Pistonphone Type 42AP

Product Data and Specifications

Features and applications

- ***Reference calibration source***
- ***Precision microphone calibrations***
- ***Microphone comparisons***
- ***P-I index measurement at 250 Hz or 251.2 Hz***
- ***Calibration indepenent of atmospheric pressure and altitude***

The G.R.A.S. Pistonphone Type 42AP (Fig. 1) is a battery-operated, precision sound source for accurate and reliable calibration of measurement microphones, sound level meters and other sound measuring equipment. It has a built-in precision barometer and a thermometer. Via its display and RS-232 interface, the user can read the actual corrected sound pressure level, as well as the pistonphone's temperature and ambient static pressure.

With a microphone placed in the coupler of the pistonphone, the calibration level and frequency is:

- nominally 114 dB* re. 20 µPa at either 250 Hz or 251.2 Hz

The actual sound pressure level, corrected for static ambient pressure, is shown on the display of the Pistonphone. The display can also show the A-weighted sound pressure level after correcting it for using an A-weighting filter.

An individual calibration chart is delivered with each Pistonphone.

The display can be switched to show any of the following (see Fig. 1):

- Actual corrected sound pressure level in decibels

Fig. 1 Pistonphone Type 42AP, 114 dB at 250 Hz shown with an example of each possible display

- Actual corrected sound pressure level in decibels if measured with an A-weighting filter
- Static air pressure in h Pa
- Calibration temperature in ºC
- Calibration temperature in ºF

The frequency of the pistonphone can be programmed, via its RS-232 interface, to be either 250 Hz or 251.2 Hz.

* 114 dB is equivalent to 10 Pa

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Remote Control via RS-232 Interface

Commands and responses, comprising ASCII characters, can be sent to and from the Pistonphone via its RS-232 interface, using a suitable utility program.

The interface comprises:

- Connector: RS-232 9-pin D-sub using adapter cable AA0050
- RS-232: 9600,8,n,1 (i.e. 9600 bits per second, 8 data bits, no parity bit, 1 stop bit)

Fig. 2 Pistonphone connection for use with a computer

There is no flow control/handshaking; therefore commands must be sent one by one, waiting for each response.

The input buffer is 32 bytes; in case of overflow, a response “Buffer overflow” will be submitted. This will not happen under normal conditions.

Fig. 2 shows how the Pistonphone is connected to the computer.

Commands and Responses

Two types of command are used. These are divided up as follows:

1. Interrogational commands
   Return information about the Pistonphone, its setup parameters, and measured ambient conditions (see examples in Fig. 3).
2. Setup commands
   For changing setup parameters and controlling the Pistonphone.

Syntax

1. Commands are not case sensitive.
2. All commands are executed by first typing in the command then pressing the <Enter> key

Precision

The Type 42AP is an extremely stable laboratory standard sound source which can also be used for field calibrations – it retains its high accuracy even under hostile environmental conditions. It complies with all the requirements of IEC Standard 60942 (2003) LS.

Couplers

The Type 42AP is delivered for calibrating ½" microphones directly since these are most commonly used. A 1" coupler (RA0023) for calibrating 1" microphones is also included.

Design

The pistonphone works on the principle of two reciprocating pistons actuated by a precision-machined cam with a sinusoidal profile. The rotation speed of the cam is controlled to within 0.1% via a tachometer signal in a feed-back loop.

The Type 42AP has a dual-colour LED above the ON/OFF switch to indicate both battery condition and stable operation.

When the pistonphone is operating properly, the LED shows green, indicating that the speed of the cam is correctly locked to give 250 Hz or, optionally, 251.2 Hz. If it shows red while the pistonphone

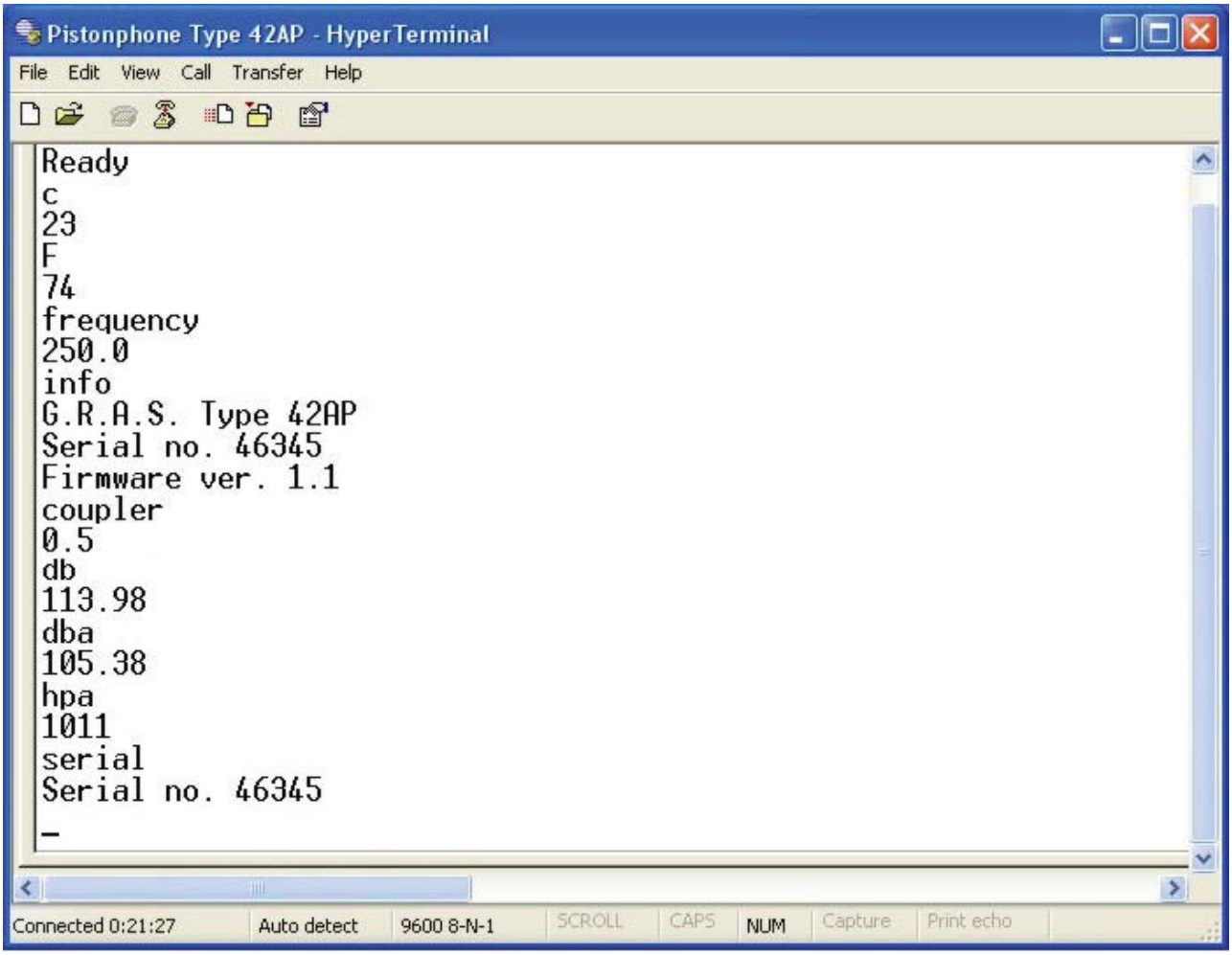

Fig. 3 Example of a dialogue showing interrogational commands and responses

is switched on, the speed is incorrect; most likely because of low batteries.

Operation

The operating procedure is straight forward, simply fit the microphone into the coupler of the pistonphone and switch on. The pistonphone will now produce a constant sound pressure level on the diaphragm of the microphone.

Compatibility

The Pistonphone Type 42AP is compatible with G.R.A.S. ½", ¼", and ⅛" microphones and all other microphones having the same standard diameters.

Adapters are included for calibrating ¼" and ⅛" microphones. Use the 1" coupler RA0023 for calibrating 1" microphones.

Precision

Each pistonphone is factory calibrated with an accuracy of ±0.09dB re. 20µPa and is supplied with an individual calibration certificate stating the exact value and test condition. The exact value is adjusted to be 114dB within ±0.05dB under reference conditions.

Since the output level of a pistonphone depends on the static ambient pressure, the Type 42AP has a built-in barometer which shows directly on a LCD (Fig. 1) the actual corrected sound pressure level. Adapters for the G.R.A.S. Environmental Microphone Type 41AL and Outdoor Microphone Systems Types 41AM and 41CN are available for use with a Pistonphone Type 42AP fitted with the 1" microphone coupler RA0023.

Specifications

Sound pressure level:
Nominal: . . . . . 114 dB re. 20 µPa
Individually calibrated under the following reference conditions:-
Ambient pressure: . . . . . 101.3 kPa
Ambient temperature: . . . . . 20 °C
Ambient humidity: . . . . . 65 % RH

Calibration accuracy:
Absolute: . . . . . ± 0.09 dB at reference conditions
Accuarcy when corrected for ambient pressure with: ± 0.1 dB

Frequencies:
250 Hz. . . . . ± 0.1 %
251.2 Hz . . . . . ± 0.1 %

Distortion:
< 1.5 %

Barometer:
Range: . . . . . 750 hPa to 1100 hPa
with reduced accuracy (± 4 hPa): . . . . . 300 hPa to 1100 hPa
Calibration accuracy:
Absolute: . . . . . ± 1 hPa (0 °C to + 55 °C)
Long-term stability: . . . . . – 1hPa (12 months)

Thermometer:
Range: . . . . . – 10 °C to + 55 °C
Absolute: . . . . . ± 1 °C

Nominal effective coupler volume:
15540 mm^3 (including effective load volume of microphone type 40AG or type 40EN)

Temperature range:
Batteries permitting: . . . . . – 10 °C to + 55 °C

Batteries:
Four standard LR6-AA alkaline cells

External power:
Voltage: . . . . . 6 V DC
Current: . . . . . 90 mA

Dimensions:
Length: . . . . . 184 mm (7.24 in)
Width: . . . . . 35 mm (1.38 in)
Height: . . . . . 35 mm (1.38 in)
Weight (with batteries): . . . . . 437 g (1 lb)

Accessories included:
1" microphone coupler: RA0023
Adapter for ½" microphones [1]: RA0048
Adapter for ¼" microphones: RA0049
Adapter for ⅛" microphones: RA0069
Four LR6-AA alkaline cells: EL0001

Accessories available:
Adapter for Outdoor Microphone System [1]:-
Type 41AM: RA0009
Type 41CN: RA0041
Adapter for Environmental Microphone [1]:-
Type 41AL: RA0010
Two-port calibration coupler: RA0024
Octopus coupler (½" mics.): RA0072
94 dB Pistonphone coupler: RA0090

[1] For pistonphone fitted with the 1" microphone coupler RA0023

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