



Calibration Manual

Oscilla® SM950 (1. version)

Specifications are subject to change without notice
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General information:

Due to tolerances in electronics and transducers (telephones and bone conductor), it is necessary to calibrate the sound level to the correct intensity. Calibration is done with the transducers that belong to the audiometer. If a transducer is replaced the audiometer has to be calibrated with the new transducer.

The device has a built-in table for the ISO hearing level offsets (called RETSPL values for the telephones). These offsets are added to the displayed sound level when the device is in normal operation mode, to obtain the ISO hearing level. When in calibration mode these offsets are not effective. Therefore all frequencies should be calibrated to equal levels, namely 80dB at air conduction, and 50dB at bone conduction. This makes it easy and quick to perform the calibration. Remember to add the correction factors for the calibration microphone.

Changing the hearing level offsets:

The hearing level offset values are stored in the audiometer's memory. They can be changed if desired, for example to use another standard, or if the ISO standard is changed. This is done in a special mode activated by holding down the keys 'FREQUENCY DOWN', 'MASKING ATTENUATOR DOWN' and 'MASKING ATTENUATOR UP' while powering on the device. When in this mode, the frequency keys select the frequency to be changed, and the tone attenuator does the actual change. The offset value is displayed in the masking level display. To switch between air and bone offsets, press the 'AIR' or 'BONE' key.

Presetting the offsets to telephone type:

In addition to altering the offset values manually, they can be preset to one of two sets of offsets. These two sets are for use with two types of telephones. One set is for TDH39 and the other is for DD45. While in calibration mode, press the TONE button to preset the offsets. Each press toggles between the two telephone types. The selected telephone type is shown briefly in the display at each press.

Entering calibration mode:

To enter the calibration mode, hold down the 'ATTENUATOR DOWN', 'TONE' and 'FREQUENCY DOWN' keys and switch on the audiometer. Wait about 2 seconds and release the three buttons. The 'RESPONSE' light will now flash five times and then stay on. The audiometer is now in calibration mode.

Using the calibration mode:

When in calibration mode, the tone attenuator keys are used to change the calibration values. Changes are stored at once when done. The 'AIR' and 'BONE' keys select if telephones or bone conductor is calibrated. The frequency keys select the frequency to calibrate, and the 'MASKING ON/OFF' key switches to and from masking level calibration. There is no masking calibration available with the bone conductor. A calibration value is displayed in the right display, and can be set between 0 and 200, corresponding to -25 dB to +25 dB. Thereby, each step is 1/4 dB. When calibrating the tone level, the masking level will follow the tone level. Masking level is calibrated separately. The TONE button toggles between RETSPL offsets for TDH39 and DD45 telephones.

Leaving calibration mode:

Calibration mode is quit by pressing the 'DATA' key, or simply by switching off the audiometer.

Adjustment of the trimmers.

There are 3 trimmers in the device. Normally they do not need to be adjusted, so to perform a normal calibration, it is not necessary to disassemble the cabinet. There are two situations that call for adjusting the trimmers, which are:

1. Clicks are heard in the telephones when changing channel between left, right and bone.
2. When in calibration mode, the difference between the tone and the masking noise is not 3dB at 1000Hz, when the calibration levels for tone and noise are set to the same value.

If clicks are heard when changing channel, an adjustment of the two DC-offset trimmers in the output stages should be done. Connect a digital voltmeter to the output selected by the 'air' selector, set the attenuator to 110 dB, and adjust the trimmer to 0V. The meter should be set to the 200mV range. Repeat with the other channel. The trimmers are labeled VR2 and VR3 and located near the output sockets.

If there is a wrong difference between tone and noise, adjust the noise generator's output level, by following this procedure:

Enter calibration mode, select 1000 Hz, and ensure that the calibration values for tone and masking are set to equal values. This is done by pressing 'MASKING ON/OFF' and check that the displayed calibration value is equal to the value displayed when tone is selected. If not, set the masking value to the same value as the tone, by using the tone attenuator.

Disconnect the bandpass filter on the calibration equipment.

Read the tone level on the calibration equipment.

Switch to masking and adjust trimmer VR1 until the average noise level is 3 dB higher than the tone level read before. VR1 is located near the tone attenuator display.

This adjustment will affect all frequencies and needs only to be done on one of the channels.

Calibrate air conduction tone and masking levels:

Place the left telephone on the measuring microphone, and ensure it fits tightly.

Set the audiometer and the bandpass filter on the calibration equipment to 125Hz.

Adjust to 80dB (plus microphone correction factor) deflection on the calibration equipment.

Set the audiometer and the bandpass filter to the next frequency and adjust again to 80dB deflection.

Repeat this with all frequencies.

After this, switch to masking calibration.

Disconnect the filter on the calibration equipment.

Calibrate to an average noise level of 83dB (again, plus microphone correction factor) at all frequencies.

Usually, only the high frequencies need masking calibration. The frequencies from 2000 and down should be fine if their masking calibration values are set to the same as the tones'.

Repeat tone and masking calibration with the right channel.

Calibrate bone conduction tone level:

Place the bone conductor on the vibration sensor.

Select bone calibration with the 'BONE' button.

Set the audiometer and the bandpass filter to 125Hz.

Adjust to 50dB deflection on the calibration equipment.

Repeat this with all frequencies except 8000Hz, as this frequency is not used with the bone conductor.

RETSPL table for TDH39 telephones (ISO-389-1995)

Hz	dB
125	45
250	25.5
500	11.5
750	7.5
1000	7
1500	6.5
2000	9
3000	10
4000	9.5
6000	15.5
8000	13

RETSPL table for DD45 telephones

These values are store in the audiometer's memory by default.

Hz	dB
125	45.5
250	28
500	14
750	7.5
1000	7
1500	9
2000	9.5
3000	11
4000	12.5
6000	18.5
8000	17

Hearing level table for bone conductor:

These values are store in the audiometer's memory by default.

Hz	dB
125	35
250	45
500	37,5
750	30
1000	24
1500	15,5
2000	15
3000	12
4000	9,5
6000	8

Responsibility of the manufacturer

The manufacturer is only responsible for the safety, reliability and performance of the device if:

- All assembly operations, extensions, re-adjustments, modifications or repairs are carried out by the device manufacturer or by personnel authorized by the manufacturer.
- The electrical installation, to which the device is connected, complies with EN/IEC requirements.
- The device is used in accordance with the instructions for use.

The manufacturer reserves the right to waive all responsibility for the operating safety, reliability and performance of devices serviced or repaired by unauthorised parties.

Service manual may be supplied upon request.

Manufacturer

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