)	≤ 6.5 μ sec	≤ 6.5 μ sec	
<b>Environmental</b>			
Temperature Range(Operating)	-100 to +400 °F	-73 to +204 °C	
Temperature Coefficient of Sensitivity	≤ 0.03 %/°F	≤ 0.054 %/°C	
<b>Electrical</b>			
Output Polarity(Positive Pressure)	Negative	Negative	
Capacitance	40 pF	40 pF	
Insulation Resistance(at room temp)	≥ 10 <sup>12</sup> Ohm	≥ 10 <sup>12</sup> Ohm	
<b>Physical</b>			
Sensing Element	Quartz	Quartz	
Sensing Geometry	Compression	Compression	
Housing Material	Aluminum Alloy	Aluminum Alloy	
Diaphragm	Invar	Invar	
Sealing	Epoxy	Epoxy	
Electrical Connector	BNC Jack	BNC Jack	
Weight	12.3 oz	349 gm	

**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]Zero-based, least-squares line method.  
 [2]Resolution dependent on range setting and cable length used in charge system.  
 [3]See PCB Declaration of Conformance PS158 for details.

**SUPPLIED ACCESSORIES:**

Model 084A70 Replacement Tip

Entered: ND	Engineer: AK	Sales: RWM	Approved: RPF	Spec Number:
Date: 06/05/2023	Date: 06/05/2023	Date: 06/05/2023	Date: 06/05/2023	137-1010-80

**PCB PIEZOTRONICS**  
AN AMPHENOL COMPANY

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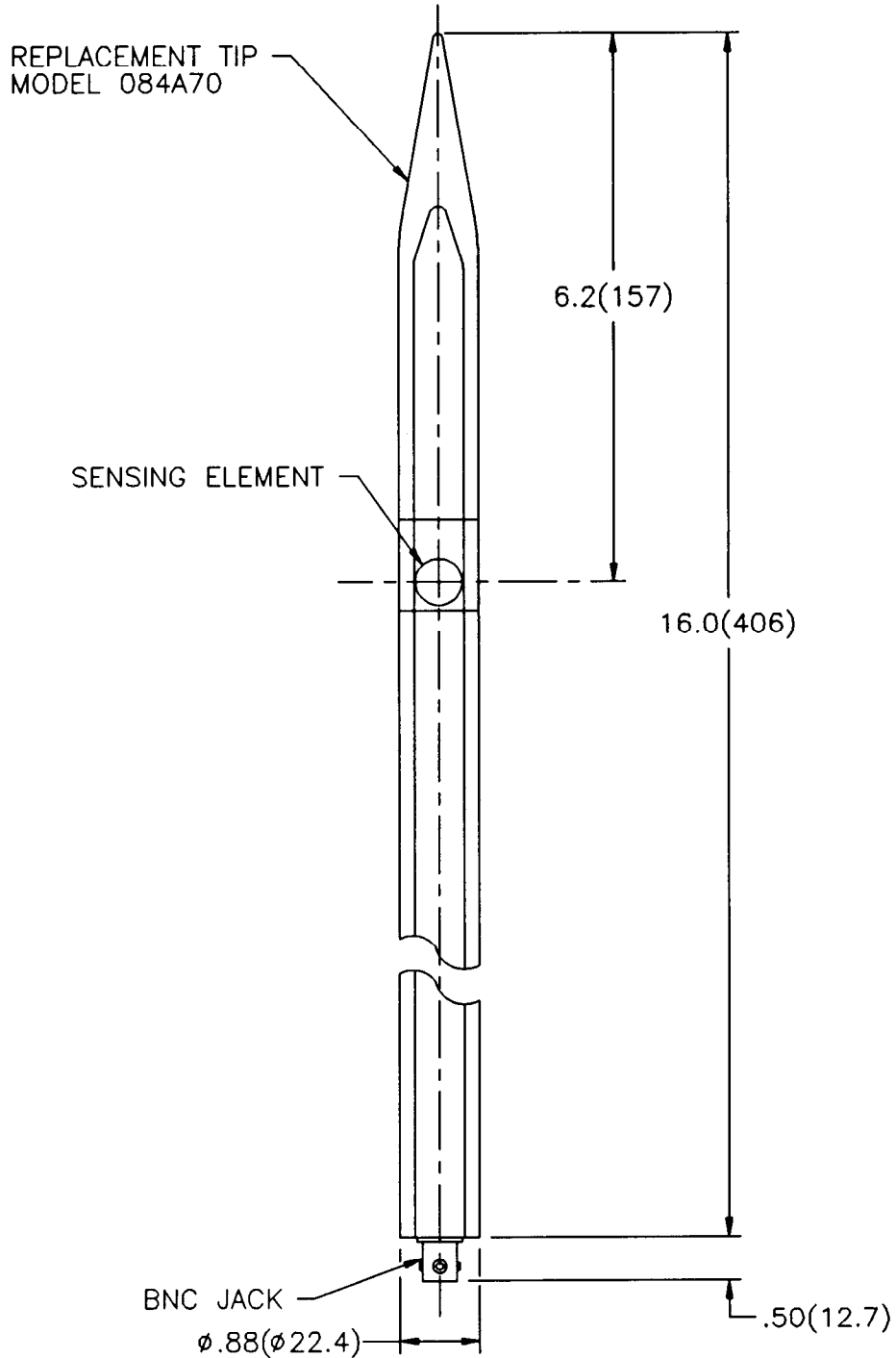
All specifications are at room temperature unless otherwise specified.  
 In the interest of constant product improvement, we reserve the right to change specifications without notice.  
 ICP® is a registered trademark of PCB Piezotronics, Inc.



137-1010-95

APPLICATION		
NEXT ASS'Y	USED ON	VAR

REVISIONS				
REV	DESCRIPTION	ECN	DATE	APP'D
B	REVISED AND REDRAWN	3926	9/28/92	DM 10/6/92



UNLESS SPECIFIED TOLERANCES		DRAWN	CP	10/1/92	MFG	RJA	10/9/92	<b>PCB</b> PIEZOTRONICS, INC. 3425 WALDEN AVE. DEPEW, NEW YORK 14043 PHONE: (716) 884-0001
DIMENSIONS IN INCHES	DIMENSIONS IN MILLIMETERS (IN PARENTHESIS)	CHK'D	DM	10/7/92	ENGR	BC	10/6/92	
DECIMALS XX ±.01	DECIMALS X ±0.3	APP'D	DM	10/7/92	Sales	DM	10/6/92	
XXX ±.005	XX ±0.13	TITLE		OUTLINE DRAWING		CODE	DWG. NO.	
ANGLES ±2 DEGREES	ANGLES ±2 DEGREES			MODEL 137A SERIES		IDENT. NO.	137-1010-95	
FILLETS AND RADII .003 - .005 (0.07 - 0.13)				FREE FIELD BLAST PROBE		SCALE: .5X	SHEET 1 OF 1	