



# ACOUSTIC MEASUREMENT SENSORS & INSTRUMENTATION

# PCB – TRUSTED BY COMPANIES AND LABORATORIES WORLDWIDE

**PCB Piezotronics, Inc.** provides a variety of acoustic measurement products, including prepolarized and externally polarized condenser, array, probe, low-profile surface, and special purpose microphones. Microphone products are complemented by an assortment of preamplifiers, signal conditioners, A-weighting filters, handheld calibrators, and accessories.

All PCB® acoustic products are manufactured from the highest quality materials. They are used by a variety of industries and customers including automotive, aerospace & defense, OEM's, universities, consultants, white goods (appliance), and consumer goods manufacturers.

## Over 50 Years Experience

PCB designs, manufactures, and sells sensors worldwide. With over 1000 employees across the globe, there are several Ph.D.'s on our large engineering staff. These skilled resources enable PCB to offer a variety of products ranging from microphones to accelerometers, force, torque, pressure, load, MEMS sensors, dosimeters, and sound level meters. At PCB, we understand the complexities of your test environment and requirements, therefore we can recommend the best solution for your application.

## Innovation

PCB is the inventor of ICP® technology. PCB heavily invests in employees, manufacturing, and R&D equipment. This keeps us a leader in sensor technology. Whether it is introducing the industry's first commercial prepolarized high temperature and first prepolarized low noise microphones, or enabling our business partners to measure the lowest noise level in the world with a custom 3" microphone, you can be assured that PCB is on the leading edge of acoustic design.



## PERFORMANCE YOU DEMAND AT A PRICE YOU CAN AFFORD

**Save up to 40% Compared to Competitor Brands**



### 1/2" FREE-FIELD PREPOLARIZED MICROPHONE & PREAMPLIFIER

MODEL 378B02

- Our most popular model. Ideal for testing in open areas and anechoic chambers
- 3.15 Hz -20 kHz (+/- 2dB)
- TEDS compliant



### 1/4" ARRAY STYLE PREPOLARIZED MICROPHONES

MODELS 130F20, 130F21 & 130F22

- Value oriented for multichannel audible range testing
- BNC connector, also available with a 10-32, or SMB connector
- TEDS compliant



### 1/2" FREE-FIELD PREPOLARIZED MICROPHONE

MODEL 377B02

- 50 mV/Pa
- 3.15 Hz -20 kHz (+/- 2dB)
- 15 dBA – 147 dB

# IN-HOUSE MANUFACTURING

PCB uses only the highest quality material and components for its microphones. While other sensor providers outsource their manufacturing, PCB has invested heavily in on-going employee training as well as in a state of the art, in-house CNC machining facility. This allows us to control all factors that affect quality and delivery. PCB has made significant investments in our people and operations, including:



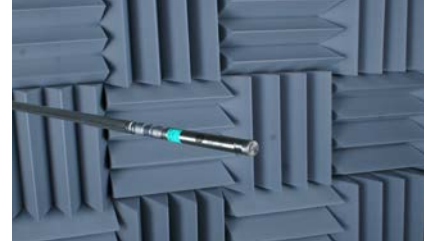
## High Volume Robotic Machining Cells

PCB's in-house machining facilities control factors that affect quality, production quantities, and delivery. This reduces dependency on outside sources, enables PCB to meet urgent requests, and keeps cost down so savings can be passed through to our customers.



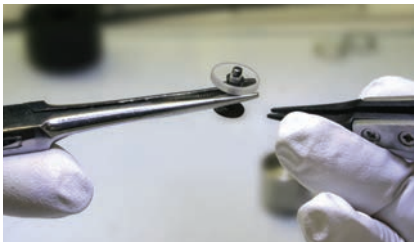
## Laser Welding

Microphones are welded in clean areas to ensure stability and robustness.



## Anechoic Chamber

This special sound proof room enables our large team of engineers to design, test, and verify acoustic sensors.



## Clean Rooms

Assembly is performed in clean rooms to ensure consistency and compliance with Working Class IEC standards. Certified professionals manufacture and assemble all microelectronics in controlled environments.



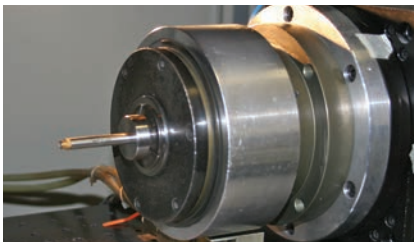
## Environmental Chambers

Environmental stress relieving and testing ensures long term stability in the harshest environments.



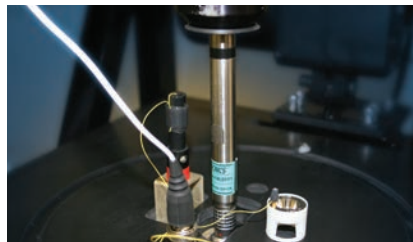
## Nitrogen Storage Chambers

All critical components and assemblies are stored in nitrogen chambers to minimize contamination and maximize stability.



## Laser Etching

Model and serial numbers are etched on the microphone assemblies. Large easy-to-read fonts are on the external housings. Disassembly is not required to read these designations.



## Calibration

Every PCB microphone and preamplifier is calibrated with traceable certifications. Some competitors only offer sensitivity readings, typical responses, or certifications of compliance.



## Inspection

Every PCB microphone and preamplifier is individually inspected to ensure a quality product gets shipped each and every time.



## SELECTING THE RIGHT MICROPHONE

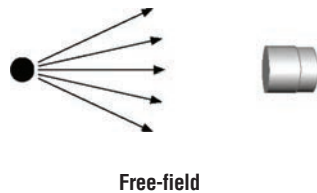


There are several product options to consider when choosing a microphone and preamplifier system to measure sound or unwanted sound, called noise. In some cases, multiple products can be used for the same application. The PCB Microphone Handbook provides detailed information about microphone selection, maintenance, calibration, associated standards, and more. To download this handbook, visit [www.pcb.com/acoustics](http://www.pcb.com/acoustics).

## MICROPHONE FIELD TYPES

### FREE-FIELD RESPONSE

Free-field microphones are designed for use in environments without reflections. They are ideal for outdoor applications, as well as laboratory applications in an anechoic chamber. Common free-field testing includes automotive pass-by, loudspeakers, appliances, and disk drive sound measurements.



Sound Source Location for Noise Reduction

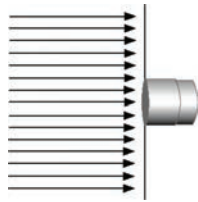


## PRESSURE RESPONSE

Pressure microphones are specifically designed to be flush-mounted to a surface at the boundary of the sound field. This allows accurate measurement of sound pressure in ducts, wind tunnels, and couplers. Pressure microphones are ideal for use as reference microphones, as they are designed to have very flat frequency response within a sound coupler or calibrator. Pressure microphones are also required for most ear simulator applications.



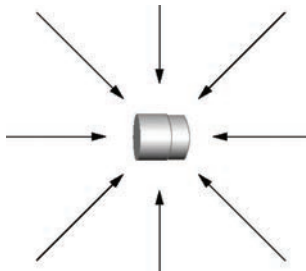
Flush Mounted Microphone Measurements in an Impedance Tube



Pressure Response

## RANDOM INCIDENCE RESPONSE

Random incidence microphones are designed for use in areas where the sound field could come from any direction. The best uses for these microphones are to perform measurements in reverberant chambers and for many indoor noise applications. They are well suited for room acoustics, as well as for aerospace and automotive cabin noise measurements.



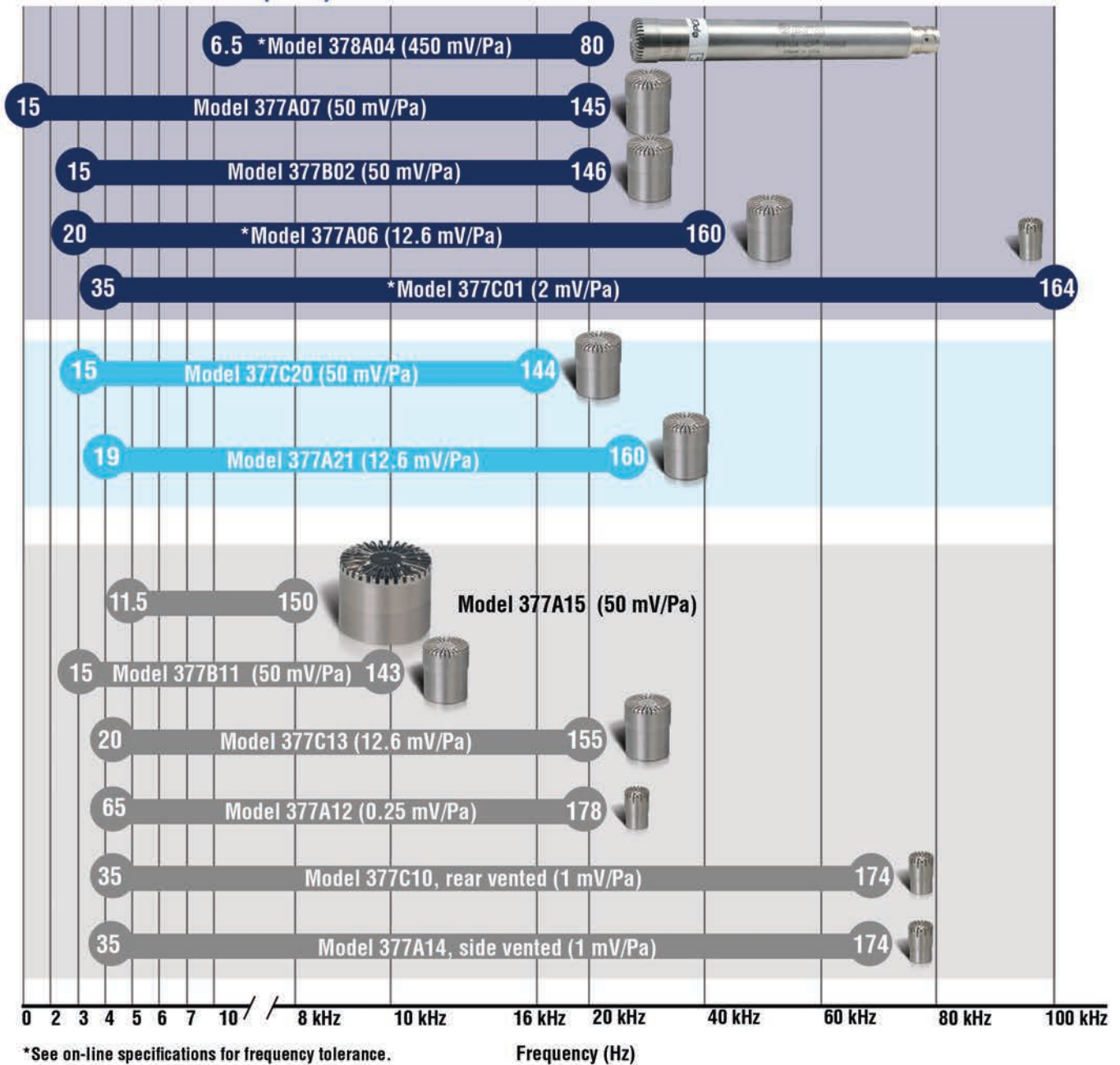
Random Incidence



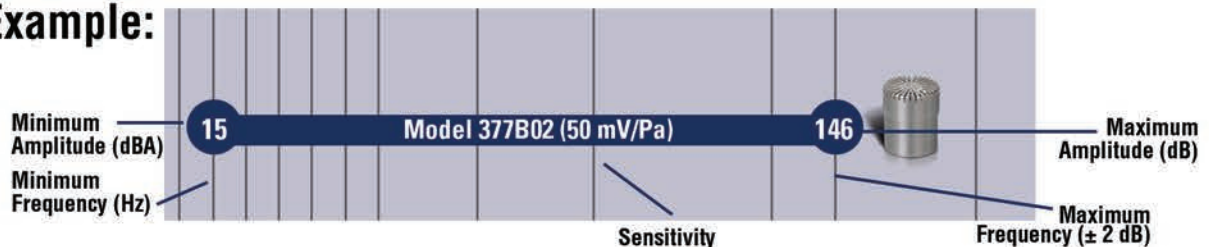
Cabin Noise Measurements for Rider Comfort

# MICROPHONE COMPARISON

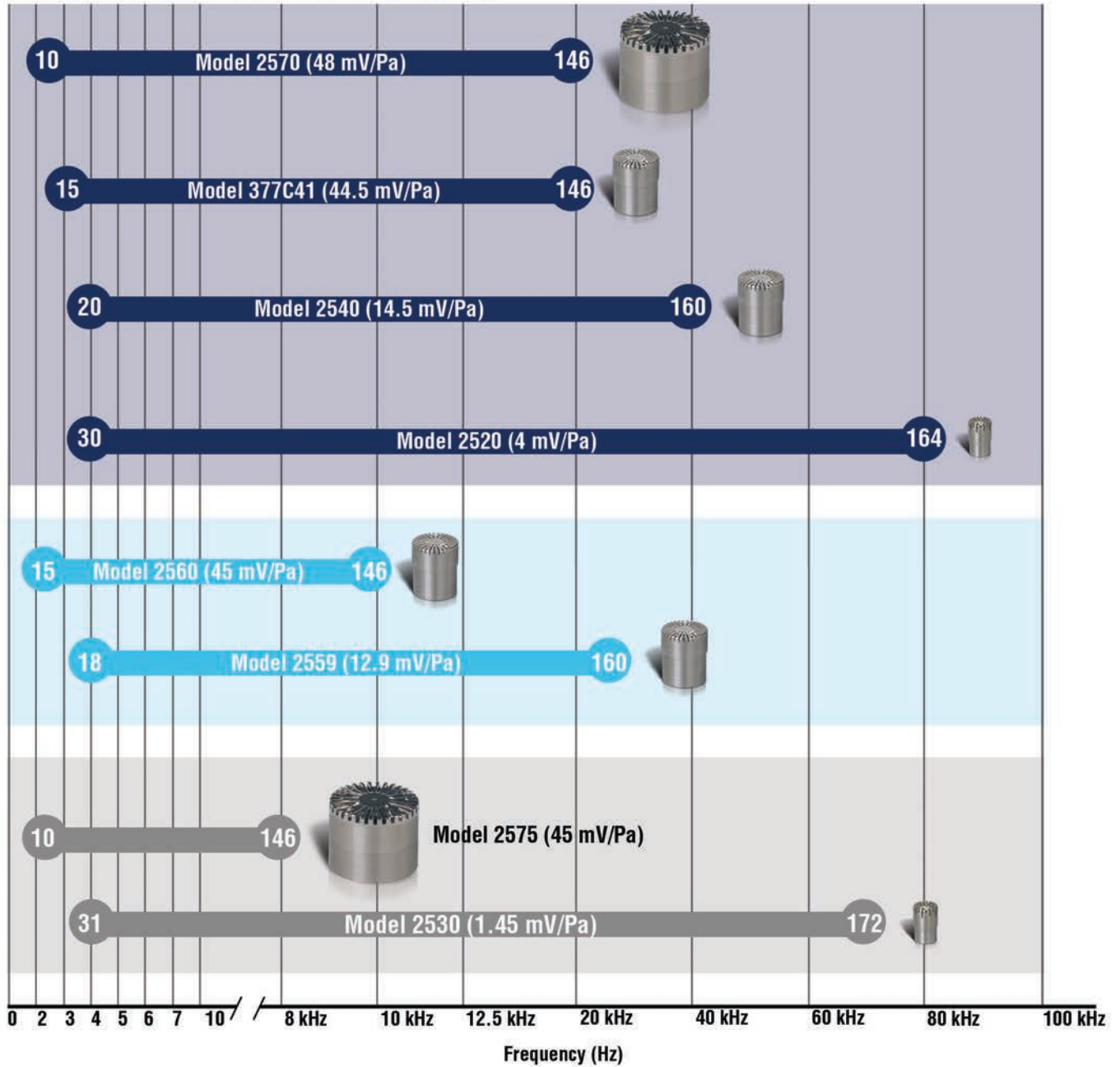
## PREPOLARIZED (0 V)



### Example:



## EXTERNALLY POLARIZED (200 V)



**Size:**



1/4"



1/2"



1"

(Not to scale)

# PREPOLARIZED ICP® PRECISION CONDENSER MICROPHONES & PREAMPLIFIERS

Prepolarized microphones have many advantages over externally polarized models. They use low power circuitry and do not require an external polarization voltage. PCB invented ICP® power. Applying a polymer coating to the top of the backplate and embedding a charge on it eliminates the need for expensive 200 V power supplies and cables, and allows use of a 2-20 mA constant current supply or signal conditioner as the power source.

Prepolarized microphones are especially useful in applications that require battery powered equipment. Prepolarized microphones are

less susceptible to the influence of high humidity environments because of the high electrical resistance of the polymer coating on the backplate.

Prepolarized microphone systems use common coaxial cables with BNC connectors and can be shared with other ICP® compatible products including: accelerometers, force, and pressure sensors. Portability and interchangeability with other sensors minimizes test set-up time and reduces the cost per-channel.



**Phantom Powered  
Microphones and Preamplifier**

## TEDS MICROPHONE & PREAMPLIFIER SYSTEMS, IEEE 1451.4 COMPLIANT

|                              | Free-field  |   |  |  |  |   |   |  |   |   |
|------------------------------|---|---|--|--|--|---|---|--|---|---|
| TEDS Version 1.0             | 378C01  | 378B02  | EX378B02   | HT378B02   | 378A04   | 378A06  | 378A07  | 376A31   | 376A32  | 376A33  |
| Mated Pair System Components | 377C01<br>426B03                                  | 377B02<br>426E01  | Single piece construction                              | 377B02<br>HT426E01                                     | Single piece construction  | 377A06<br>426E01                                    | 377A07<br>426E01                              | 377C01<br>426A14                                     | 377B02<br>426A14                                | 377A06<br>426A14                                    |
| Diameter                     | 1/4"  | 1/2"  | 1/2"   | 1/2"   | 1/2"   | 1/2"  | 1/2"  | 1/4"   | 1/2"  | 1/2"  |
| Notes                        | High amplitude, high frequency measurements       | Audible range, low to medium amplitudes, most common                                    | Intrinsically safe                                     | High temperature version of 378B02                     | Extreme low noise measurements   | Medium to high amplitude and frequency measurements | Extreme low frequency infrasound measurements | High amplitude, high frequency measurements          | Audible range, low to medium amplitudes         | Medium to high amplitude and frequency measurements |
| Application                  | Ultrasound, blast, gun shot, noise identification | Pass-by, noise identification, sound power, sound intensity, Class 1 sound level meters | For use in hazardous locations, leak detection, mining | Engine analysis, exhaust testing, HVAC, leak detection | Computer fan and disk drives appliance testing, electric vehicle sound quality | Railway and horn testing, alarm monitoring          | Wind turbine testing, sonic boom detection    | Clarity and life cycle testing for musical equipment | Speaker design and "Rub and Buzz" noise testing | Live and studio recording                           |

Transducer Electronic Data Sheets (TEDS) enhance the identification of each microphone. All PCB microphone and preamplifier systems come standard with TEDS functionality and are compliant with the IEEE 1451.4 standard.





Computer Fan and Disk Drive  
Noise Test (Model 378A04)

**ENGINEERED TO MAXIMIZE SYSTEM PERFORMANCE**

For optimum performance, PCB matches the microphone and preamplifier to complement each other. The model 378 microphone system series takes the precision and durability of the standard model 377 microphone series line and mates it with one of PCB's model 426 preamplifiers. This system approach provides a convenient and user friendly option for purchasing acoustic measurement equipment and allows for use of TEDS to store calibration data.



**Hazardous Approved  
Microphone & Preamplifier**  
Model EX378B02

| TEDS MICROPHONE & PREAMPLIFIER SYSTEMS, IEEE 1451.4 COMPLIANT |  |   |   |   |   |   |  |                                    |
|---|--|---|---|---|---|---|--|------------------------------------|
|   | Pressure System  |   |   |   |   | Random Incidence System                             |  |                                    |
| TEDS Version 1.0  | 378A12   | 378A14  | 378C10  | 378B11  | 378C13  | 378A21  | 378C20   | HT378C20                           |
| Mated Pair System Components                                  | 377A12<br>426A03   | 377A14<br>426A05  | 377C10<br>426B03  | 377B11<br>426E01  | 377C13<br>426E01                                | 377A21<br>426E01                                    | 377C20<br>426E01   | 377C20<br>HT426E01                 |
| Diameter  | 1/4"   | 1/4"  | 1/4"  | 1/2"  | 1/2"  | 1/2"  | 1/2"   | 1/2"                               |
| Notes   | Extreme high amplitude measurements                          | High frequency, high amplitude measurements side vented | High frequency, high amplitude measurements rear vented | High sensitivity, low frequency, low noise measurements     | Mid range frequency and amplitude measurements  | Medium to high amplitude and frequency measurements | Audible range, high sensitivity, low - medium amplitudes                       | High temperature version of 378C20 |
| Application   | Blast detection, cavity analysis, gunshot noise measurements | Ultrasound, impedance tubes, cavity analysis            | Ultrasound, impedance tubes, cavity analysis            | Infrasound, impedance tubes, cavity analysis, panel testing | Impedance tubes, cavity analysis, panel testing | Cabin noise, consumer product testing               | Cabin testing, environmental noise, room acoustics, Class 1 sound level meters | Environmental noise, HVAC testing  |

# PREPOLARIZED (0 V) PRECISION CONDENSER MICROPHONES



## 1/4" MICROPHONES

MODELS

377C01, 377C10, 377A12, 377A14



## 1/2" MICROPHONES

MODELS

377B02, 377A06, 377A07, 377B11,  
377C13, 377C20, 377A21



## 1" MICROPHONE

MODEL 377A15

| PREPOLARIZED (0 V) PRECISION CONDENSER MICROPHONES      |                                  |                                  |                                  |                                  |                                  |                                  |
|---|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
|   | Free-field                       |                                  |                                  |                                  | Random Incidence                 |                                  |
| <b>TEDS Version 1.0</b>                                 | <b>377C01</b>                    | <b>377B02</b>                    | <b>377A06</b>                    | <b>377A07</b>                    | <b>377C20</b>                    | <b>377A21</b>                    |
| Diameter  | 1/4"                             | 1/2"                             | 1/2"                             | 1/2"                             | 1/2"                             | 1/2"                             |
| Open Circuit Sensitivity                                | 2 mV/Pa                          | 50 mV/Pa                         | 12.6 mV/Pa                       | 50 mV/Pa                         | 50 mV/Pa                         | 12.6 mV/Pa                       |
| Frequency Range ( $\pm 2$ dB)                           | 4 Hz<br>to 80 kHz                | 3.15 Hz<br>to 20 kHz             | 3 Hz<br>to 31.5 kHz              | 0.07 Hz<br>to 20 kHz             | 3.14 Hz<br>to 16 kHz             | 4 Hz<br>to 25 kHz                |
| Dynamic Range Upper Limit - 3% Distortion Limit [1]     | 164 dB                           | 146 dB                           | 160 dB                           | 145 dB                           | 144 dB                           | 160 dB                           |
| Dynamic Range Lower Limit - Cartridge Thermal Noise [1] | 35 dB (A)                        | 15 dB (A)                        | 20 dB (A)                        | 15 dB (A)                        | 15 dB (A)                        | 19 dB (A)                        |
| Temperature Range                                       | -40 to +248 °F<br>-40 to +120 °C | -40 to +302 °F<br>-40 to +150 °C | -40 to +248 °F<br>-40 to +120 °C | -40 to +248 °F<br>-40 to +120 °C | -40 to +248 °F<br>-40 to +120 °C | -40 to +248 °F<br>-40 to +120 °C |
|   | Pressure                         |                                  |                                  |                                  |                                  |                                  |
| <b>TEDS Version 1.0</b>                                 | <b>377A12</b>                    | <b>377A14</b>                    | <b>377C10</b>                    | <b>377B11</b>                    | <b>377C13</b>                    | <b>377A15</b>                    |
| Diameter  | 1/4"                             | 1/4"                             | 1/4"                             | 1/2"                             | 1/2"                             | 1"                               |
| Open Circuit Sensitivity                                | 0.25 mV/Pa                       | 1 mV/Pa                          | 1 mV/Pa                          | 50 mV/Pa                         | 12.6 mV/Pa                       | 50 mV/Pa                         |
| Frequency Range ( $\pm 2$ dB)                           | 4 Hz<br>to 20 kHz                | 4 Hz<br>to 70 kHz                | 4 Hz<br>to 70 kHz                | 3.15 Hz<br>to 10 kHz             | 4 Hz<br>to 20 kHz                | 5 Hz<br>to 8 kHz                 |
| Dynamic Range Upper Limit - 3% Distortion Limit [1]     | 178 dB                           | 174 dB                           | 174 dB                           | 143 dB                           | 155 dB                           | 150 dB                           |
| Dynamic Range Lower Limit - Cartridge Thermal Noise [1] | 65 dB (A)                        | 35 dB (A)                        | 35 dB (A)                        | 15 dB (A)                        | 20 dB (A)                        | 11.5 dB (A)                      |
| Temperature Range                                       | -40 to +248 °F<br>-40 to +120 °C | -40 to +248 °F<br>-40 to +120 °C | -40 to +248 °F<br>-40 to +120 °C | -40 to +248 °F<br>-40 to +120 °C | -40 to +248 °F<br>-40 to +120 °C | -40 to +248 °F<br>-40 to +120 °C |

Notes: [1] re 20  $\mu$ Pa



### 1/4" PREAMPLIFIER

MODEL 426B03



### 1/2" PREAMPLIFIER

MODELS HT426E01, 426E01, 426A10



### 1/2" SHORT PREAMPLIFIER

MODEL 426A13



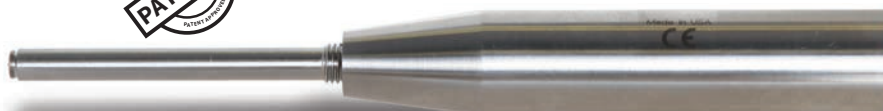
### 1/2" PREAMPLIFIER

MODEL 426A11



### 1/4" SHORT PREAMPLIFIER

MODEL 426A07



### 1/4" - 1/2" PREAMPLIFIER

MODEL 426A14

These low noise, general purpose, preamplifiers are powered by any constant current (2-20 mA) ICP® sensor power supply. They are designed to be used with prepolarized microphones.

| ICP® PREAMPLIFIERS FOR PREPOLARIZED MICROPHONES |                                 |                                   |                                 |                                 |                                  |
|---|---------------------------------|-----------------------------------|---------------------------------|---------------------------------|----------------------------------|
| Model Number                                    | 426B03                          | 426A05                            | 426A07                          | 426E01                          | HT426E01                         |
| Microphone Diameter                             | 1/4"                            | 1/4"                              | 1/4"                            | 1/2"                            | 1/2"                             |
| Gain (Attenuation)                              | -0.08 dB [1]                    | -0.19 dB [1]                      | -0.19 dB [1]                    | -0.05 dB [1]                    | -0.06 dB [2]                     |
| Frequency Response (± 0.1 dB)                   | 5 Hz to 126 kHz                 | 5 Hz to 126 kHz                   | 2.5 Hz to 126 kHz               | 6.3 Hz to 125 kHz               | 6.3 Hz to 126 kHz                |
| Electrical Noise (A-weight)                     | ≤ 3.2 μV [1]                    | ≤ 3.2 μV [1]                      | ≤ 2.5 μV [1]                    | ≤ 2.8 μV [1]                    | ≤ 4.9 μV [2]                     |
| Electrical Noise (Linear)                       | ≤ 5.6 μV [1]                    | ≤ 5.6 μV [1]                      | ≤ 5.6 μV [1]                    | ≤ 5 μV [1]                      | ≤ 13.4 μV [2]                    |
| Output Voltage (Maximum)                        | ± 8 V pk                        | ± 8 V pk                          | ± 8 V pk                        | ± 7 V pk                        | ± 7 V pk                         |
| Temperature Range                               | -40 to +158 °F<br>-40 to +70 °C | -40 to +158 °F<br>-40 to +70 °C   | -40 to +158 °F<br>-40 to +70 °C | -40 to +176 °F<br>-40 to +80 °C | -40 to +257 °F<br>-40 to +125 °C |
| Output Connector                                | 10-32 Coaxial jack              | 10-32 Coaxial jack                | 10-32 Coaxial jack              | BNC jack                        | BNC jack                         |
| TEDS IEEE 1451.4                                | Yes                             | Yes                               | Yes                             | Yes                             | Yes                              |
| Application                                     | General purpose                 | Used with side vented microphones | Confined areas                  | General purpose                 | High temperature                 |
| Model Number                                    | 426A10                          | 426A11                            | 426A13                          | 426A14                          |                                  |
| Microphone Diameter                             | 1/2"                            | 1/2"                              | 1/2"                            | 1/4" & 1/2"                     |                                  |
| Gain (Attenuation)                              | -0.1 dB [1]                     | -0.16 dB [1]                      | -0.20 dB [1]                    | -0.20 dB [1]                    |                                  |
| Frequency Response (± 0.1 dB)                   | 80 Hz to 125 kHz                | 5 Hz to 125 kHz                   | 10 Hz to 126 kHz                | 11 Hz to 100 kHz                |                                  |
| Electrical Noise (A-weight)                     | ≤ 3.6 μV [1]                    | ≤ 7.5 μV [1]                      | ≤ 3 μV [1]                      | ≤ 2 μV [1]                      |                                  |
| Electrical Noise (Linear)                       | ≤ 11.2 μV [1]                   | ≤ 5.7 μV [1]                      | ≤ 6 μV [1]                      | ≤ 4.5 μV [1]                    |                                  |
| Output Voltage (Maximum)                        | ± 7 V pk                        | ± 5 V pk                          | ± 8 V pk                        | ± 10 V pk                       |                                  |
| Temperature Range                               | -40 to +176 °F<br>-40 to +80 °C | -4 to +158 °F<br>-20 to +70 °C    | -40 to +158 °F<br>-40 to +70 °C | -40 to +149 °F<br>40 to +65 °C  |                                  |
| Output Connector                                | BNC jack                        | BNC jack                          | BNC jack                        | 3 Pin XLR                       |                                  |
| TEDS IEEE 1451.4                                | Yes                             | Yes                               | Yes                             | No                              |                                  |
| Features  | High pass filter                | Gain, filter                      | Confined areas                  | 12 V, 24 V, or 48 V             |                                  |

Notes: [1] Measured with an 18 pF reference microphone [2] Measured with a 12 pF reference microphone

# PREPOLARIZED ICP® ARRAY MICROPHONES

Prepolarized ICP® array microphones are a cost-effective alternative to the higher end, test and measurement microphones. They are suitable for sound measurements within the normal human hearing range. Array microphones have excellent phase characteristics and can be combined with the appropriate software to effectively map acoustic energy flow. The number of microphones, spacing and predetermined patterns, which are typically dictated by the software and application, allow you to analyze spatial transformation of complex sound fields to understand hot spots. The location of a noise source can be pinpointed and the speed and direction of sound can be determined.

These value-priced array microphones are an excellent choice for large channel count applications such as noise identification, nearfield acoustic holography, sound pressure mapping, acoustic cameras, and beamforming.

All PCB array microphones come standard with Transducer Electronic Data Sheets (TEDS) for microphone identification.

## HIGHLIGHTS

- Low Per Channel Cost
- Powered by ICP® Sensor Signal Conditioners
- Integrated Preamplifier
- Water & Dust Resistant Model Available

## APPLICATIONS

- Holography
- Sound Pressure Mapping
- Noise Source Identification
- Beamforming



**Model 130F20**  
(BNC Jack)



**Model 130F22**  
(SMB Socket)



**Model 130F21**  
(10-32 Jack)



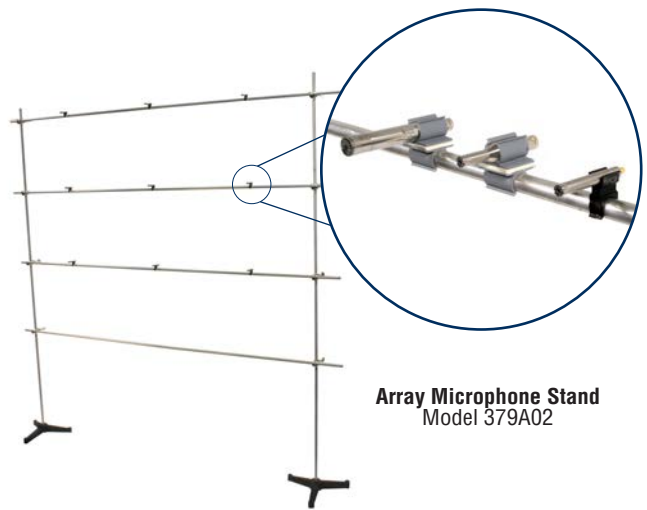
**Model 130A23**  
Higher Amplitude & Wider Frequency  
(SMB Socket)



**Model 130B40**  
Low Profile  
Surface Microphone Pad



**Model 130A24**  
Water & Dust Resistant  
(BNC Jack)



**Array Microphone Stand**  
Model 379A02

## TEDS COMPLIANCE

Transducer Electronic Data Sheets (TEDS) enhance the identification of each microphone. This is very helpful in large channel count applications. All series 130 microphones are CE marked and contain IEEE 1451.4 TEDS memory circuitry.

CE  All preamplifiers are CE marked and contain TEDS memory circuitry.

| PREPOLARIZED ARRAY MICROPHONES WITH INTEGRAL PREAMPLIFIER |                                 |                                    |                      |                      |                         |  |
|---|---------------------------------|------------------------------------|----------------------|----------------------|-------------------------|--|
| Model Number  | (New) 130A24                    | 130A23                             | 130F20               | 130F21               | 130F22                  | 130B40   |
| Microphone Diameter                                       | 1/2"                            | 1/4"                               | 1/4" [4]             | 1/4"                 | 1/4"                    | 1/4"   |
| Response  | Free-field                      | Free-field                         | Free-field           | Free-field           | Free-field              | Pressure                                       |
| Sensitivity ( $\pm 3$ dB at 250 Hz)                       | 10 mV/Pa                        | 14 mV/Pa                           | 45 mV/Pa             | 45 mV/Pa             | 45 mV/Pa                | 8.5 mV/Pa                                      |
| Frequency response ( $\pm 2$ dB)                          | 20 Hz to 16 kHz [2]             | 20 Hz to 20 kHz                    | 10 Hz to 20 kHz [1]  | 10 Hz to 20 kHz [1]  | 10 Hz to 20 kHz [1]     | 20 Hz to 10 kHz [2]                            |
| Dynamic Range   | < 30 dBA<br>to >143 dB [3]      | < 30 dBA<br>to >143 dB [3]         | 24 dBA<br>to >122 dB | 24 dBA<br>to >122 dB | 24 dBA<br>to >122 dB    | <32 dBA<br>to >142 dB [3]                      |
| Polarized Voltage   | 0 V                             | 0 V                                | 0 V                  | 0 V                  | 0 V                     | 0 V  |
| Temperature Range (°F)                                    | -14 to +122 °F                  | -14 to +122 °F                     | +14 to +122 °F       | +14 to +122 °F       | +14 to +122 °F          | -40 to +176 °F                                 |
| Temperature Range (°C)                                    | -10 to +50 °C                   | -10 to +50 °C                      | -10 to +50 °C        | -10 to +50 °C        | -10 to +50 °C           | -40 to +80 °C                                  |
| Connector   | BNC Jack                        | SMB Socket                         | BNC Jack             | 10-32 Jack           | SMB Socket              | 10-32 Jack                                     |
| Features  | Rugged water and dust resistant | High frequency and high amplitudes | General purpose      | General purpose      | Quick release connector | Low profile and surface mount to minimize wind |

Notes: [1]  $\pm 4$  dB. [2] 20 Hz to 10 kHz  $\pm 3$  dB, 20 to 20 kHz  $\pm 6$  dB. [3] 150 dB max without clipping. [4] 1/2" preamplifier diameter.

# EXTERNALLY POLARIZED PRECISION CONDENSER MICROPHONES & PREAMPLIFIERS

Externally polarized microphones were the original standard for all acoustic measurement applications. This design utilizes a separate 200 V power supply and special cables with 7 pin style connectors. Their ease of design enables a large product offering. Externally polarized microphones are typically used to replace microphones in existing systems or when a prepolarized alternative is not available.



## 1/4" MICROPHONES

MODELS  
2520  
2530



## 1/2" MICROPHONES

MODELS  
2540  
2559  
2560  
377C4



## 1" MICROPHONES

MODELS  
2570  
2575

| EXTERNALLY POLARIZED (200 V) PRECISION CONDENSER MICROPHONE CARTRIDGES |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |
|--|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
|  | Free-field                       |                                  |                                  |                                  | Pressure                         |                                  | Random Incidence                 |                                  |
| Model Number   | 2520                             | 2540                             | 377C41                           | 2570                             | 2530                             | 2575                             | 2559                             | 2560                             |
| Diameter   | 1/4"                             | 1/2"                             | 1/2"                             | 1"                               | 1/4"                             | 1"                               | 1/2"                             | 5 mV/μ 1/2"                      |
| Open Circuit Sensitivity   | 4 mV/Pa                          | 14.5 mV/Pa                       | 44.5 mV/Pa                       | 48 mV/Pa                         | 1.4 mV/Pa                        | 45 mV/Pa                         | 12.9 mV/Pa                       | 45.2 mV/Pa                       |
| Frequency Range (± 2 dB)   | 4 Hz to 80 kHz                   | 4 Hz to 40 kHz                   | 3.15 Hz to 20 kHz                | 2.6 Hz to 20 kHz                 | 4 Hz to 70 kHz                   | 2.6 Hz to 80 kHz                 | 4 Hz to 25 kHz                   | 2.6 Hz to 10 kHz                 |
| Dynamic Range Upper Limit - 3% Distortion Limit [1]                    | 164 dB                           | 160 dB                           | 146 dB                           | 146 dB                           | 172 dB                           | 146 dB                           | 160 dB                           | 146 dB                           |
| Dynamic Range Lower Limit - Cartridge Thermal Noise [1]                | 30 dB (A)                        | 20 dB (A)                        | 15 dB (A)                        | 10 dB (A)                        | 31 dB (A)                        | 10 dB (A)                        | 18 dB (A)                        | 15 dB (A)                        |
| Temperature Range  | -40 to +302 °F<br>-40 to +150 °C | -40 to +302 °F<br>-40 to +150 °C | -40 to +302 °F<br>-40 to +150 °C | -40 to +302 °F<br>-40 to +150 °C | -40 to +302 °F<br>-40 to +150 °C | -40 to +302 °F<br>-40 to +150 °C | -40 to +302 °F<br>-40 to +150 °C | -40 to +302 °F<br>-40 to +150 °C |
| <b>Notes</b>   |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |
| [1] re 20 μPa  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |



## PREAMPLIFIERS FOR EXTERNALLY POLARIZED MICROPHONES

Model 426A30 is a rugged 1/2" diameter preamplifier optimized for use with externally polarized microphones. It is compatible with microphones as defined in the international standard IEC 61094, and connects to a 200 V power supply requiring a 7 pin cable with connectors. Model 426B31 is a 1/4" diameter preamplifier with integral 10 ft. cable that terminates with a 7 pin connector.



### 1/4" PREAMPLIFIER AND CABLE

MODEL 426B31



### 1/2" PREAMPLIFIER

MODEL 426A30



### MICROPHONE PREAMPLIFIER POWER SUPPLY

MODEL 2221

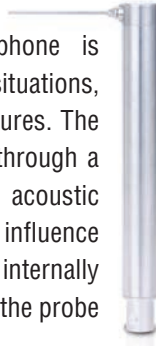
- 0 V and 200 V polarization options
- Extended battery life
- 0, 20, and 40 dB gain
- Selectable flat (Z), A, and C-weighting

| PREAMPLIFIERS                      |                                |                                 |
|------------------------------------|--------------------------------|---------------------------------|
| Model Number                       | 426B31                         | 426A30                          |
| Diameter                           | 1/4"                           | 1/2"                            |
| Gain (Attenuation)                 | -0.14 dB [2]                   | -0.2 dB [1]                     |
| Frequency Response ( $\pm 0.5$ dB) | 3.98 Hz to 126 kHz             | 3.0 Hz to 126 kHz               |
| Electrical Noise (A-weight)        | $\leq 4.8 \mu\text{V}$ [2]     | $\leq 2.8 \mu\text{V}$ [1]      |
| Electrical Noise (Linear) [1]      | $\leq 12 \mu\text{V}$ [2]      | $\leq 5 \mu\text{V}$ [1]        |
| Output Voltage (Maximum)           | $\pm 25$ V pk                  | $\pm 14$ V pk                   |
| Temperature Range                  | -4 to +167 °F<br>-20 to +75 °C | -40 to +185 °F<br>-40 to +85 °C |
| Output Connector                   | Integral Cable with 7 Pin      | 7 Pin                           |
| TEDS IEEE 1451.4                   | Yes                            | No                              |

# ADDITIONAL ACOUSTIC PRODUCTS & ACCESSORIES

## HIGH TEMPERATURE PROBE MICROPHONE (UP TO 800°C)

Model 377B26 Pre-polarized Probe Microphone is designed for use in difficult measurement situations, such as small cavities and very high temperatures. The acoustic signal is guided to the microphone through a detachable, stainless-steel probe. The high acoustic input impedance of the probe tip minimizes its influence on the acoustic field. Probe microphones are internally compensated to equalize the static pressure at the probe tip with the internal microphone pressure.



## IN-LINE “A-WEIGHTING” FILTER

Model 426B02 In-line A-weighting Filter is powered by constant current excitation and is compatible with ICP® microphone preamplifiers. When using this filter, a minimum of 4 mA excitation current is required of the ICP® sensor signal conditioner or readout device which incorporates ICP® sensor power.



CE

**A-weighting Filter  
Model 426B02**



079A02

079B03

079B25

079A24

079A29

079A41

079A42

## ADAPTORS

079A02 – 1/4” Microphone to 1/2” Preamplifier Adaptor

079B03 – 1/2” Microphone to 1/4” Preamplifier Adaptor

079B25 – 1” Microphone to 1/2” Preamplifier Adaptor

079A24 – Tripod Stand Adaptor to Convert 5/8” Stud to 1/4” for Microphone Holder

079A29 – Swivel Head, Stand to Holder Adaptor

079A41 – Right Angle Adapter for 1/4” Microphone

079A42 – Right Angle Adapter for 1/2” Microphone



EXA010

003C10

003D10

003U10

003V10

003V30

## CABLES (additional lengths available)

EXA010 – 10’ Cable with 7 Pin Connector

003C10 – 10’ Coaxial Cable with 10-32 Plug and BNC Plug

003D10 – 10’ Coaxial Cable with BNC Plugs

003U10 – 10’ Coaxial Cable with SMB Plugs

003V10 – 10’ Coaxial Cable with SMB Plug and BNC Plug

003V30 – 30’ Coaxial Cable with SMB Plug and BNC Plug



ADP021

ADP024

079A31  
079A58

## CALIBRATION ACCESSORIES

ADP021 – CAL250 to 1/4” Microphone Adaptor

ADP024 – CAL200 to 1/4” Microphone Adaptor

079A31 – 8-Channel Coupler for 1/4” Microphones

079A58 – 8-Channel Coupler for 1/2” Microphones





079A06



079A07



079A53



EPS2116



079C20



079B21

## ENVIRONMENTAL PROTECTION

- 079A06 – 3-1/2" Windscreen for 1/2" Mic
- 079A07 – 3-1/2" Windscreen for 1/4" Mic
- 079C20 – Nose Cone for 1/4" Mic
- 079B21 – Nose Cone for 1/2" Mic
- 079A53 – 3/4" Windscreen for 1/4" Mic
- EPS2116 – Outdoor Protection, 3/4" Mount and 1/4" Side Exit Mount



079B10



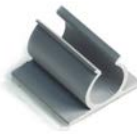
079A11



079C23



079B32



079A13



079A49

## HOLDERS

- 079B10 – Holder for 1/4" Mic
- 079A11 – Holder for 1/2" Mic
- 079C23 – Swivel Head with 1/4" and 1/2" Holders
- 079B32 – Clip Holder for 1/4" Mic
- 079A13 – Clip Holder for 1/2" Mic
- 079A49 – Holder for phantom powered preamplifier



079A15



079B16



079A17



079A18



079A44



379A02

## STANDS AND MOUNTS

- 079A15 – Tripod Stand with Boom Arm
- 079B16 – Miniature Tripod Stand with Adjustable Legs
- 079A17 – Camera Tripod Stand
- 079A18 – Adjustable Clamp
- 079A44 – 5 Link Extension Arm for Clamp Holders
- 379A02 – Array Microphone Stand

CE



Battery Powered ICP®  
Model 480C02

CE



3-Channel Battery Powered ICP®  
Model 480B21

CE



USB Dual Channel ICP®  
Model 485B36

CE



DIN-rail mount with Gain  
Model 410C01

CE



4-Channel ICP® 4 to 20 mA  
Model 482C05

CE



8-Channel ICP®  
Model 483C05

## ICP® SIGNAL CONDITIONERS

# ADDITIONAL ACOUSTIC PRODUCTS

## SOUND LEVEL METERS

Model 831C is the most recent Larson Davis sound level meter platform. This model provides superior performance, reliability, and 2GB of internal memory. Various firmware modules expand the functionality of Model 831C for a variety of environmental noise and architectural acoustics measurements. The Model 831C also includes the easy-to-use personal health and safety measurement features of other advanced SLM products.



### SOUNDTRACK LxT®

The SoundTrack LxT® sound level meter represents a significant advance in performance, reliability, and ease-of-use. This ergonomically designed meter ensures that gathering, analyzing, and presenting detailed workplace and environmental noise data is simple, fast, and accurate.



Please visit [www.LasonDavis.com](http://www.LasonDavis.com) for further details.



### ENVIRONMENTAL PROTECTION SHROUDS

Model EPS2116 environmental shrouds are complete weather protection systems for 1/2" microphone systems. The environmental shrouds are the perfect choice for longer-term measurements in inclement weather. Their special acoustic windscreen material and configuration protect the microphones from rain, sleet, and snow. The shroud seals the preamplifier in a desiccated chamber, thus preserving performance in high humidity environments. The desiccant volume is many times greater than that of inline desiccant cartridges, for lasting protection without interference between the microphone and preamplifier. The shroud is also equipped with bird-spikes to deter winged intruders.



### OUTDOOR PREAMPLIFIER & MICROPHONE WITH CALIBRATION CHECK

The Larson Davis PRM2103-FF is designed to be used with the Model 831C sound level meter and an environmental shroud. It can be used in a wide range of weather conditions.

The PRM2103-FF provides a five frequency calibration check which is automatically controlled by the Model 831C sound level meter. It does not require routine maintenance. It includes a built-in humidity and temperature sensor and can automatically turn on an internal heater when there is a risk of condensation. The low power usage makes the PRM2103-FF an excellent solution for battery powered applications.

# ACOUSTIC CALIBRATION

## PRODUCTS



**THE MODAL SHOP**  
AN AMPHENOL COMPANY

### TURNKEY ACOUSTIC CALIBRATION WORKSTATION

The Precision Acoustic Calibration Workstation Model 9350C is an accurate, turnkey, automated, PC-based system. The 9350C offers efficient and cost-effective calibration of 1/4", 1/2", and 1" microphone cartridges (open-circuit sensitivity), microphone cartridges with preamplifiers (closed-circuit sensitivity), and microphone frequency response function.

The 9350C generates ISO 17025 compliant calibration certificates for:

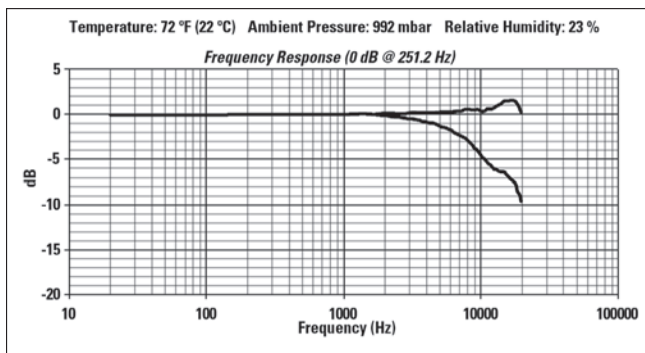
- Microphone and Preamplifier Calibration
- Preamplifier Conformance Test
- Source Calibration (example: pistonphone)

## SERVICES

### PCB HAS A "STATE-OF-THE-ART" ACOUSTIC CALIBRATION SYSTEM

All calibrations include test documentation showing the actuator response, corrected responses, the conditions under which the calibration was performed, and the equipment used. Calibrations are performed with reference microphones traceable to national laboratories specializing in acoustic measurements (NIST, PTB, or DFM). PCB's quality system is certified to AS9100:2016 QMS Certified by DQS, Inc. and ISO 9001:2015 QMS Certified by DQS, Inc. PCB's calibration service is accredited to ISO17025 & ANSI-Z540.3 by A2LA (see ILAC MRA) and compliant with ISO10012.

PCB is equipped to calibrate most competitors' microphones and preamplifiers: [www.pcb.com/calibration-services](http://www.pcb.com/calibration-services)



### PRECISION HANDHELD ACOUSTIC CALIBRATORS

PCB offers calibrators for microphones that meet IEC 60942 and ANSI S1.40 standards. These units are easy-to-use and available with optional adaptors for use with a variety of microphone diameters. Calibrators are lightweight, portable, and battery operated.

| PRECISION CALIBRATORS    |                            |  |
|--------------------------|----------------------------|--|
| Model Number             | CAL200                     | CAL250   |
| Microphone Sizes         | 1/4" (6 mm)*, 1/2" (12 mm) | 1/8" (3 mm)*, 1/4" (6 mm)*, 1/2" (12 mm), 1" (25 mm) |
| Frequency                | 1 kHz ± 1%                 | 251.2 Hz ± 2 Hz                                      |
| Output Level (re 20 µPa) | 94 dB, 114 dB ± 0.2 dB     | 114 ± 0.1 dB   |
| Barometric Compensation  | Automatic                  | Automatic  |
| ANSI S1.40               | Yes                        | Yes  |
| IEC 60942 Class 1        | Yes                        | Yes  |

Notes: \* With optional adaptors

| Freq (Hz) | Lower (dB) | Upper (dB) | Freq (Hz) | Lower (dB) | Upper (dB) | Freq (Hz) | Lower (dB) | Upper (dB) |
|-----------|------------|------------|-----------|------------|------------|-----------|------------|------------|
| 20.0      | -0.08      | -0.08      | 1584.9    | -0.14      | 0.07       | 6683.4    | -2.14      | 0.38       |
| 25.1      | -0.02      | -0.02      | 1678.8    | -0.16      | 0.07       | 7079.5    | -2.35      | 0.43       |
| 31.6      | 0.00       | 0.00       | 1778.3    | -0.17      | 0.08       | 7498.9    | -2.61      | 0.46       |
| 39.8      | 0.01       | 0.01       | 1883.7    | -0.19      | 0.09       | 7943.3    | -2.94      | 0.45       |
| 50.1      | 0.01       | 0.01       | 1995.3    | -0.22      | 0.09       | 8414.0    | -3.24      | 0.49       |
| 63.1      | 0.02       | 0.02       | 2113.5    | -0.24      | 0.10       | 8912.5    | -3.58      | 0.53       |
| 79.4      | 0.02       | 0.02       | 2238.7    | -0.26      | 0.11       | 9440.6    | -3.98      | 0.54       |
| 100.0     | 0.02       | 0.02       | 2371.4    | -0.30      | 0.11       | 10000.0   | -4.54      | 0.41       |
| 125.9     | 0.01       | 0.01       | 2511.9    | -0.33      | 0.13       | 10595.5   | -4.98      | 0.42       |
| 158.5     | 0.01       | 0.01       | 2660.7    | -0.37      | 0.14       | 11220.2   | -5.32      | 0.54       |
| 199.5     | 0.01       | 0.01       | 2818.4    | -0.41      | 0.15       | 11885.0   | -5.77      | 0.55       |
| 251.2     | 0.00       | 0.00       | 2985.4    | -0.46      | 0.16       | 12589.3   | -6.06      | 0.71       |
| 316.2     | 0.00       | 0.01       | 3162.3    | -0.51      | 0.17       | 13335.2   | -6.16      | 1.03       |
| 398.1     | -0.01      | -0.01      | 3349.7    | -0.57      | 0.17       | 14125.4   | -6.41      | 1.18       |
| 501.2     | -0.02      | 0.02       | 3548.1    | -0.64      | 0.18       | 14962.4   | -6.50      | 1.47       |
| 631.0     | -0.03      | 0.01       | 3758.4    | -0.72      | 0.18       | 15848.9   | -6.83      | 1.52       |
| 794.3     | -0.04      | 0.05       | 3981.1    | -0.82      | 0.18       | 16788.0   | -7.13      | 1.59       |
| 1000.0    | -0.06      | 0.06       | 4217.0    | -0.91      | 0.20       | 17782.8   | -7.63      | 1.46       |
| 1059.3    | -0.07      | 0.06       | 4466.8    | -1.01      | 0.22       | 18836.5   | -8.20      | 1.01       |
| 1122.0    | -0.08      | 0.06       | 4731.5    | -1.12      | 0.25       | 19952.6   | -8.83      | 0.10       |
| 1188.5    | -0.08      | 0.07       | 5011.9    | -1.25      | 0.28       | -         | -          | -          |
| 1258.9    | -0.09      | 0.07       | 5308.8    | -1.41      | 0.29       | -         | -          | -          |
| 1333.5    | -0.10      | 0.08       | 5623.4    | -1.57      | 0.31       | -         | -          | -          |
| 1412.5    | -0.11      | 0.08       | 5956.6    | -1.75      | 0.32       | -         | -          | -          |
| 1496.2    | -0.13      | 0.07       | 6309.6    | -1.94      | 0.35       | -         | -          | -          |

Upper curve: Free-field microphone response at 0° sound incidence with grid cover

Lower curve: Pressure response as tested with electrostatic actuator



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