



The ACoustical Interface^(tm)

PRECISION MICROPHONE SYSTEM

User's Manual



Figure 1

ACoustical Interface SystemTM

SYSTEM OPERATION - USERS MANUAL

This manual describes the basic operation of the ACoustical InterfaceTM System. Installation, system controls and the actual operation of the ACoustical Interface^(tm) system are included.

The **ACOustical Interface™** system has four major components: a measurement microphone; (1/4, 1/2 and 1 Inch versions are available), the companion microphone preamplifier; the power supply; and the optional "G" - gain stage, windscreen, and optional **PS9 (110VAC)**. or **PS29 (220VAC)** AC adaptors. Use of the SPL Calibrator may be found in the **511E** manual.

INSTALLATION

The microphone system has three main components: the microphone capsule; the preamplifier/cable and microphone adaptor (where applicable).

Preamplifier - The **4012** preamplifier has two components. The preamplifier body with end-cap (**EC2**), and the companion cable with mating connectors (XLR or Lemo). The **CA4012-5** is terminated in a 5 pin Male XLR. This mates with the standard PS9200 family of power supplies. The **CA4012-7L** is terminated in a 7 pin Male Lemo™ connector. The CA4012-L7 pinout is compatible with the PS9200L7 (2 channel) and PS9204L7 channel) power supplies. It is also compatible with Hewlett Packard, Norsonic and Bruel and Kjaer instruments equipped with the mating connector.

4016 - 1/4 Inch preamplifier consists of the **4012** and companion cable and the **AD0016** 1/4 to 1/2 Inch adaptor.

4022 - 1 Inch preamplifier consists of the **4012** and companion cable and the **AD0122** 1 Inch to 1/2 Inch adaptor.

Prepolarized (Electret) Microphones

CAUTION: ELECTRET (Prepolarized) MIC CAPSULES e.g. **ACO Pacific's MK224, 7052S, 7051S** or B&K 4155

require the special **CA4012-5E (CA4012L7E)** cable - designated by **yellow** or **black** marking on the XLR/Lemo end. This cable has the **200 Vdc polarization connection removed** and is the polarization connection at the preamp is grounded.

Never place an Electret Capsule on a standard preamp/cable. This will cause temporary and possibly permanent loss of sensitivity.

The preamplifier body is detachable from the **CA4012XX** cable. This makes for easier installation of cables and allows the preamp cable to be permanently installed. The preamplifier body may be detached for safe storage, testing, or replacement. Longer CA4012 cables or CE4012 extension cables are available on special order.

ATTACH THE CA4012-XX TO THE PREAMP.

Microphone Installation

The microphone is supplied in a reusable storage box. 1 inch and 1/2 inch condenser microphones are supplied with a plastic protective cap. 1/4 inch microphones may have a storage stand. **Save these accessories.**

All ACO Pacific measurement microphones have an individual "**Birth Certificate**". The certificate provides actual measured sensitivity data and frequency response curves for the specific capsule. **RETAIN THIS CHART.**

The plastic cap provided on some capsules protects the stored microphone from accumulation of dust and dirt on the diaphragm. The cap should be stored in the microphone box as may the 1/4 inch mic stand.

INSTALLING THE MICROPHONE CAPSULE -

The microphone end of the **4012** preamplifier is protected by a machined metal cap (**EC2**). This cap protects the preamplifier input from dust, oil and physical damage when the microphone is not installed.

To remove - simply unscrew the cap from the preamp body.

Save the preamp cap. The cap may be stored in the microphone box with the microphone cap.

1/2 INCH MICROPHONES

Carefully install the selected microphone capsule on the face of the preamplifier - ***DO NOT OVERTIGHTEN - YOU MAY PERMANENTLY DAMAGE ANY PRECISION MIC BY EXCESSIVE FORCE - FINGER TIGHT IS ADEQUATE!***

1/4 INCH MICROPHONES

An **AD0016** 1/4 to 1/2 inch adaptor is required. Place the **AD0016** preamp adaptor on the face of the preamp. The **ACO Pacific 4016** Preamp is this combination. Carefully place the 1/4 inch mic capsule on the end of the 1/4 inch adaptor. ***DO NOT OVERTIGHTEN!***

1 INCH MICROPHONES

An **AD0122** 1 inch to 1/2 inch adaptor is required. Slide the **AD0122** 1 Inch Mic to 1/2 inch preamp adaptor over the preamplifier from the microphone end and thread in place. This is the **ACO Pacific 4022** Preamp combination. Mount the mic capsule on the adaptor/preamp combination. ***DO NOT OVERTIGHTEN!***

The dust cap must be removed when making measurements.

MICROPHONE GRIDS - *DO NOT REMOVE - It Is Not Necessary*

The grids of most ACO Pacific microphones are removable. **This is not necessary for most measurements.** The microphone is designed for use with the grid. Removal will not give you better or higher or lower readings. The **FREE FIELD** response curve supplied with **Free Field** capsules assumes the grid is on the microphone capsule. Removing the grid does change the high frequency response.

If you must remove the grid **do so with care**. It is very easy to crease the **2u thick diaphragm** or

even tear it.

In **ALL** cases **DO NOT OVERTIGHTEN** the grid or the microphone. The fine threads of both make this very easy.

PS9200 OPERATION

The PS9200 utilizes a standard L1604 - 9 Vdc Alkaline Transistor Radio Battery. The Battery Compartment is located on the bottom of the case below the BNC cable connectors.

The **Power Switch** is located on the bottom front of the unit below the Preamp input connectors. **The Power Switch is a "LOCKING TOGGLE" TO Turn ON or to Turn OFF- GENTLY PULL OUT ON THE HANDLE BEFORE TOGGLING THE SWITCH.** Up is "ON" and Down is "OFF".

INSTALLING BATTERY - Not required for AC operation

First **TURN OFF the PS9200.**

Turn over the unit. Slide open the compartment door and connect the battery to the polarized connector in the compartment. Use caution - **DO NOT Reverse the Battery Connections.** If you have accidentally left the unit turned on - **you will blow the 250 mA fast blow fuse** inside the PS9200.

Replace the door. **BATTERY LIFE FOR A SINGLE PREAMP OPERATION IS 50 HOURS - TYPICAL.** As with all battery powered devices temperature, type of battery, and age of the battery effect operational battery life. Battery life with the **4012HP** (higher current version) is much less - about 10 - 12 hours. Battery life for the **PS9250** is similarly reduced.

AC OPERATION - 110 Vac (PS9), 220 Vac (PS29) - Plugging your PS9 or PS29 into the external power connection on the side of the PS9200 disconnects the battery (removal of the battery is not necessary). The PS9200 automatically disconnects the battery when external DC is supplied. **You do not need to install a battery for AC Only operation.**

OPERATION

With a 9 Vdc battery installed or an AC Adaptor (**PS9 or PS29**) connected you are now ready to connect the microphone preamplifier and output BNC cables.

ATTACHING THE 4012 or similar Preamp - Your BNC signal cable should then be attached to the BNC connector directly inline with the preamp cable. The label designates these channels "A" and "B".(Note the PS9204L7 has only A&B markings. Designate the remaining two channels "C" and "D" as you wish.

The **Power Switch** is located on the bottom front of the unit - below the Preamp input connectors. **The Power Switch has a "LOCKING TOGGLE" TO Turn On - GENTLY PULL OUT ON THE HANDLE BEFORE TOGGLING THE SWITCH UPWARDS ("ON").**

A "**Flashing LED**" indicates power is applied. "**FLASHING**" also indicates the battery or supply voltage is above 6.2 Vdc. A **STEADY** LED indicates the battery voltage is low. You will have about 1 -2 hours (with 1 preamp) of useful battery life left when the LED is on "STEADY". Replace the battery as soon as possible. You should not see a steady LED during normal AC Adaptor (PS9 or PS29) operation

"TURN ON" TIME - 2-4 minutes - The extended low frequency response of the microphones and the preamplifier result in long turn on times for the **ACOustical Interface™** System. Typically this will be about 2 - 4 minutes.

IMPORTANT - THE PS9200 HAS BEEN DESIGNED TO REDUCE THE 200 Vdc POLARIZATION VOLTAGE WHEN NO PREAMPS ARE PLUGGED IN TO THE SUPPLY. IT WILL TAKE AT LEAST 1 - 2 MINUTES TO STABILIZE AFTER THE PREAMP IS INSTALLED.

YOU WILL NOT READ **200 Vdc** ON PIN 3 OF THE SPARE XLR CONNECTOR. THE OUTPUT RESISTANCE OF THE CIRCUIT IS **11 MEGOHMS**. THIS IS **TO PROTECT YOU - THE USER**. The typical DVM (Digital Voltmeter) has 10 MegOhms of input resistance, creating a voltage divider. You may read about 60 to 100 Vdc. This is not an accurate reading

CAUTION - While the input to the **4012** Preamp is protected against electrical discharge - use care when installing and removing the microphone. If you accidentally touch the center pin of the preamp to the shield or ground the 200 Vdc polarization charge will be removed and take about 2 minutes to restabilize. A slow increase in the sensitivity will be noticed as the voltage returns.

"G" - Gain Option

The "**G**" option provides two independent fixed gain (or buffer) stages. Factory installed the gain is preset - to order - by the factory. Standard gains are 20 dB and 40 dB. Switches for each channel are located on the back of the PS9200 next to the BNC signal output connectors. A color dot or label next to the switch indicates the preset gain of the individual channel.

In the "Direct" position signals from the 4012 or other preamp are directly fed to the BNC through the internal decoupling cap. The maximum signal limits in this mode are determined by the preamplifier and the preamp 28 Vdc operating voltage (50 Vdc with the PS9250).

The maximum output voltage swing of the "G" option is determined by the DC supply voltage of the PS9(PS29). This is typically 3.3 Vrms for a 13.5 Vdc source. **NOTE:** Operation from the internal 9Vdc battery is not recommended.

The **ACOustical Interface™** and microphones are **precision measurement equipment**. Designed for the rigors of field use they will last for many years of accurate stable measurements if properly treated and maintained.

Acoustic Signal Polarity - A Reminder

In some measurement applications ,such as loudspeaker testing, knowing the absolute polarity of the acoustic wave is important. The traditional **polarized measurement microphone** has a positive polarization voltage on the back plate. This is an artifact of the positive plate (anode)

voltage found in tube (valve) designs. The output of the traditional measurement microphone preamplifier both tube and solid-state is non-inverting. These designs are usually a cathode (tubes) or JFET source followers.

As a result of the positive polarization voltage - **positive going acoustical** waves result in a **negative going electrical** signals from the microphone and preamplifier. This does not affect the accuracy of the measurements but does need to be taken into account in some applications

On the other hand - **Electret (prepolarized)** microphones have a **negative polarization voltage** (electrons stored in the electret material). **Positive going acoustic** waves result in the electron charge being reduced on the backplate - thus a **positive going output** voltage is seen. Again, the measurement accuracy is not affected.

It is convention for **POLARIZED MEASUREMENT MICROPHONES** on Non-Inverting Preamps to output:

NEGATIVE GOING SIGNALS FOR POSITIVE GOING SOUND PRESSURE

For **ELECTRET MICROPHONES** on Non-Inverting Preamps:

POSITIVE GOING SOUND PRESSURE RESULTS IN POSITIVE GOING SIGNALS

The preamps of ACO Pacific, Bruel and Kjaer and others are Non-Inverting

Optional Equipment

SC1 and SC2 Custom Storage Cases

The **SC1** - non-locking and **SC2** locking storage cases have die cut foam inserts designed specifically for the storage and transport of the PS9200, Microphones, Preamps and their cables, WS1 windscreen, PS9 or PS29 Adaptors, Microphone Adaptors, Spare Batteries, and the 511E calibrator. The **SC1** is provided as part of the **PS9200KIT**. The **SC2** may be specified as an option.

WS1 - 3" Windscreen

The **WS1** windscreen is designed to reduce wind noise in outdoor applications. The material was selected to minimize attenuation of sound to beyond 20 kHz. The **WS1** may also be used additional mechanical protection for the microphone. It will protect the microphone diaphragm from stray particles, oils and other materials and act as a bumper in the case of a mishap. The **WS1** is included in the **PS9200KIT**.

WS7 - 7" Windscreen

The **WS7** windscreen was designed for higher velocity wind environments, like thjose found in the desert of the Southwest US. The **WS1** is adequate for most applications.

DM2 Series of Dummy Microphones

The **DM2 Series** of dummy microphones permits the connection of electrical signals to the input

of the **4012** preamplifier. The **DM2-22** dummy microphone has a 22 pF coupling capacitor to simulate a typical 1/2 inch mic capsule. For more information read the **Dummy Microphone Users Manual**.

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