

Pistonphone for Acoustic Calibration

type 4220

FEATURES:

- Well defined sound source
- Few, highly stable parameters determine SPL
- High calibration sound level, 124 dB SPL at microphone diaphragm
- Accurate calibration within $\pm 0,15$ dB
- Precise frequency control, within 1%
- Individually calibrated

- Battery operated
- Fits 1", 1/2", 1/4" and 1/8" microphones

USES:

- Direct calibration of sound measurement equipment
- Field and laboratory use
- Laboratory standard

The Pistonphone Type 4220 is a small, battery operated, high level precision sound source, which provides quick and accurate direct calibration of sound measuring equipment, tape recordings of sound etc. with a calibration error of less than $\pm 0,15$ dB. It is always ready for use and can be utilized in the field under severe environmental conditions while still maintaining high accuracy. It is also extremely useful as a laboratory standard sound pressure level. The Pistonphone fulfils the recommendations of the IEC on the calibration of precision sound level meters. The calibration frequency, which is 250 Hz with the self-contained batteries, is controlled within $\pm 1\%$ by means of a tachometer signal and comparator circuit. The piston arrangement, an original B & K design, consists of two pis-

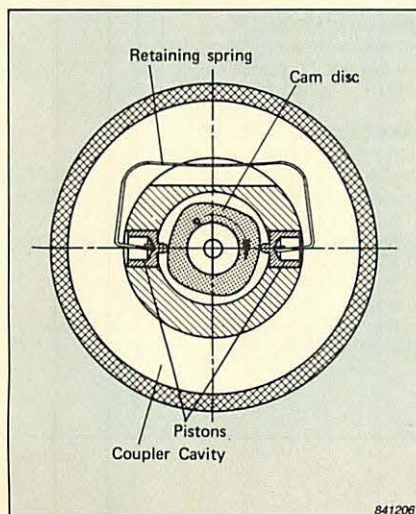
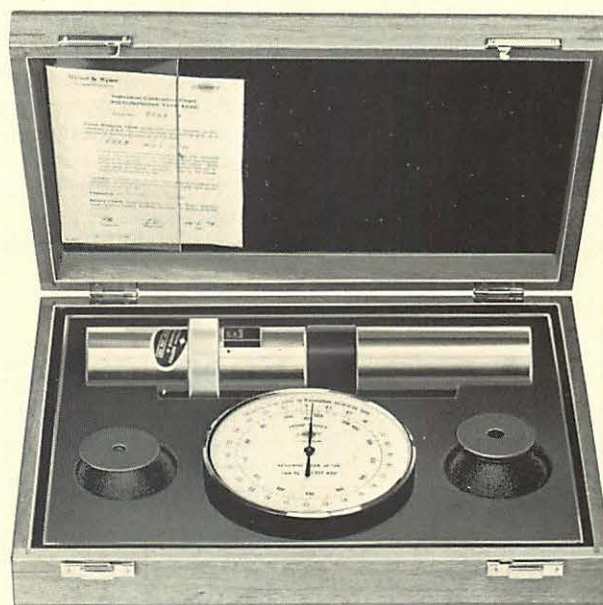


Fig. 1. Cross sectional view showing the principle of operation

tons moving in opposite direction and ensures maximum stability and low non-linear distortion (see Fig.1).

The operation procedure is simple: Fit the microphone into the coupler of the Pistonphone and push the control switch to the "On" position and the Pistonphone will now produce a constant sound pressure level on the diaphragm of the microphone. The Pistonphone can be held in one hand in any position, while with the free

hand the sensitivity of the sound measuring equipment is adjusted until a reading corresponding to the sound pressure level produced is obtained.

The Pistonphone fits the B & K 1", 1/2", 1/4" and 1/8" microphones and microphones having the same standard diameter, such as the types WE640AA, MR103, etc. Fig.2 shows its use with 1" and 1/2" microphones. The Pistonphone can also be adapted to other types of microphones by

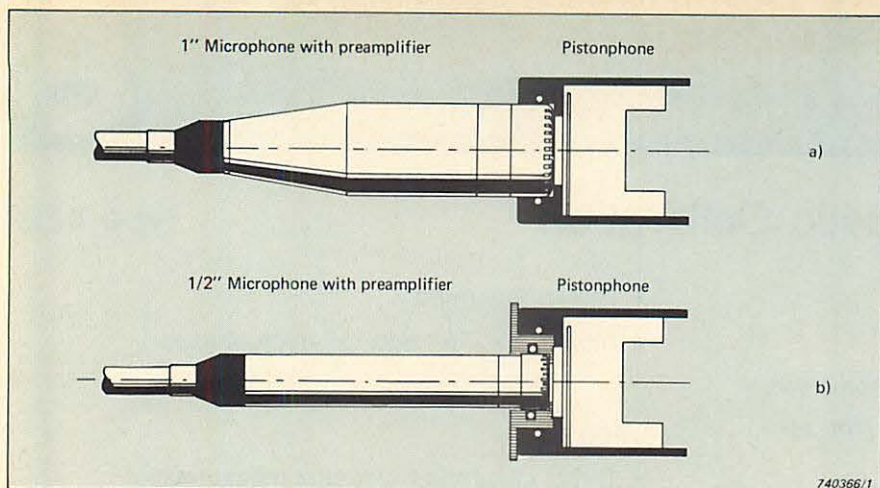


Fig. 2. Mounting B&K microphones on the Pistonphone

- a) 1" microphone
b) 1/2" microphone. The total volume of the cavity is the same in both cases

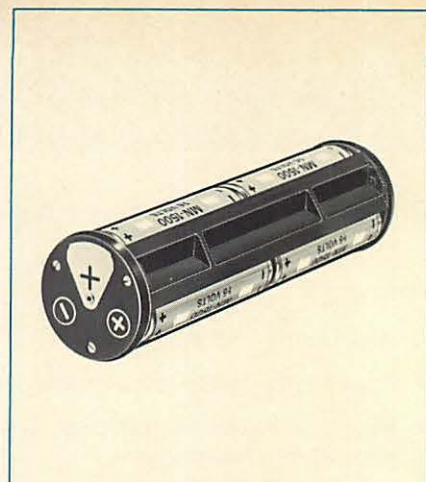


Fig. 3. Battery container DH0236 fitted with 6 batteries

means of special adaptors. The sound level produced by the Pistonphone, when fitted to a B&K microphone is nominally $124 \pm 0,2 \text{ dB re } 2 \times 10^{-5} \text{ Pa}$. The instrument is factory calibrated and delivered with an individual calibration chart. The value stated on this chart is measured to an accuracy of $\pm 0,15 \text{ dB}$. The high sound level from the Pistonphone allows correct calibration to be made even in very noisy surroundings. Each pistonphone is individually calibrated at normal atmospheric pressure. A barometer sup-

plied with the Pistonphone gives the ambient pressure correction in dB, in the range 790 to 1040 mbar.

The Pistonphone is delivered with alkaline batteries, IEC LR6 (QB0013), mounted in a battery container DH0236 (Fig.3), which enables very easy battery replacement. Fitted with alkaline batteries, the 4220 operates in the temperature range -10 to $+55^\circ\text{C}$ (14 to 131°F). The batteries can be checked by pushing the control switch of the Pistonphone to the

"Batt." position where the frequency should be higher than in the "On" position (approximately 320 Hz with new batteries).

The operating frequency of the Pistonphone can be varied from less than 30 Hz to maximum 320 Hz by using an appropriate external DC power supply. (In the range 30 Hz to 320 Hz the sound level is independent of the frequency).

Specifications 4220

SOUND PRESSURE LEVEL:

(Individually calibrated)
124 dB re $2 \times 10^{-5} \text{ Pa} \pm 0,2 \text{ dB}$ at
Ambient Pressure: 1013 mbar
Ambient Temp.: 20°C
Ambient Humidity: 65% RH
Effective Load Volume: $1,333 \text{ cm}^3$

CALIBRATION ACCURACY:

$\pm 0,15 \text{ dB}$

FREQUENCY:

Pos. "On": 250 Hz $\pm 1\%$ between $+5$ and $+45^\circ\text{C}$ ($+41$ to $+113^\circ\text{F}$). 250 Hz $\pm 2\%$ between -10 and $+55^\circ$ ($+14$ to $+131^\circ\text{F}$)
Pos. "Batt.": approximately 320 Hz with new batteries

NOMINAL EFFECTIVE COUPLER VOLUME:

$19,733 \text{ cm}^3$ (at 250 Hz) including Nominal Effective Load Volume $1,333 \text{ cm}^3$

DISTORTION:

$< 3\%$ at 250 Hz

TEMPERATURE RANGE:

Operation:

With batteries: -10 to $+55^\circ\text{C}$ ($+14$ to $+131^\circ\text{F}$)

With external power supply: -30 to $+55^\circ\text{C}$ (-22 to $+131^\circ\text{F}$)

INFLUENCE OF:

Ambient Pressure: SPL is proportional to the ambient pressure. (corrections read from Barometer supplied)

Ambient Temperature: $< \pm 0,002 \text{ dB}/^\circ\text{C}$ from -10 to $+55^\circ\text{C}$

Ambient Humidity: $-12 \times 10^{-5} \text{ dB}$ per % Relative Humidity

Effective Load Volume: See Manual

BATTERIES:

6 batteries IEC LR6
If frequency (speed of motor) increases when switching from "On" to "Batt." position, then battery voltage is sufficient

DIMENSIONS:

Length: 224 mm (8,7 in)
Diameter: 36 mm (1,4 in)

WEIGHT:

Pistonphone with batteries 0,7 kg (1,5 lb)
Total weight of case containing pistonphone, adaptors and correction barometer: 1,6 kg. (3,5 lb)

CORRECTION BAROMETER UZ 0003

SPECIFICATIONS:

Pressure Range: 790 to 1040 mbar
Accuracy (1 year): better than $\pm 0,1 \text{ dB}$ at 20°C ; $\pm 0,2 \text{ dB}$ from -10°C to $+50^\circ\text{C}$

ACCESSORIES INCLUDED:

6 alkaline batteries IEC LR6,
size AA QB 0013
1 battery container DH 0236
1 adaptor for 1/2" microphones DB 0311
1 adaptor for 1/4" microphones DB 0310
1 adaptor for 1/8" microphones DB 0352
1 Correction Barometer UZ 0003