

NTI Minirator MR-PRO

Mike Rivers

I love neat gadgets, and when the Neutrik (at the time) Minirator MR1 was introduced at the Fall 1988 AES show, it was love at first sight. This pocket sized audio signal generator went directly into my field tool kit and another one time-shares between my workbench and studio. Nine years later, the Minirator has been updated, and a significant update it is. Now there are two models, the MR2 and MR-PRO. I reviewed the more fully featured MR-PRO, but I'll point out the differences between the models as we go along the tour.



Features

The Minirator had a complete facelift including a larger, more informative, and easier to read LCD, a scroll wheel and Enter button replacing the Mode and Cursor buttons, and quick access buttons to the waveform selection, level, and frequency adjustments. New on the front panel are an Esc key to back out of the current menu, a Mute button to turn off the output, and a control to select the setting increments for frequency (1/3, 1/6, 1/12 octave or continuously adjustable to 4 significant digits) and amplitude steps (0.1 or 1.0 dB). The Power button doubles as a display backlight switch.

Gone from the original design is the wanky swing-out male XLR output connector. It's been replaced by a solid, locking (bless 'em) recessed XLR. The unbalanced output RCA jack seems to fit most plugs better than the MR1's. The MR-PRO also has a female XLR connector which is used in conjunction with its Cable Test function. A USB port is provided for firmware upgrades and for uploading WAV files to the PRO's file player (stay tuned!). Power is from three AA cells with expected battery life of about 10 hours for the MR-PRO and 20 hours for the MR2. An external power socket is provided (5-8 vdc), and a wall wart adapter is available as an accessory, though NTi recommends using battery power for the cleanest output. Finally, the MR-PRO comes equipped with a spiffy blue rubberized plastic bootie to protect it against physical shock.

One major improvement over the MR1 is an increase in maximum output level. When the MR1 was introduced, we were still working largely in an analog world and a +4 dBu test signal was sufficient for most applications. With its maximum sine wave output level of +6 dBu, the MR1 filled the bill. In the digital world, with headroom being essentially at the discretion of the user, we frequently want to test a device near its maximum operating level. +6 dBu barely gets the meters up to about half scale. The MR-PRO's maximum sine wave output is +18 dBu, however the MR2 poops out at +8 dBu.

Along with a higher output voltage, the MR-PRO, with its 12.5Ω output impedance, can deliver more current than the MR2, and does so with lower THD (0.0016%) and noise (< 5μV) at maximum output. The MR2 is no slouch though, with an output impedance of 200Ω, THD of 0.0032% and noise below 10μV.

The MR-PRO offers a unique and powerful feature, the ability to load and play and continuously loop a 48 kHz 16-bit audio WAV file. The latest firmware version accommodates both mono and stereo files, playing back the mono sum of both stereo channels. The file-player capability allows you to create and use specialized test waveforms or sequences. A few examples are pre-loaded, including a speech intelligibility test sequence (to go along with a function in NTI's AL-1 Acoustilizer), several musical instrument sounds, and voice announcements in both English and, I think, German: "The following test sequence helps our specialists to optimize the PA system. Thank you for your understanding." The NTI web site offers a collection of useful waveform files for downloading, or you can make your own.

You can store the current setup in any one of ten presets for instant recall. You'll need a good memory though, as they're all named Config_(0-9) and there's no means of renaming them to remind you of what you've stored. Just for kicks, I stored a 440 Hz +4 dBu sine wave in one location as an tuning reference.

Functions

Minirator is the name, and generating signals is the game. The waveform menu includes sine, pink and white noise, sweep (stepped), chirp (essentially a continuous sweep, either linear or logarithmic), plus Delay and Polarity, a couple of specialized waveforms that go along with tests built into NTI's Acoustilizer and Minilyzer. Square waves are conspicuous by their absence. I like to run a square wave through a device and look at its output with an oscilloscope as a quick check for ringing or loss of high or low frequency response, so I inquired about their whereabouts. Tom Minter, president of NTI Americas offered a rational explanation.

While the MR1's square wave output was useful, it wasn't perfect (I refreshed my memory – it does indeed ring quite a bit). It's really better, though more expensive in a digital-based product, to generate a square wave with hardware than to synthesize it digitally. NTI decided that rather than providing the extra hardware circuitry necessary to generate a square wave equivalent in quality to the MR-PRO's sine waves, users who wanted square waves (or square pulses of various duty cycles) could add their own using the wave file player feature. I usually use only 100 Hz and 1 kHz square waves, so I'm a happy camper using the file player. MR2 users, however, will miss out since file playback is unique to the MR-PRO.

While its primary function is as a generator, the MR-PRO includes several measurement functions: Load impedance, balance (impedance difference between pins 1-2 and 1-3) and phantom powering voltage. Impedance is read directly, with an open or near-open circuit indicating “>50kΩ.” Placing the cursor over either the DC or RL (load impedance) legend displays the voltage or resistance between pins 1-2 and 1-3 independently, an aid to diagnosing a defective cable or dodgy phantom power supply.

The MR-PRO’s Cable Test function utilizes resistance measurements to verify the integrity of a cable plugged either between the two XLR connectors on the unit or connected to the MR-PRO outputs and terminated with a test plug (included). In the Cable Test mode, it looks for specific resistances built into the test plug – 1 kΩ between pins 1-2 and 2 kΩ between pins 1-3. If it’s happy with what it sees, OK is displayed. A cable with either lead or the shield open or with pins 2-3 reversed will display DEFECTIVE and the two resistance readings will be displayed (pin 1 open reads 1.5kΩ for each leg), guiding you to the problem.

In the Impedance mode, two different measurements can be made. In the sine wave generator mode and connected to a load, the magnitude of the load impedance is displayed. However, when switched to the Impedance mode, both the magnitude and phase angle are displayed. When connected to the input of a mic preamp with an input transformer, the in the Impedance mode, the phase angle displayed a positive angle indicating that the load was inductive. When connected to a transformerless preamp input which has capacitors at the input (to block the DC phantom power from reaching the active amplifier stage), the displayed phase angle was negative, indicating capacitance. Cool!

Another function of the Impedance measurement mode is one that I didn’t have the opportunity to test, so I can’t fully describe it. When connected to a constant voltage (e.g. 70 v) distributed string of loudspeakers, the MR-PRO displays the total power requirement for the string. If you know what it’s supposed to be, you can identify such issues as a disconnected transformer or speaker, an incorrect transformer tap, or a short.

In Use

There really isn’t much to say other than that everything works just as expected, and that’s a good thing. Operation is intuitive – other than understanding how to interpret resistance readings when checking a cable, updating the firmware, and loading WAV files, you’ll hardly have to crack the manual. I had fun checking the input impedance of every mic preamp in the studio.

I have a few small quibbles. One is that the resistance readings displayed for a faulty cable can be confusing. More than once when measuring a cable with pins 2 and 3 reversed, I saw 0.98kΩ and it didn’t register with me that this is nearly 1kΩ, the correct value but on the wrong pin. If, when this test mode was selected,

the load impedance display was rounded to 1 decimal place it would have read 1.0kΩ, giving a clear indication of the nature of the fault. I could blame it on senility, but it could have been simplified.

Because of the nature of the digitally generated sine waveforms, when the amplitude is reduced, the noise increases. When using the MR-PRO as the source when making THD measurements and you need a low level signal, for example when testing a mic preamp, because of the increased noise in the output, a THD measurement can appear higher than it really is. NTI suggests inserting a 40 dB pad (they offer a precision calibrated one as an accessory) in line with the generator output and set it 40 dB higher than the desired test level.

While I recognize the limitations of battery powered equipment, I wish they could have squeezed a couple more dB out of it. Many contemporary A/D converters require an input of +20 to +24 dBu in order to reach digital full scale, so even the MR-PRO won't always make the Overload light come on.

Another wish is that the frequency range extended beyond 20 kHz. Since much of today's digital work is done at 96 kHz sample rate and higher, arguments as to whether we can hear it or not notwithstanding, it's reasonable to test at least out to 35 kHz. I expect that since waveforms are generated digitally, this limitation is a function of a 48 kHz sample rate.

Summary

The MR-PRO does what it claims, and it does it very well. The compact size and shock protection make it ideal for the field kit, and the accuracy, precision, and low distortion of the signals it generates make it equally home in the lab or service bench.

Now for the hard part: At \$525 list (a bit over \$500 on the street – there isn't a big dealer margin on this sort of gear) it's not going to be for everyone, and everyone who works with audio gear really *should* have some test gear. The MR2 at \$325 is a little gentler on the wallet, but it's not the bargain that the original MR1 was at its initial price of \$139 (though it eventually crept up over \$200). Blame inflation or the weak dollar, but do give it some consideration. Good test equipment can answer a lot of questions about your gear and help you to find problems when they occur.

Fast Facts

Applications:

Field and bench test and service, troubleshooting in the studio, PA, or installed sound.

Key Features:

Good variety of very high quality test signals as well as other useful performance checks and measurements. Compact, easy to operate, rugged.

Price:

\$525

Contact:

<http://www.nti-audio.com>

NTI Headquarters
Liechtenstein / Europe
Phone: +423 - 239 60 60

NTI Americas Inc.
Tigard, Oregon
Phone: +1 503-684-7050

NTI Japan Limited
Sumida-ku, Tokyo
Phone: +81-3-3634-6110