The ultrasound detector D 100 is an easy-to-handle instrument for conversion of ultrasound to audible sound. It is primarily intended for studying bats and other animals emitting ultrasound and uses the well-known heterodyne conversion principle.

Before using the detector, please read the following information!

Further information on the identification of different bat species using ultrasound detectors may be found in the literature, e.g., Barataud: The inaudible world (CD + booklet).

INTRODUCTION

With the bat detector D 100, ultrasound in the range 10 - 120 kHz may be transformed into the audible frequency range. Although the main application for the D 100 is studying bioacoustic ultrasound (bats, rodents, bush crickets etc.), the detector can be used in many other situations where detection of ultrasound is involved (ultrasonic intruder systems, leaks in pressurized systems, corona discharges etc.).

The transformed sounds are monitored either through the built-in loudspeaker or through headphones connected to the PHONES socket. A tape recorder may be connected to the TAPE socket to make recordings of the transformed sounds or the direct microhone signal (handy for recording spoken comments on one channel of the tape!).

THE FIRST TIME

The detector is powered from one 9 V battery. An alkaline battery will last for appr. 30 hours.

Insert a new battery and turn the VOLUME control clock-wise to turn on the detector. The frequency dial backlight is turned on (this backlight is rather weak and may not be visible in daylight). To test the detector, perform the following steps.

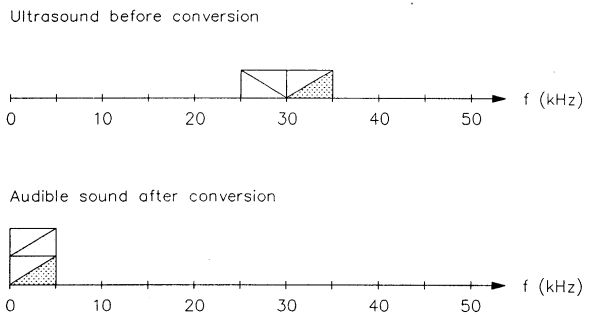
Set the VOLUME control to a medium position so that a weak noise is heard in the loudspeaker. Then turn the FREQUENCY control to give a reading of approximately 20 kHz and gently snap your fingers near the microphones (at the front of the detector). A scraping sound should then be heard in the loudspeaker. Another good ultrasound source is a jingling bunch of keys.

The frequency control works in the following way. The dial shows the center of the frequency range (approximately 10 kHz wide), which will be transformed. If the control is set to 30 kHz, you can listen to ultrasonic frequencies between approximately 25 and 35 kHz.

If the volume control is turned up too high, acoustic feedback (a howling sound) may occur, particularly at lower frequency settings. This is quite normal, simply turn down the volume control and the feedback disappears.

SOME TECHNICAL INFORMATION

Several different principles exist to convert ultrasound into audible sound. As mentioned above, the D 100 utilizes the heterodyne principle. This technique means that a limited frequency range is selected for conversion into the audible range. If the frequency control is set to 30 kHz, the range from appr. 25 to 35 kHz will be transformed. This is illustrated in the figure below.



Assume an ultrasound source of constant frequency is to be monitored. When the frequency control is turned from low frequencies to higher, a high-pitched tone will be heard in the loudspeaker when the frequency setting is appr. 5 kHz lower than the frequency of the ultrasound source. The closer the tuned frequency comes to the ultrasound's frequency, the lower the frequency to the loudspeaker tone gets. When both frequencies are identical, the resulting output frequency becomes zero, i.e. nothing is heard in the loudspeaker. If you continue to turn the frequency control to higher frequencies, a tone will again be heard in the loudspeaker, however this time the frequency will increase as the tuned frequency increases. By tuning the frequency control up and down it is possible to locate the frequency resulting in a zero Hz output frequency (the tuned frequency then equals the frequency of the ultrasound).

NOTE: The example only serves to illustrate the heterodyne principle. Constant frequency sounds are very rare in practice, so normally you will only be able to get an approximate measure of the signal frequency.

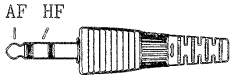
OUTPUTS

The two 3.5 mm sockets are used to connect a set of headphones or a tape recorder. The TAPE output is not affected by the setting of the volume control.

The PHONES socket may be used to connect a set of stereo headphones with a 3.5 mm plug. Connecting a set of headphones will automatically turn off the internal loudspeaker.

At the TAPE socket, both the transformed AF signal and the original HF signal are available (see the figure below). The HF signal can be used to record spoken comments to the tape recorder. If the input impedance of the tape recorder is very low (lower than 5 kohms), the signal levels in the detector will be decreased, resulting in a weaker output to the loudspeaker or headphones.

NOTE: The headphones socket should only be used for headphones. Particularly it shoud not be connected to the tape recorder, if the tape recorder socket is also connected to the same tape recorder, since this may cause permanent damage to the detector.



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Technical specifications

Type:	Heterodyne
Frequency range:	10 - 120 kHz (min.)
Bandwidth:	8 kHz (+/- 4 kHz), -6 dB
Battery:	1 x IEC 6LF22 (9V)
Quiescent current:	16 mA typ.
Size:	112 x 70 x 52 mm including knobs
Weight:	200 g. including battery
Outputs:	2 x 3.5 mm jacks for headphones and tape recorder.

Using the detector in intense electromagnetic fields may cause interference and/or temporary signal loss.

ULTRASOUND DETECTOR D 100

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