

# MINIRATOR MR1

Analog Audio Generator



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## 1. INTRODUCTION

Congratulations and thank you for buying NTI's Minirator MR1, a product specially suited for professional audio applications. We are convinced you will enjoy using it!

NTI products are manufactured in compliance with the highest quality standards and marked with the CE sign.

In order to avoid any damage to the unit, we strongly recommend to read the entire manual before you start using the instrument.

### 1.1 CE Declaration of Conformity

We, the manufacturer

NTI AG  
Im alten Riet 102  
FL- 9494 Schaan  
Liechtenstein, Europe

hereby declare that the product Minirator MR1, released in 1998, conforms to the following standards or other normative documents:

EMC-Directives: 89/336, 92/31, 93/68  
Harmonized Standards: EN55103-1, EN55103-2

This declaration becomes void in case of any changes on the product without written authorization by NTI.

Date: 1.4.2000

Signature:

Position of Signatory:



CEO



## 1.2 International Warranty & Repair

### International Warranty

NTI guarantees the Minirator and its components against defects in material or workmanship for a period of **one year** from the date of original purchase, and agrees to repair or to replace at its discretion any defective unit at no cost for either parts or labor during this period.

### Restrictions

This warranty does not cover damages caused through accidents, misuse, lack of care, the attachment or installation of any components that were not provided with the product, loss of parts, connecting the instrument to a power supply, input signal voltage or connector type other than specified, or wrongly polarized batteries. In particular, no responsibility is granted for special, incidental or consequential damages.

This warranty becomes void if servicing or repairs of the product are performed by any party other than an authorized NTI service center or if the instrument has been opened in a manner other than specified in this manual.

No other warranty, written or verbal, is authorized by NTI. Except as otherwise stated in this warranty, NTI makes no representation or warranty of any kind, expressed or implied in law or in fact, including, without limitation, merchandising or fitting for any particular purpose and assumes no liability, either in tort, strict liability, contract or warranty for products.

### Repair of your Minirator MR1

In case of malfunction, take - or ship prepaid - your NTI Minirator, packed in the original box, to the authorized NTI representative in your country. For contact-details please see the NTI web page [www.nt-instruments.com](http://www.nt-instruments.com).

Be sure to include a copy of your sales invoice as prove of purchase date. Transit damages are not covered by this warranty.

## 1.3 Warnings

In order to avoid any problems and damages, follow the rules listed below:

- **Read this manual thoroughly before you operate the instrument for the first time.**
- **Use the instrument for the intended purpose only.**
- **Never connect the instrument to a voltage output such as a power amplifier, mains power plug, etc.**
- **Do not disassemble the instrument.**
- **Never use the instrument in a damp environment.**
- **Remove the batteries as soon as they are flat or if the instrument is not intended to be used for a longer period of time.**
- **Before you connect the Minirator to an input, verify that level and frequency are in an acceptable range for the device. Line signals such as guitar inputs may only be operated to a max. level of 500 mV (-6 dBV), suitable frequency for a first test is around 1 kHz.**
- **If you have headphones or loudspeakers connected, make sure that the volume control is set to a very low level to avoid damages to speakers or ears.**
- **Microphone inputs require low levels of approx. 1 mV only. Make sure that the level is set accordingly before you connect the Minirator to such inputs.**
- **Very low and very high frequency signals at high levels may cause damages to the input of the device under test.**
- **High sound pressure levels can cause permanent damages to your hearing system. Make sure that all faders of the mixing console are set to minimum to avoid overloading inputs or giving very loud levels.**

## 1.4 Overview

The Minirator MR1 is the first member of a family of miniaturized battery powered audio instruments, called Minstruments. It is a professional, multifunctional analog audio signal generator that fits in the palm of your hand.

It covers most of the typical test signals used in a professional audio environment:

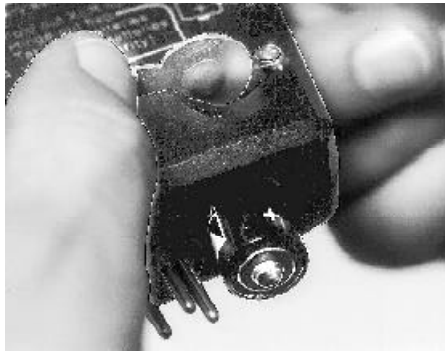
- **Sinusoidal Signal, 20 Hz - 20 kHz,**
- **Frequency Sweep, 20 Hz - 20 kHz**
- **Square Signal, 20 Hz - 5 kHz**
- **White Noise**
- **Pink Noise**
- **Polarity Test Signal**

Over the entire audio band the output level ranges from the lowest microphone levels in the microvolts range up to studio reference levels.

The user interface is simple and intuitive with three buttons only. A short instruction of the Minirator control can also be found on the rear side of the instrument.

## 1.5 Battery Replacement

After unpacking, insert two batteries into the battery compartment.

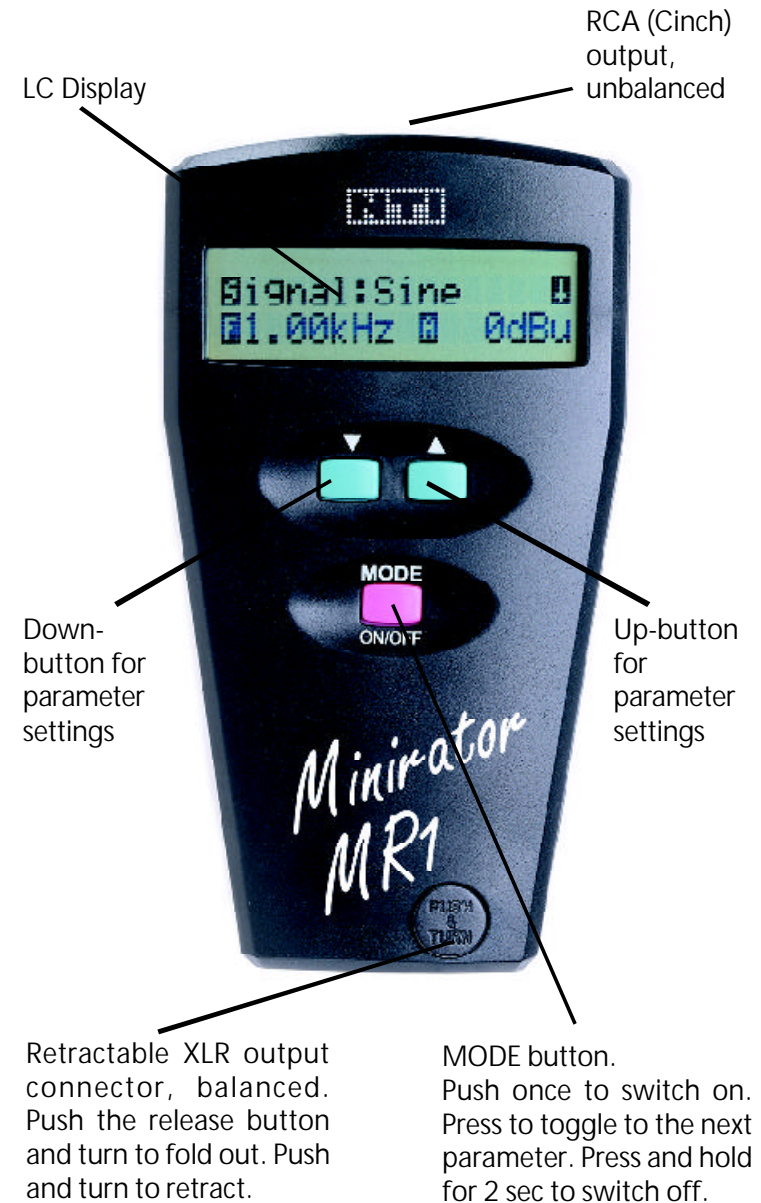


*Fig 1 Insertion of batteries*

- Hinge out the XLR connector by pressing the thumb on the release button. Turn out the gripped plug until it locks in the open position.
- Open the battery compartment flap with your fingernails or any appropriate tool.
- Insert two 1.5 V AA size alkaline batteries as shown in Fig 1. The direction is labeled on the rear side of the instrument.
- Close the battery compartment flap.




- Notes**
- We do not recommend to use NiCd or NiMh rechargeable batteries.
  - Do not insert batteries of different types.
  - Note the correct polarities of the inserted batteries. Wrongly polarized batteries may cause permanent damages to the electronics inside!
  - Remove the batteries as soon as they are flat.

## 2. BASIC OPERATION



*Fig 2 Instrument overview*

## 2.1 Getting Started

For better understanding, the words MODE, UP and DOWN refer to the three corresponding keys, whilst the dot matrix type icons (e.g. ) (Signal), ) (Frequency), ) (Amplitude, Level), ...) refer to the selectable parameters in the display.

## 2.2 Power On/Off, Low Battery

The MODE-key provides the on/off functions.



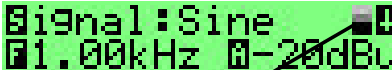
*Fig 3 Power-up screen*

- Press the MODE-key to switch on.
- The start-up screen appears shortly after showing the serial number of your Minirator MR1, see Fig 3.
- Hold the MODE-key pressed for about two seconds to switch the device off again.

Furthermore Minirator features an Auto Power Off function that automatically switches off the instrument after a selectable duration of inactivity. Refer to 2.8.a Define the Auto Power Off Time.

- Notes**
- **Minirator reverts all values to the last active status when powered on.**
  - **If exposed to very high electrostatic discharges, the instrument might loose control (e.g. no display). In such a case, switch the instrument off and on again.**

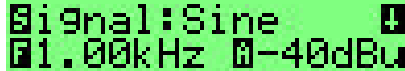
The Minirator features a low battery status indicator, displaying the end of the battery lifetime, see Fig 4. A pulsing vertical block becomes visible at the right top corner of the display, reminding to replace the batteries.



*Fig 4 Low battery indicator*

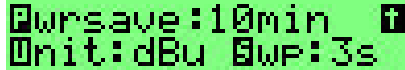
## 2.3 Display

The display shows either the signal parameter screen, Fig 5, or the setup screen, Fig 6.



*Fig 5 Default values*

In the parameter screen the waveform, frequency and level may be altered. The setup screen allows the change of setup



*Fig 6 Setup display*

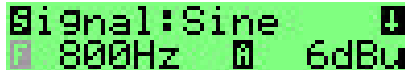
parameters. By selecting the arrow-symbol in the right top corner and pressing the corresponding arrow-key you may switch from one to the other screen.

After initialization, the instrument will re-enter the last active status prior switching off the last time.


To re-enter factory settings, as shown in Fig 5 and Fig 6 switch the Minirator MR1 on with pressing the UP- and MODE-key simultaneously.

## 2.4 Keypad

The Minirator has only two basic rules:



*Fig 7 Selectable items*

- Each time you press the MODE-key you will move to the next selectable item. The currently selected item is indicated by a flashing, inverted first character. In Fig 7 the letter  is selected, represented graphically by gray color.
- To alter the parameter use the UP- and DOWN-keys. The changed parameter becomes immediately effective. The signal setting cycles through the available values while amplitude and frequency stop at their maximum and minimum values.

MODE-, UP- and DOWN-key provide a repeat function if you keep them pressed.

## 2.5 Choose Waveform

Select the **S**-sign with the MODE-key and toggle through the available waveforms using the UP- or DOWN-key. The available waveforms are listed below in Table 1.

Waveform	Frequency	Description
Sine	20 Hz - 20 kHz	Pure, low distortion sinusoidal waveform defined by frequency and level (RMS) in the display. This is the most common waveform in the audio world for measurements of frequency response, distortion, etc..
Sweep	---	The output signal is sequentially stepped through all the available frequencies. Step duration can be adjusted. Actual frequency is displayed. Sweep starts automatically indicated by the rotating bar .
W. Noise	--	White noise signal with 20 kHz bandwidth. Use this signal in conjunction with a spectrum analyzer (FFT analyzer).
P. Noise	--	Pink Noise signal with 20kHz bandwidth. Signal level decreases with 10 dB/decade (3 dB/octave). Use this waveform in conjunction with swept narrow band filters or for auditive (aural) testing.
Square	20 Hz - 5 kHz	Square wave signal with 50% duty cycle and no DC offset.
Pol Test	20 Hz	Proprietary polarity test signal with fix frequency of 20Hz.

Table 1 Available waveforms

## 2.6 Change Frequency

The frequency range of the instrument covers the entire audio range from 20Hz to 20kHz in 31 1/3<sup>rd</sup> octave steps.

20Hz	25Hz	30Hz	40Hz	50Hz	65Hz	80Hz	100Hz
125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz
800Hz	1kHz	1.25kHz	1.60kHz	2.00kHz	2.5kHz	3.15kHz	4.00kHz
5.00kHz	6.30kHz	8.00kHz	10.0kHz	12.5kHz	16.0kHz	20.0kHz	

Table 2 Frequency table for sinusoidal signals

Select the **F**-sign with the MODE-key and toggle through the frequencies using the UP- or DOWN-key.

**Note** • The frequency may not be altered in waveforms Sweep, Pink Noise, White Noise and PolTest.

## 2.7 Change RMS Level

To change the level of the generated signal, toggle with the MODE-key, until the **L**-character is flashing and increase or decrease the level with the UP- or DOWN-key.

Waveform	Unit	Range	Increment
Sine, Square, White Noise, Sweep	dBu dBV Volts	-76 dBu - +6 dBu -78 dBV - +4 dBV 0.13 mV - 1.6 V	2 dBu 2 dBV ~±23%
Pol Test	dBu dBV Volts	-76 dBu - +4 dBu -78 dBV - +2 dBV 0.13 mV - 1.25 V	2 dBu 2 dBV ~±23%
Pink Noise	dBu dBV Volts	-56 dBu - -4 dBu -58 dBV - -6 dBV 1.25 mV - 500 mV	2 dBu 2 dBV ~±23%

Table 3 Level ranges and increments for signals and units

## 2.8 Setup Display

- Select the **L**-sign.
- Press the DOWN-key to reach the setup screen.
- To revert to the signal parameter screen, select the **T**-sign and press the UP-key.



*Fig 8 Setup display*

### a. Define the Auto Power Off Time

Minirator features an auto power off function, switching the instrument off after a certain period of no key-press. The default setting is 10 minutes. To alter the auto power off time select with the MODE-key the **P**-sign, Pwrsave. The power off time may be decreased by using the DOWN-key or increased with the UP-key and is immediately active.

Available settings:

10 minutes [10min], 30 minutes [30min],  
60 minutes [60min] and OFF [Off]

In the OFF mode, the instrument remains active until the batteries are flat by not switching off the MR1 manually.

### b. Change Level Units

Select the **U**-sign with the MODE-key and toggle through the available units using the UP- or DOWN-key. The new unit is immediately active. The default unit is dBu.

Available settings:

Volts [V], logarithmic level dB Volts [dBV],  
logarithmic level dB unit [dBu]

### c. Change Sweep Speed

In the sweep mode the MR1 automatically sweeps through the audio band by stepping through all the available 1/3 octave frequencies as per Table 2. The user may define the sweep speed by setting the duration of each frequency. To alter the sweep speed select the **S**-sign with the MODE-key and toggle through the available settings using the UP- or DOWN-key.

Available sweep increment settings:

50 milliseconds [50m], 500 milliseconds [.5s],  
1 second [1s], 2, 3, 4 and 5 seconds

The new sweep speed is immediately active. At the beginning of each cycle, a 1kHz start tone remains active twice as long as the step duration defined. A running sweep is indicated by a rotating bar in top right corner of the signal parameter screen.

## 2.9 Connections

Minirator features two output connectors, an unbalanced RCA (Cinch or Phono plug) output and a balanced, ground-free XLR connector. The RCA output is permanently active, whilst the XLR pins are only connected in the folded out position.

**Note** • **Never connect both outputs simultaneously, it may cause short circuits.**

### a. Balanced / Unbalanced Connections

Use balanced connections via the retractable XLR output pins whenever a balanced input is available, especially for low level input signals such as microphone inputs and for longer cables. Balanced connections have the advantage of a far better noise and hum immunity.

Unbalanced connections are advised if the input of the device is unbalanced such as inputs of HiFi amplifiers and low cost mixers.



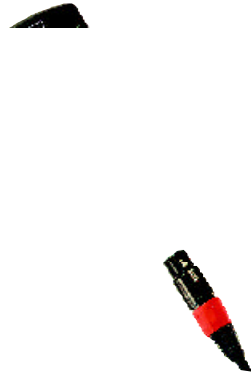
## b. RCA Output

The RCA, also called phono connector or cinch connector, is located on the top of the instrument, see Fig 9. It provides the selected output signal in an unbalanced mode with a nominal output impedance of 200 ohm. The center pin carries the signal (hot), and the screen is the ground. The RCA output is always active regardless of the XLR connectors position.

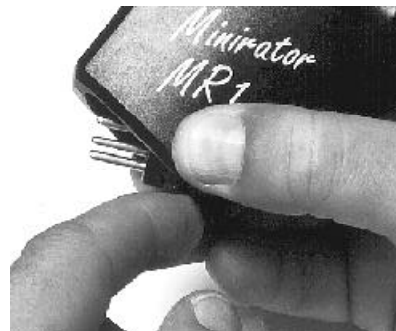
*Fig 9 RCA output*

## c. XLR Output

The XLR output is a balanced signal output with nominal 200 ohm output impedance, see Fig 10. The XLR pins are retractable in order to protect the pins from inadvertent connections and short circuits. To flip the connector out, push the release button and turn the XLR output whilst pressing. For example press a finger into the notch on the rotator, see Fig 11. To retract the pins, simply press again the release button and turn the pins back.

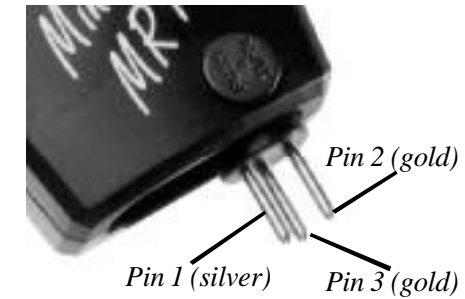


*Fig 10 XLR output*



*Fig 11 Open the XLR output*

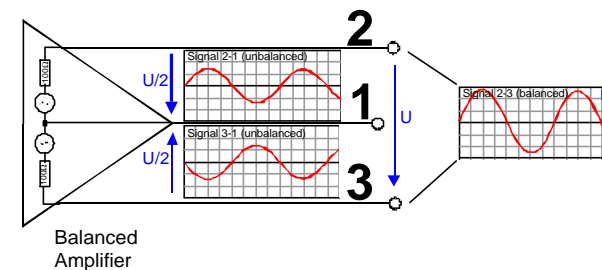
The XLR pin assignment, see Fig 12, is internationally standardized.



*Fig 12 Pin assignment*

- Pin 1 (silver plated, left hand side) is connected to the cable screen only and is the reference for pin 2 and pin 3 with balanced loads.
- Pin 2 (gold plated, right hand side) provides the signal with positive polarity.
- Pin 3 (gold plated, center) provides the signal with negative polarity.

The difference of the signals (pin2-pin3) results in the balanced signal of doubled amplitude, see below Fig 13. Each of the semi outputs has a source impedance of 100 ohm, corresponding to 200 ohm in balanced mode.



*Fig 13 Balanced output diagram*

### 3. TECHNICAL SPECIFICATION

Outputs	Balanced XLR, unbalanced RCA, phantom power resistant		
Waveforms	Sinusoidal, Square, White Noise, Pink Noise, Polarity		
Frequency Range	20 Hz - 20 kHz in 31 steps (Sine) 20 Hz - 5 kHz in 25 steps (Square)		
Frequency Sweep	20 Hz ... 20 kHz with sinusoidal signals		
Sweep Speed	0.05, 0.5, 1, 2, 3, 4, 5 sec. per step		
Units	dBu, dBV, V selectable		
Level Ranges	Waveform	Range	Inc
	Sine, Square	-76 dBu to +6 dBu	2 dBu
	White Noise	-78 dBV to +4 dBV	2 dBV
	Sweep	0.13 mV to 1.6 V	±23%
	Pol Test	-76 dBu to +4 dBu	2 dBu
		-78 dBV to +2 dBV	2 dBV
		0.13 mV to 1.25 V	±23%
	Pink Noise	-56 dBu to -4 dBu	2 dBu
		-58 dBV to -6 dBV	2 dBV
		1.25 mV to 0.5 V	±23%
Flatness	±0.5 dB		
Accuracy	±0.5 dB		
THD+N	<-72 dB (0.025%) typical @ 6 dBu, 1 kHz <-55 dB (0.18%) @ 10 mv, 20 Hz - 20kHz		
White Noise	20 Hz - 20 kHz, Crest factor = 2.12		
Pink Noise	20 Hz - 20 kHz, Crest factor = 3.27		
Output Impedance	200 ohm balanced & unbalanced		
Auto Power Off	10, 30, 60 minutes or OFF		
Batteries	2 x 1.5 V Dry or NiCd type cell, LR 6, AA, AM3 types		
Lifetime	Typical battery lifetime >20 hours		
Temp. Range	0° to +45 °C (32 °F to +113 °F)		
Humidity	< 90% R.H., non condensing		
Dimensions	140 x 74 x 25 mm (5.5" x 2.9" x 1")		
Weight	170 g (6 oz) including batteries		

# Quick Guide

## Minirator MR1

MODE  
On / Off (2 sec)

