

Line adapter

LTA - 3

Connecting and testing board

LTA-INT-RJ

High voltage insulator

LTA-HV

Specification and User manual

Read this manual before use

Version 1.0

Specification

LTA-3 is an additional accessory to the RFD-5 RF detector. LTA-3 allows detection of different types of line eavesdropping devices like microphones, loudspeakers, manipulated or unsuitable phones etc. which are using audio spectrum. The low frequency detection mode allows spectrum analyses and detection of various devices using LF and RF spectrum from 18kHz to 41MHz.

The LTA-3 can detect a number of different digital eavesdropping systems and also standard communication systems like ADSL, Ethernet over power lines and provide their selective frequency analysis.

The LTA-INT-RJ is a board with two parallel connected RJ plugs and outputs for connection of the LTA-3 input.

The LTA-INT-RJ board allows operative check of standard telephone lines. The LTA-HV is an insulating adapter for secure separation of cables under higher voltage.

1. Controls, input, outputs

- 1 - GAIN: sensitivity control (Fig.1 and Fig.2)
- 2 - TUNING: frequency tuning (tuning curves are at Fig.3 to Fig.10)
- 3 - Switch: OFF = power off, AUD = audio + 8 frequency segments
- 4 - Input: twin-lead cable, green banana plug = ground level
red banana plug = active wire
- 5 - Output: 3.5mm microphone plug – connect to RFD-5 ext. probe input
- 6 - Green LED: light = ON, flashing = weak battery
- 7 - Red LED: charging indicator
- 8 - Charger connector: rear panel 2,1/5,5mm, 12V, +pole = central pin

2. Power ON, battery check, charging

Connect the LTA-3 output connector into EXT.PROBE input of the RFD-5 and switch ON the RFD-5. Turn the main switch of LTA-3 to the required detection mode, AUD = audio, other positions set the corresponding frequency sector. When the LTA-3 is ON, the green LED ON is lighting. If the green LED ON is flashing or does not light the battery must be changed or the accumulator charged. To change the battery unscrew the screw on the bottom of the LTA-3 and take away the upper part of the LTA-3 box. It is recommended to use 9V NiMH accumulator (size 6P) instead of the 6F22 standard battery and regularly charge the device by a 12V 0,3A charger. Complete charging takes 14

hours. During any measurement always disconnect the charger to avoid asymmetric load of the tested line. Always switch OFF the LTA-3 after use (green LED does not light). Proper function of a charger and charging are indicated by the red LED CHARGE.

3. Audio measurement – Audio signals

Set the main switch to AUD (audio). The knob TUNING has in the AUD mode no function. The GAIN knob controls sensitivity of the audio amplifier (see Fig.1). The values correspond to the RFD-5 display reading = 20 in LOG (logarithmic) detection mode for input audio frequency 1kHz. If an asymmetric object is measured (e.g. wire testing against ground level) connect the green banana plug to zero (ground) potential. To the symmetric line the red and green banana plugs can be connected in any order, but it is very important to disconnect the charger and it is better not to hold the RFD-5 in the hand to eliminate the asymmetric spurious capacity to the ground to minimum. To check the telephone lines use the LTA-INT-RJ board. Disconnect the communication device (phone, fax, modem, etc.) from the telephone outlet and connect there the connecting RJ cable leading to one of the RJ plugs on the LTA-INT-RJ board. Connect the tested device to the second RJ plug of the LTA-INT-RJ board. The active line is usually on pins 3 – 4, but during the comprehensive security check all wires and their combinations should be tested. According to the local situation other measurement equipment like voltmeter, oscilloscope, spectrum analyzer, etc., can be connected to the LTA-INT-RJ plugs or the probes of such devices can be connected to plug's lead-in wires. Listen to the RFD-5 earphone if any sound from the swept area is not leaking. The analog phone lines are heard very strongly if the phone is off the hook. A hung up phone must not transfer any sound.

For the audio activation of the swept room the pulse, frequency modulated audio generator should be used (WHG-2).

4. 18kHz to 41MHz spectrum measurement

There is a number of listening devices and communication systems using metallic cables to transfer information inside an object, but also for distances up to kilometers. Simple micro-size analog eavesdropping devices are usually using AM or FM modulation and transmit signals in frequency sector 30kHz to 2MHz. Their main advantage is very low power consumption and they are suitable for both telephone and power lines. Other category of listening devices is based on the digital signal

processing. If the digital signal is detected it is difficult to recognize if the signal is legal (like ADSL on the phone line or Ethernet on the power line) or if it is a dangerous signal.

4.1 RF check of the telephone lines

Connect the checked device via LTA-INT-RJ board and connect the red and green banana plugs to corresponding outlets. Set AUD and check if the audio signal is really passing through wires 3 – 4. Adjust GAIN to 2 and successively check and tune all eight frequency bands 18 – 22kHz to 9 – 41MHz. Provide this tuning for both off the hook and hung up phone. At each frequency segment the lowest frequency is at TUNING = 0, highest frequency at TUNING = 8.

Most frequently received signals and their characteristic

ADSL: ADSL is a legal signal, which is dangerous because the communication between telephone exchange and the modem is permanent, regardless whether the connected PCs are switch on or off. ADSL is detected like a noise spectrum in frequency range 28kHz – 950kHz with the maximum at about 220kHz. Close to the modem if GAIN = 2 the RFD-5(LOG) indicates level 250.

Radio broadcast: Legal signals in radio broadcast occupy the following frequencies: LW 150 – 300kHz, MW 470kHz – 2MHz, SW 4 – 28MHz. According to local and ionospheric conditions different broadcast stations can be heard, namely in objects where overhead lines are used.

Analog eavesdropping: Analog eavesdropping is usually using frequencies 25kHz to 150kHz, but there are some systems operating on frequencies up to few MHz. It is possible to tune a sound leaking from the room. To recognize the leaking audio signal and in some cases to activate the voice controlled listening device it is recommended to use special pulse audio generator (WHG-2). Close to the listening device for GAIN = 2 the RFD-5(LOG) indicates level greater than 100.

Digital eavesdropping: Digital eavesdropping is usually using frequencies from 100kHz to 20MHz. There are different encoding systems, some can be heard in the earphone like a noise (systems similar to the ADSL), or the signal can have a pulse envelope independent on the voice activity (DECT encoding), or the density of pulses is depending on the voice or the data stream (GSM, Ethernet

encoding). Close to the listening device for GAIN = 2 the RFD-5(LOG) indication is more than 100.

To identify the digital listening system the signal strength is predominant **RFD-5 indication > 100**. To differentiate the modulation is hardly possible due to the digital coding.

4.2 Checking of other lines

According to local condition (local power outlets) connect the appropriate plug to the twin-lead of the LTA-HV adapter. Red wire = hot, black wire = ground level. Connect the banana plugs from LTA-3 to the LTA-HV. The LTA-HV adapter contains separation capacitors for voltage 1200V DC (440V AC). To check the AC power line carefully tune all eight frequency segments 18kHz to 41MHz. The AUD (audio) test on the AC power line is usually not important.

Other lines with no AC voltage which can be used for a microphone eavesdropping should also be checked in the AUD (audio) detection mode. If the lines are without any voltage (different historical or unknown installations) it is not necessary to use the LTA-HV, the LTA-3 can be connected directly.

Like at the RF check of the telephone lines adjust GAIN = 2 and if some of the dangerous signals indicates on the RFD-5(LOG) more than 100 find the signal source.

Most frequently received legal signals

- **Pulse controlled electronic power supplies:** frequencies 40kHz to 1MHz, on the carrier there is 50Hz or 100Hz modulation
- **Radio broadcast:** see 4.1 RF check of the telephone lines

Most frequently received dangerous signals

- **Analog eavesdropping:** usually 20kHz to 2MHz, the sound from the room is heard
- **Digital eavesdropping:** see 4.1 RF check of the telephone lines
- **Ethernet over power line:** bursts of pulses; their density depends on the data stream. The pulses are wide-band in the frequency range 1MHz to 15MHz with the maximum at about 12MHz. Set GAIN = 2 and if the RFD-5(LOG) indicates peak level more than 100 find the source of the signal (modem). The Power Line Ethernet is very dangerous, as it allows modifications for data, sound or picture transfer.

5. Sensitivity and tuning and curves for frequencies 18kHz to 41MHz

The dependence of the RF sensitivity on setting of the GAIN knob for RFD-5(LOG) indication = 20 is shown on Fig. 2 (measured at 0,8MHz). The received frequency in dependence on the TUNING knob settings at specific frequency sectors is shown in Fig.3 to Fig.10.

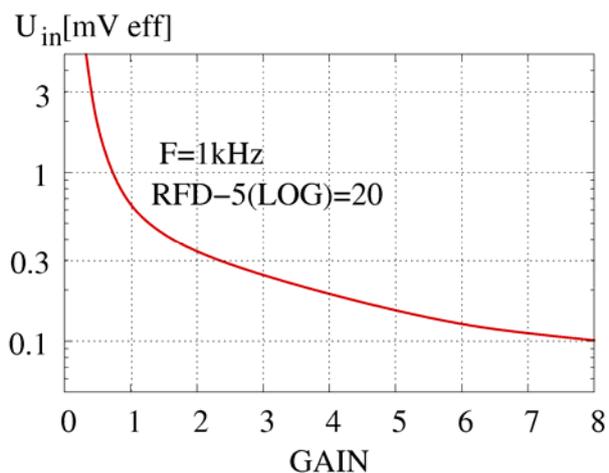


Fig.1 Sensitivity in AUDIO mode

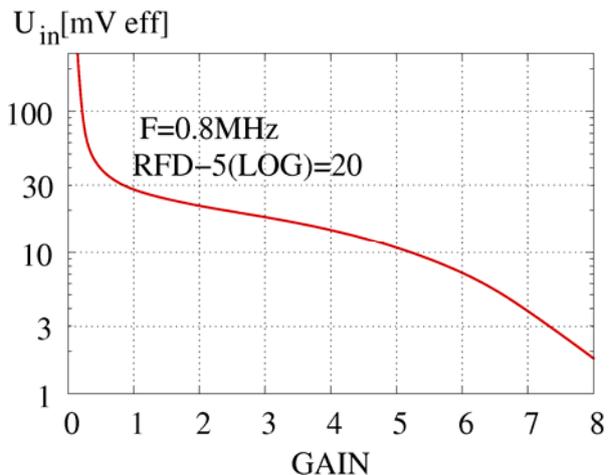


Fig.2 Sensitivity in RF detection mode

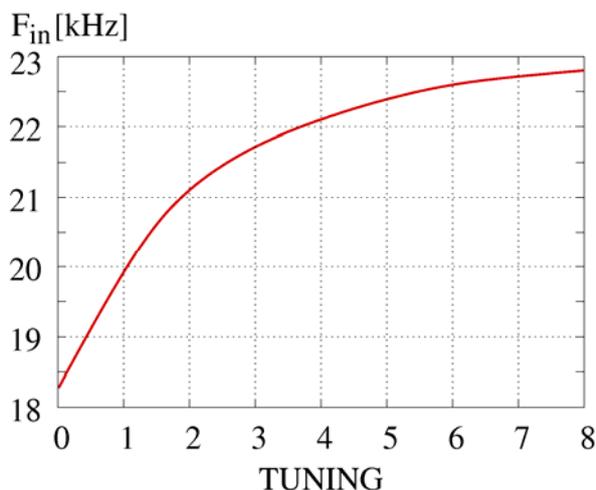


Fig.3 Tuning curve 18 – 22kHz

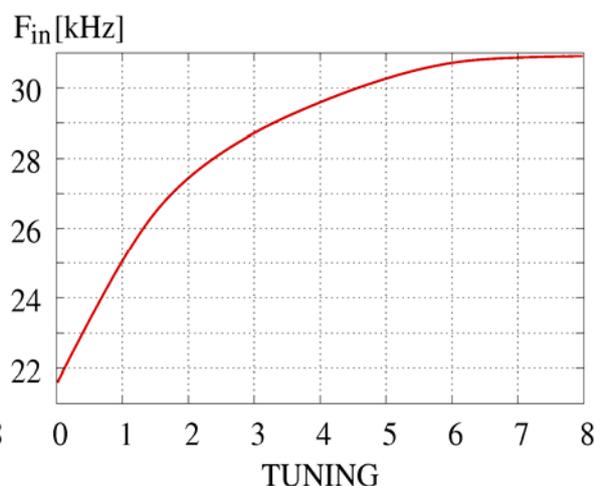


Fig.4 Tuning curve 21 – 30kHz

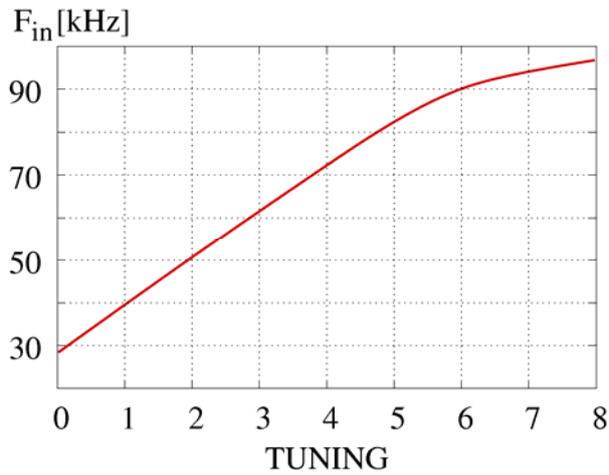


Fig.5 Tuning curve 28 – 95kHz

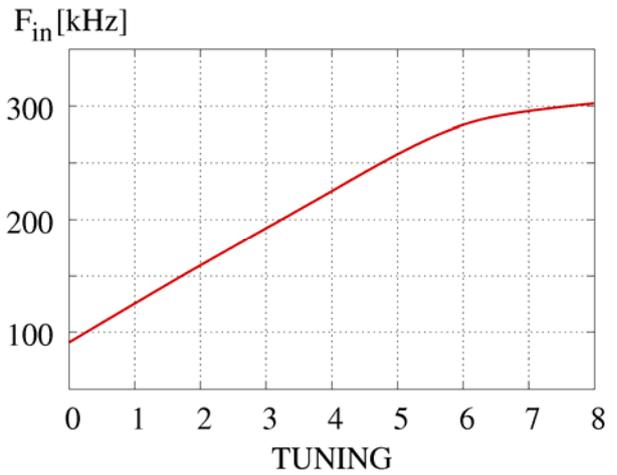


Fig.6 Tuning curve 90 – 300kHz

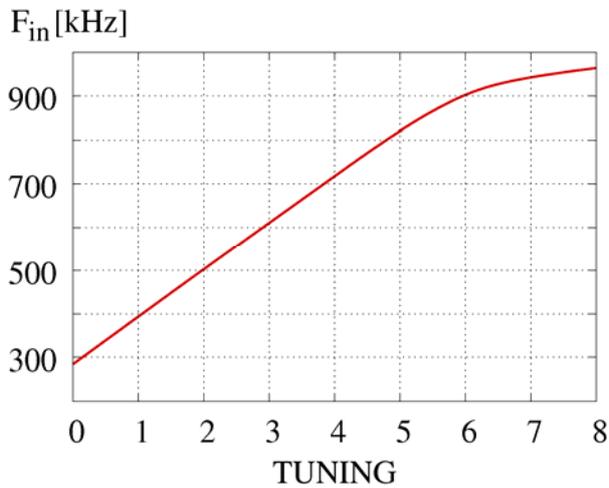


Fig.7 Tuning curve 280–950kHz

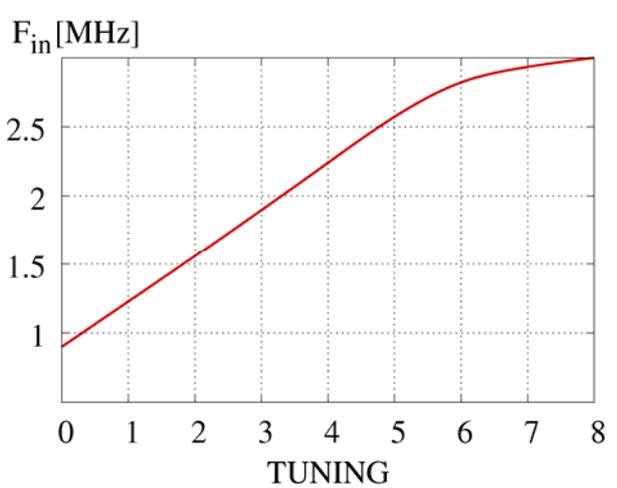


Fig.8 Tuning curve 0.9 – 3MHz

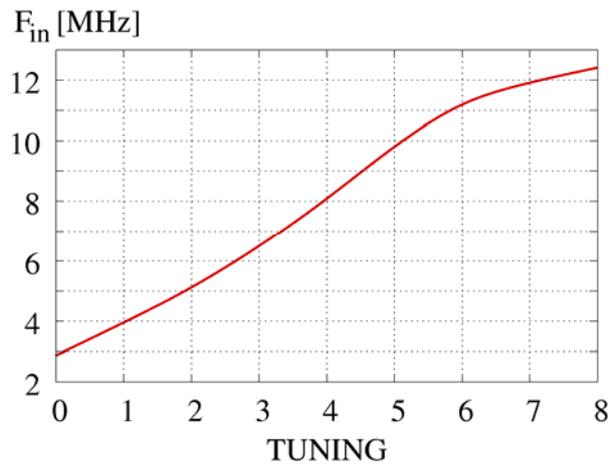


Fig.9 Tuning curve 2,9 – 12MHz

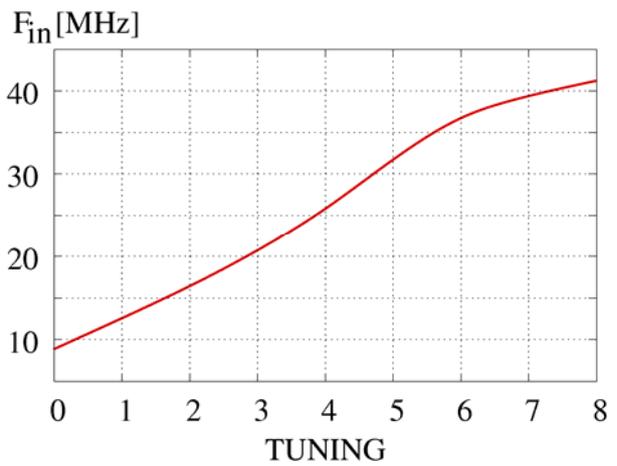


Fig.10 Tuning curve 9 – 41MHz

Technical Specification of LTA-3

Version 1.0

- AUDIO sensitivity (300 – 3000Hz) 0.1mVeff
- RF detection sensitivity 1.8mVeff
- RF frequency range 8 sections, 18kHz – 41MHz
- GAIN control min. 30dB
- Input insulation ground (green) 100N 275V AC
Active (red) 5N 440V AC
- Input impedance 100k ohm
- RF demodulation AM, FM
- Battery 9V (6F22) or 9V accumulator
- Current consumption 2 – 5,5mA
- Accumulator charging 14 hours, 12V DC
- Size 112 x 92 x 48mm
- Weight 280g

High voltage insulator LTA-HV

- Insulation voltage 2 x 440V AC
- Separation capacity 2x 5N

Connecting and testing board LTA-INT-RJ

- 2 x parallel connected RJ12
- 6 x plug for connection of LTA-3 input