

*instructions  
for*

## Model PA-5 PROBE MICROPHONE SYSTEM



### **MODEL PA-5 PROBE MICROPHONE SYSTEM**

#### **GENERAL DESCRIPTION**

The Quest MODEL PA-5 Probe Microphone System is designed to allow accurate sound level measurements using the Quest 215R Sound Level Meter. This microphone system makes it possible to determine the sound level at very discrete locations in the sound field. As an example, this system can measure the sound pressure level at the microphone of a hearing aid directly within 1.5 dB. This measurement technique improves the reliability and validity of sound pressure measurements when compared to the more conventional substitution methods of measurements. The probe system shown in Figure 1 includes an electret microphone and cable, a PA-5 preamplifier with built-in Quest microphone connector, a 1-inch microphone adaptor, and a rubber microphone holder.

#### **SPECIFICATIONS**

##### **MICROPHONE**

TYPE: Electret condenser  
MODEL: Knowles Electric Inc. BT-1759  
SENSITIVITY: -60 dB re 1 volt/microbar  
FREQUENCY RESPONSE: Flat 50 Hz to 10,000 Hz  
OUTPUT IMPEDANCE: 2000-6000 Ohms "A"  
WEIGHTED NOISE FLOOR: 25 dB  
SIZE: .35 x .22 x 0.1 in. (8.9 x 5.6 x 2.5 mm)  
WEIGHT: .01 ounces (0.28 grams)



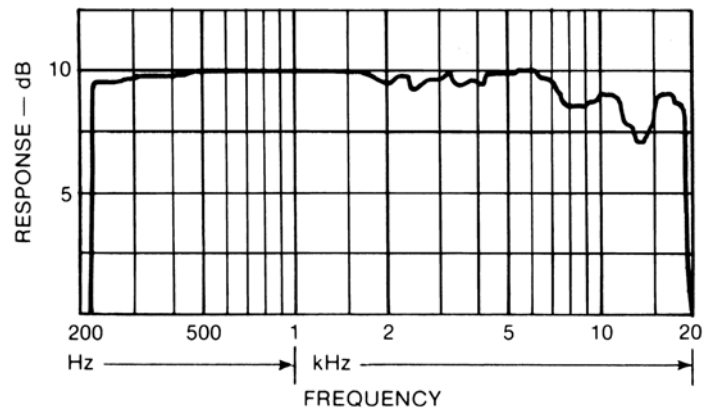
**Figure 1. Model PA-5 Probe Microphone System Shown with Model 215R Sound Level Meter, Octave Band Filter and CA-12 Calibrator**

**PREAMPLIFIER**

GAIN: -3.5 dB to +6.5 dB  
 FREQUENCY RESPONSE: Flat 25 Hz to 7,000 Hz (See Figure 2)  
 INPUT IMPEDANCE: 90,000 Ohms  
 OUTPUT IMPEDANCE: 1000 Ohms  
 HOUSING: 1/16 inch aluminum tube  
 SIZE: 4.5 x .875 inches (114 x 23 mm)

**PA-5 PROBE MICROPHONE SYSTEM**

NOISE FLOOR: "A" Weighted < 27 dB  
 "C" Weighted < 35 dB  
 Lin < 38 dB  
 TEMPERATURE RANGE: -10 to 50°C Operating  
 -40 to 65°C Storage  
 RELATIVE HUMIDITY: 0 to 95% non condensing  
 POWER: 9 volts at 0.7 milliamps (powered by 215R Sound Level Meter)  
 CABLE: Flexible .069 in. x 19 ft. (1.75 mm x 5.8 m)



**Figure 2. System Frequency Response**

## PRINCIPLES OF OPERATION

The Knowles electret (BT-1759) microphone is used with the system. It was selected because of its linear response over the 200 to 4000 Hz range (10.5 dB).

The cable attached to the microphone was designed for flexibility so it can easily be placed beside a hearing aid microphone or over the ear.

The low noise preamplifier is designed to match the microphone output to the input of the Quest 215R Sound Level Meter. Its frequency response is designed for flat response when used with the BT-1759 microphone. A calibrate adjustment is provided to accommodate gain differences between the microphone and the 215R Sound Level Meter.

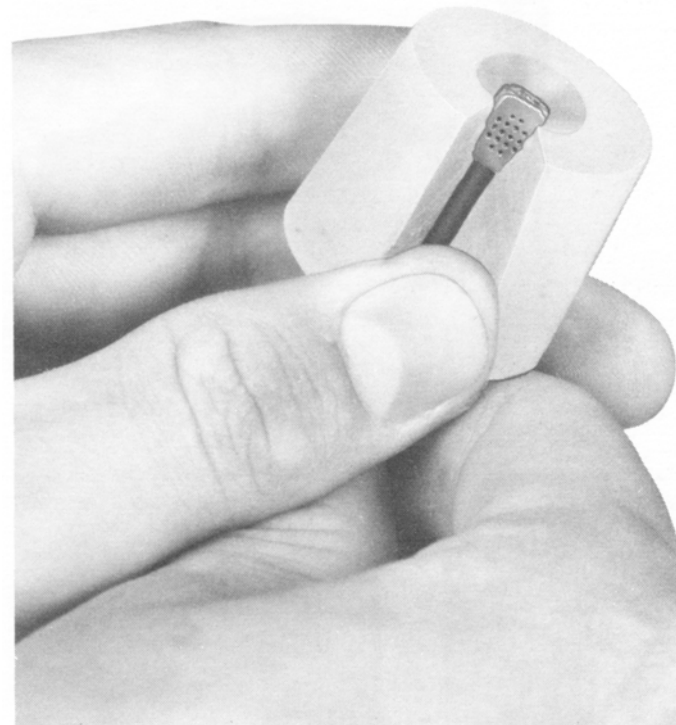
## CALIBRATION

To calibrate the probe system, proceed as follows:

1. Perform the sound level meter battery test.

2. Place the probe microphone in the rubber microphone holder (see Figure 3).

3. Place the 1-inch Quest microphone adapter over the rubber microphone holder.



**Figure 3. Inserting Microphone in Holder**

4. Turn the CA-12 Calibrator ON.
5. Place the microphone and adapter assembly onto the CA-12 Calibrator (see Figure 4).



**Figure 4. Calibrating the Probe System**

6. Set the Model 215R Sound Level Meter to Lin, 100 dB, Slow.

7. Use a small screwdriver to adjust the recessed potentiometer screw on the PA-5 preamplifier until the meter reads 110 dB (+10 on the meter scale).

8. Consult the CA-12 manual for altitude corrections and adjust reading as indicated.

## **OPERATING PROCEDURE**

### **Placement of Probe Microphone**

The probe microphone should be placed as close to the ear (if no prosthesis) or the prosthesis microphone as possible. The microphone can be held in place by simply taping the cable. The face of the microphone should be oriented in the same manner as the ear or microphone of the device under study. Small differences in the microphone orientation should not affect measurements significantly.

Figure 5 provides an illustration of the sound field and the microphone responses when the microphone is placed at a patient's ear and oriented at 0 degrees, 45 degrees, and 90 degrees azimuth (speaker front). These response curves were obtained using swept sinusoids and therefore reflect the maximum interaction effects of the test environment. The figure reveals that the most significant microphone effects occur at frequencies above 5000 Hz. Below 3000 Hz variations do not exceed 4 dB. It should be noted that these values are not considered unreasonably large since they were derived from sinusoidal stimuli.

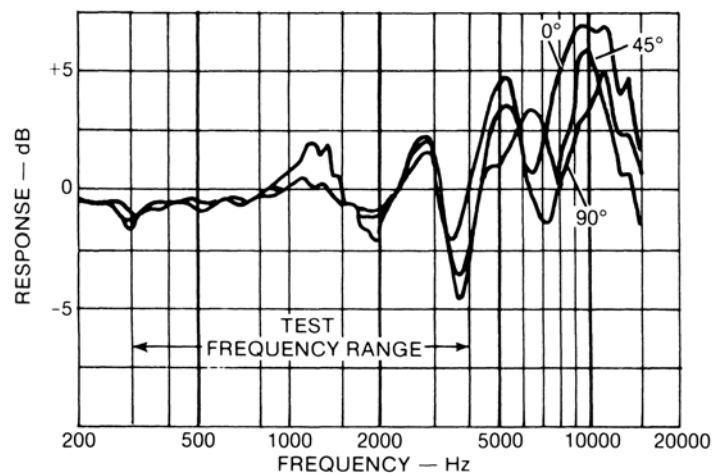
If the clinician makes an attempt to orient the probe microphone to approximate that of the device being tested and if the sound field testing is done using either warbled tones or narrow band noise, the measured sound pressure level will be highly repeatable.

With the probe microphone in place, the clinician can read the sound pressure level on the Model 215R Sound Level Meter (see the Model 215 manual for meter operation).

### Maintenance of the Probe System

This probe microphone system has been designed to be extremely rugged and stable. The following cautions should be considered:

1. Keep the system removed from damp or high humidity areas.



**Figure 5. Frequency Response Curves for Different Microphone Orientations**

2. Never use excessive force to connect the preamplifier housing to the sound level meter.

3. Never pull on the microphone cable.

4. Take care not to catch or pinch cables in doors or to knot the cable.

### Potential User Problems and Suggested Remedies

1. Cannot get microphone properly placed and oriented.

A. Tape in place on the hearing aid microphone housing.

B. Tape to an ear hook and place the ear hook and microphone in the correct position.

2. Excessive background noise.

A. If the noise is related to the microphone placement (clothing noise, for example) instruct the patient not to move during testing. Also, if possible, adjust the microphone placement.

B. If the noise is room noise, use either a narrow band filter set or the "A" weighted filter. Apply the correction factors in Table 1 if using the "A" weighted filter.

**Table 1. "A"-Weighted Correction Factors**

Frequency	250	500	750	1K	2K	3K	4K	Speech
Add dB	8	4	2	0	0	1	2	3

## **Service Policy**

The Quest product you have purchased is one of the finest acoustic instruments available. It is backed by our full one-year warranty, which seeks complete customer satisfaction. This is your assurance that you can expect prompt courteous service for your equipment from the entire Quest service organization.

Should your Quest equipment need to be returned for repair or recalibration, please contact the Service Department at (800) 245-0779 (USA) or Fax (262) 567-4047 for a Return Authorization Number. The RA number is valid for 30 days, and must be shown on the shipping label and purchase order/cover letter. If you are unable to return instruments in that time, call for a new RA number. Send it prepaid and properly packed in the original shipping carton directly to Quest Technologies, 1060 Corporate Center Drive, Oconomowoc, WI 53066 U.S.A.

Repair or replacement work done under warranty will be performed free of charge, and the instrument will be returned to you prepaid. Your copy or a photocopy of the Quest Registration Card will serve as proof of warranty should the factory require this information.

If for any reason you should find it necessary to contact the factory regarding service or shipping damage, please direct your calls or letters to the attention of the Service Manager, Quest Technologies, (262) 567-9157 or (800) 245-0779. Office hours are from 7 AM to 6 PM (Central Standard Time) Monday through Friday.

For service or recalibration outside the U.S.A., please contact your local Quest Dealer or fax Quest U.S.A. at (262) 567-4047.