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TECHNOLOGY GROUP

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Find the *Neutrik Test Instruments RT-2M* at our website: *Click HERE*

RT-2M Audio Analyzer

Measure what you hear
...and beyond

Less noise • More sound



High-speed audio analyzer for production testing of

- Pro Audio Equipment
- Transducers, Microphones
- Communication Devices
- Industrial Equipment

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Key Features

Productivity
- Very fast production testing reduces test costs
- Versatile platform for audio & acoustical measurements
- Evaluations with unbeatable correlation to the human ear
- Increases quality and production line yield at the same time

Wide range of test signals
- Multitone technology for maximum speed
- Stepped sweep for high-resolution measurements
- Chirp analysis for perceptual analysis

Easy-to-use turnkey solutions
- Mobile phone test system
- Speaker test system
- Microphone test system

Comprehensive interfaces
- 2-channel output & input
- Banana and BNC connectors
- Built-in microphone power supply
- GPIB IEEE-488 and RS232 control interface

Living in the world of sound?

2-channel Analog Audio Frequency Generator & Analyzer

Alone in the World of Sound?
The specialized challenges of high speed manufacturing test for the world of acoustics and audio are different from any others. There are many ways to test slowly – but only a few ways to test rapidly and precisely. Test system or environmental noise, errors in test methodology, ground loops and EMI are all waiting to spoil your test results --- and add expensive warranty or field service costs to your product.

NTI delivers much more than the analyzer itself - we are worldwide specialists in audio testing. Our staff and local partners give you an expert link to our hundreds of man-years of audio frequency testing experience.

Rapid-Test RT-2M
The centerpiece is the RT-2M audio frequency analyzer, a fast, programmable two-channel generator and analyzer. The RT-2M ensures proper and reliable function in every industrial environment, including easy to handle calibration and service procedures.

High Speed Production Testing
The RT-2M provides complete performance tests of essential audio parameters simultaneously, typically in less than a second. Test setups can easily be reconfigured to meet changing production test requirements.

Optimized for Production Lines
The RT-2M is optimized for integration into production lines and QC sample inspections. The mission is to completely automate test procedures with no need for any form of manual or human “Golden Ear” testing. The RT-2M automatically captures, stores and analyzes incoming signals against QC tolerances in real-time and returns the test results back to the controlling PC without unnecessarily loading the host controller with number-crunching tasks.

Ready-to-go Software Packages
We offer different types of software, basic sample code generation for writing your own applications up to complete turnkey software optimized for specialized markets.

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Test Applications



Speaker & Microphone Testing

Choose from several PC software packages



LabView™, LabWindows™ NI-VISA drivers available

Pro- & Consumer Audio





Mobile Phone Testing

Industrial Quality Control



Speaker & Mic Testing

- Drivers, Woofers, Tweeters
- Receiver, Transducers
- Speaker Cabinets
- Microphones

Mobile Phone Testing

- Transducers
- Preassembled Phones
- PCB Subassemblies
- Complete Phones

Pro- & Consumer Audio

- Amplifiers
- Headphones
- Vocal Microphones
- TV & Multimedia Sets
- Sound Cards

Industrial Quality Control

- Bearings
- Motors & Fans
- Vibration Testing
- Transducers, MEMS IC
- Annunciators & Alarm Signals

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Objective Rub & Buzz Detection

PureSound™ measures Annoyance

Technology to replace the Human Ear
PureSound™ is based on a patented model for acquiring and analyzing the sound signal in the time domain while still accounting for the frequency position of the artifacts.
It measures the transient components typically found in defective speakers or non-linearities of other devices. The PureSound™ algorithm offers the very first reliable Rub&Buzz test with a perfect equivalence to the human "Golden Ear".

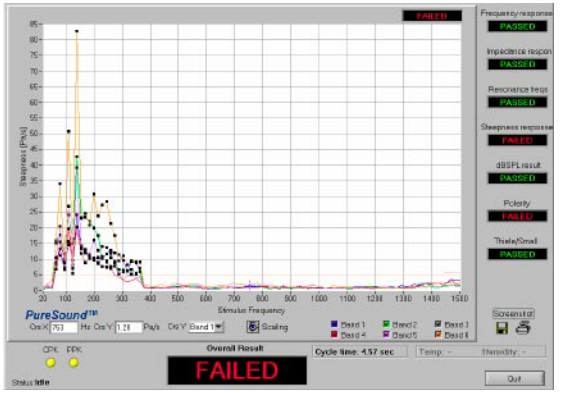
Detecting slightest Rub & Buzz Defects
PureSound™ provides a complete speaker or transducer characterization, detecting the slightest Rub & Buzz defects of speakers or transducers, such as air-leaks, miscentered coils, rubbing voice coils, loose particles, or defects from any other cause.

Short Test Cycle Time
The measurement is compared in real-time against user-defined QC tolerances, allowing accurate PASS/FAIL results. The typical Rub&Buzz test time is less than one second.

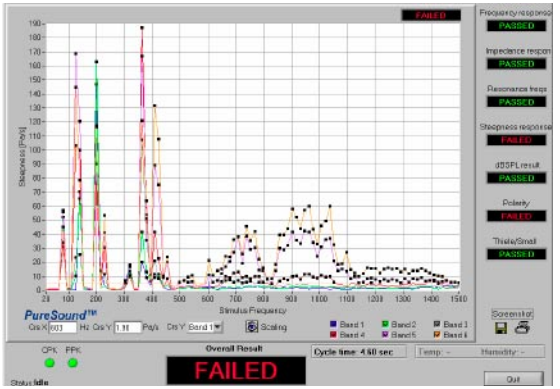
Objective Rub & Buzz Testing
Most Rub&Buzz defects are audible, but hard to measure with conventional measurement techniques, such as harmonic analyzers. Often they cannot detect the variation in low energy content causing the Rub & Buzz defects, due to insufficient consistent energy in the upper harmonics.

100% Correlation to Human Ear
PureSound™ acquires in the time domain, thus measuring all audible production imperfections with a 100% correlation to human hearing. This correlation allows uncompromised cost saving by replacing the subjective Golden Ear with an objective Rub&Buzz test.

Production Noise Immunity
Ambient factory noise is an omnipresent problem. An effective patented noise cancellation algorithm eliminates all non-correlating signal components from the measurement signal, thus immunizing the measurement process against factory noise.



Rub&Buzz Test Result, Rubbing Voice Coil



Rub&Buzz Test Result, Loose Particle in Driver

Hundreds of PureSound systems are now in use every hour of the day across the globe from Arkansas to Zhejiang.

Test Configuration
- RT-2M Audio Analyzer
- PureSound™ Option
- RT-IB Impedance Test Box
- M2010 Measurement Microphone

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Speaker Production Testing

The RT-2M audio analyzer and the PC-based turnkey production software RT-Speaker™ form a complete speaker test system. The well-structured user interface makes the operation an easy task. The complete initial system setup and configuration may only take less than 30 minutes.

The speaker test system can be easily integrated into existing production lines. Even complex individual test configurations are supported by using USB controlled input- or output switchers.

RT-Speaker™ supports serial number handling with barcode reader and features a barcode-dependant project loading. All measured speaker test results are logged to a data file, allowing detailed quality monitoring.

Comparison of Test Solutions for Defects Testing

Parameter \ Test Solution	RT-2M Audio Analyzer	Human Ear "Golden Ear"	Soundcard - based harmonic Analyzers
			
Speed	very good	very good	good
Rub&Buzz Detection	objective	subjective	poor
Traceability	very good	none	very good
Consistency	very good	changing	poor
Objectivity	very good	poor	poor
Endurance	very good	a few hours	very good
Accuracy	very good	good	good
Calculation Power	built in	-	PC depending
Setup Time	< 30 min.	1 hour	many hours



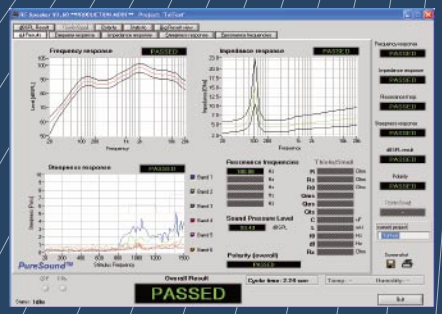
Speaker & Mic Testing

- Drivers, Woofers, Tweeters
- Receiver, Transducers
- Speaker Cabinets
- Microphones

Measurements

- Frequency Response & SPL
- Impedance Response & f0
- PureSound Rub&Buzz Testing
- Distortion & Polarity
- Thiele/Small Parameters
- Statistical Process Control (SPC) incl. Histogram, Trend & CPK/PPK





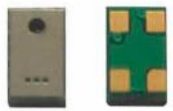
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Microphone Production Testing

Specialized Solutions



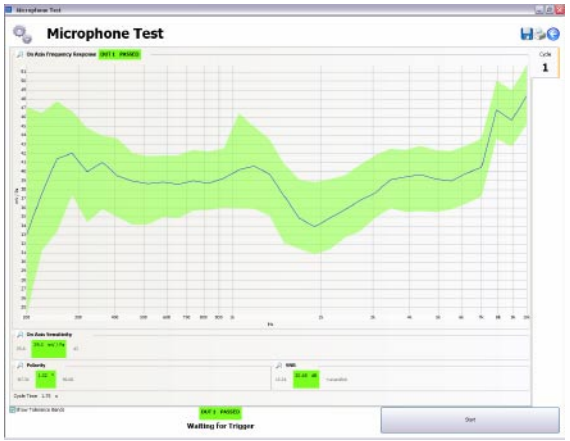
Mobile Phone Microphones



Mems Microphones



Vocal Microphones



RT-Microphone - Production Mode

Flexible Parameter & Tolerance Setting
Microphones naturally bear an error rate in production. Sorting out faulty devices in an early production stage increases the overall yield, reduces the cost of waste material and optimizes the quality of the manufactured goods. Important for a modern, state-of-the-art Microphone Test system are reproducibility, automation, speed and simplicity. The RT-2M Audio Analyzer and the turnkey test software form together the Microphone Test System that comprises exactly these features.

Recording of Reference Data
The automated calibration (e.g. equalization of the reference speaker) is carried out with the measurement microphone. The smart "learn-mode" simplifies tolerance definition by feeding the system with a representative set of one or more "Golden Samples". The unique tolerance management derives its tolerance criteria automatically and supports up to five different quality clusters, which may be user-defined, such as "Excellent", "OK", "Acceptable", "Class 3" and "Reject".

Short Test Cycle Time
System integration into existing production lines and the connection to host controllers is very simple. The extremely short test cycle time enables the microphone test system to easily cope with high volume production lines. The patented measurement algorithms have been optimized for factory noise immunity. This maximizes your production line yield and allows conducting the same measurement in R&D as well as in the production floor.

Microphone Test Production Mode
Production testing can be started automatically or manually by any external start-button. The implemented digital input/output functions supports automation handling for e.g.

- Connection to external PLC
- Test result indication to the operator
- Automated splitting of PASSED/FAILED samples
- Individual bin splitting of different FAILED samples

Test Configuration

- RT-2M Audio Analyzer
- RT-Microphone™ Test Software
- Output Switcher
- Input Switcher

Measurements

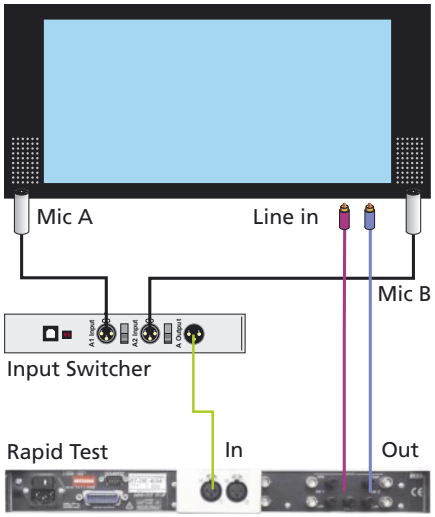
- Frequency Response, Sensitivity
- Distortion, Signal-to-Noise ratio S/N
- PureSound, loose particle detection
- Directivity, Polar pattern

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End of Line Testing

Audio Amplifier Testing
The RT-2M audio analyzer is ideally suited for comprehensive, yet fast verification of amplifiers and other audio devices. The instrument allows execution of virtually all possible measurements within less than 1 second.

Consumer Audio Testing
Quality testing of professional & consumer audio products is an essential part in the production process and the service aspect over the life cycle of an audio product. Based on varying product needs, you may choose either basic functional tests or complete performance tests, including documentation of results.
In either case, your test setup remains the same, minimizing the cost of ownership and providing maximum flexibility.



Configuration Stereo TV Testing

Industrial Quality Control
In the production of rotative, mechanical or electromechanical parts, quality control often is carried out by subjective human operators. The test results depend very much on the individual operator and automatic logging is not applicable with this method.

NTI provides an objective, repeatable solution for reliable quality control and monitoring of industrial parts.

PureSound technology detects even the most subtle, audible manufacturing imperfections, which cannot be recognized by common averaging FFT measurements.

We measure what you hear !



Pro- & Consumer Audio
- Amplifiers
- Headphones, Microphones
- TV & Multimedia Sets
- Pocket PC Audio
- Sound Cards, MP3 Players



Industrial Quality Control
- Bearings
- Motors & Fans
- Vibration Testing
- Annunciators & Alarm Signals
- Industr. Transducers, MEMS IC

Test Configuration
- RT-2M Audio Analyzer
- PureSound™ Option
- RT-Eval Software
- M2010 Microphone

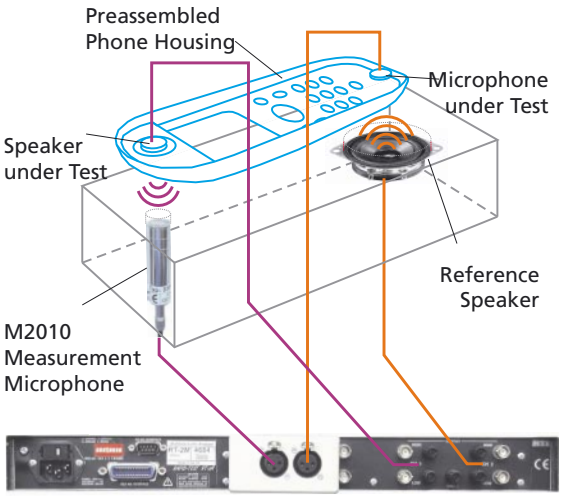
Measurements
- Frequency Response, Distortion
- Vibration, RPM
- Phase, Idle Channel Noise
- Interchannel Crosstalk

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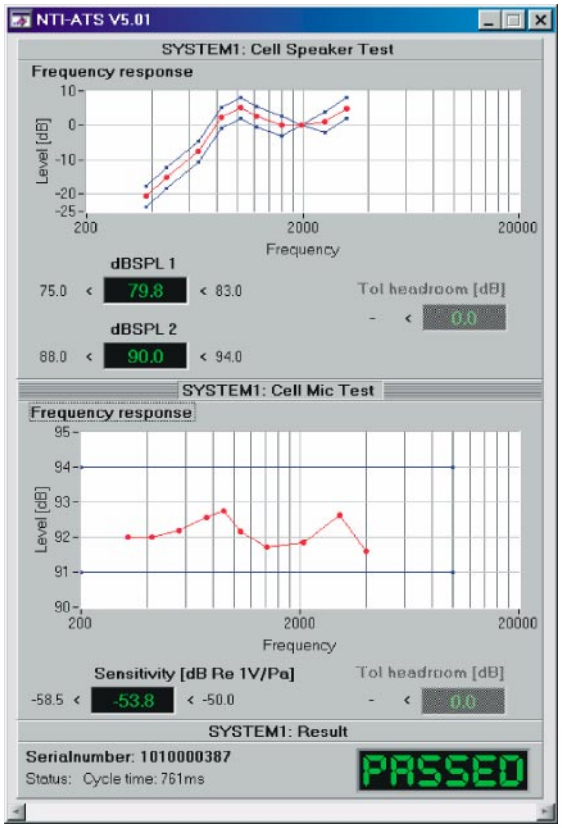
One Second in the Life of a Cellular Phone

Mobile Phone Testing

Incoming Inspection, Pre-Assembly Test
Testing the quality of the incoming speakers, microphones or pre-assembled housings is important to reduce the failure rate at the final test. Sorting out defective parts at this early stage is much more efficient than rejecting the costly completed phones at the end of the production line.



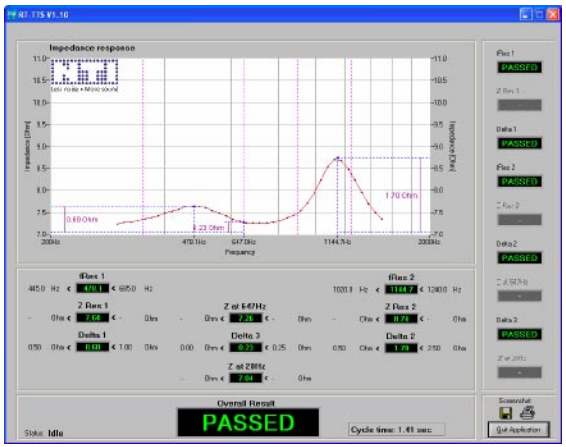
Simultaneous Transducer & Microphone Test



RT-ATS Mobile Phone Test Software

RT-ATS, Automated Test System
RT-ATS measures microphone, speaker and vibration alert parameters utilizing multitone measurements within a typical test cycle time of less than one second.

RT-TTS, Transducer Test Software
Optimized production test software for mobile phone transducers based on impedance measurements.



RT-TTS Transducer Test Software

Measurements

- Transducer & Microphone
- Frequency Response & Sensitivity
- Vibration Alert
- Typical Test Cycle Time < 1 second

Test Configuration

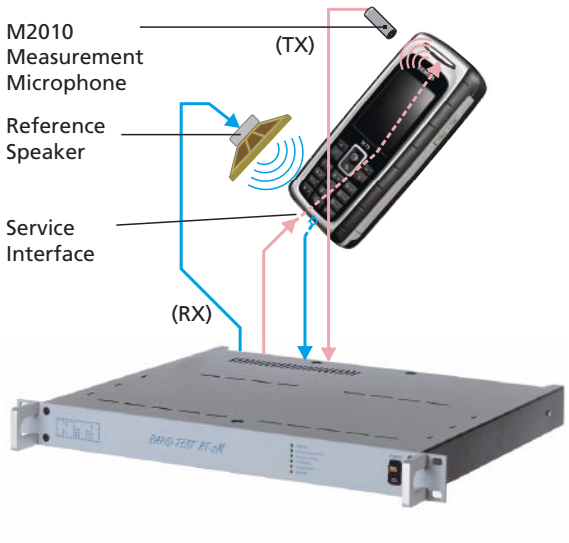
- RT-2M Audio Analyzer
- RT-ATS™ or RT-TTS™ Test Software
- M2010 Measurement Microphone
- Input Switcher or Impedance Test Box

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Versatile Integration

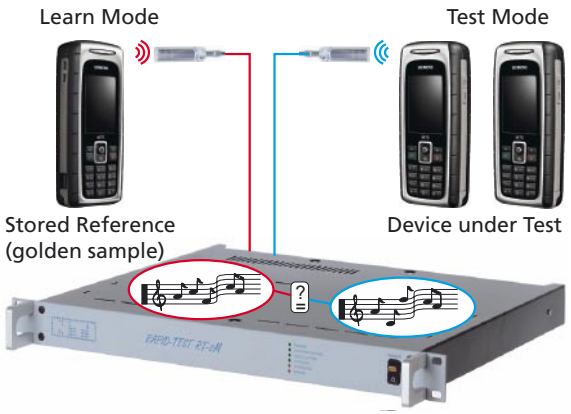


Final Test (End of Line)
The Rapid Test RT-2M audio analyzer is ideally suited for comprehensive end of line testing of mobile phones.
The RT-2M provides a detailed view of the voice quality and thus the stability of the phones manufactured.



Test Configuration

Sound Correlation
The unique sound correlation feature offers verification of conventional and polyphonic ringer melodies as well as music sequences. Subtle degradations are easily audible, but hard to detect by conventional test instruments. The PureSound correlation algorithm emulates the perception of the human ear. This allows comparing and rating any measured sound pattern against the former recorded reference sample.



PureSound Correlation Analysis

Mobile Phone Testing
- Transducers
- Preassembled Phones
- PCB Subassemblies
- Complete Phones
- Optional DAI Interface with RT-2X Audio Analyzer

Measurements
- Frequency Response, Sensitivity
- Distortion THD, SINAD, Noise
- Rub&Buzz of Speakers
- Loudness Rating (RLR, STMR, SLR)
- Sound Correlation
- Ringer Melody
- Vibration Alert
- DTMF

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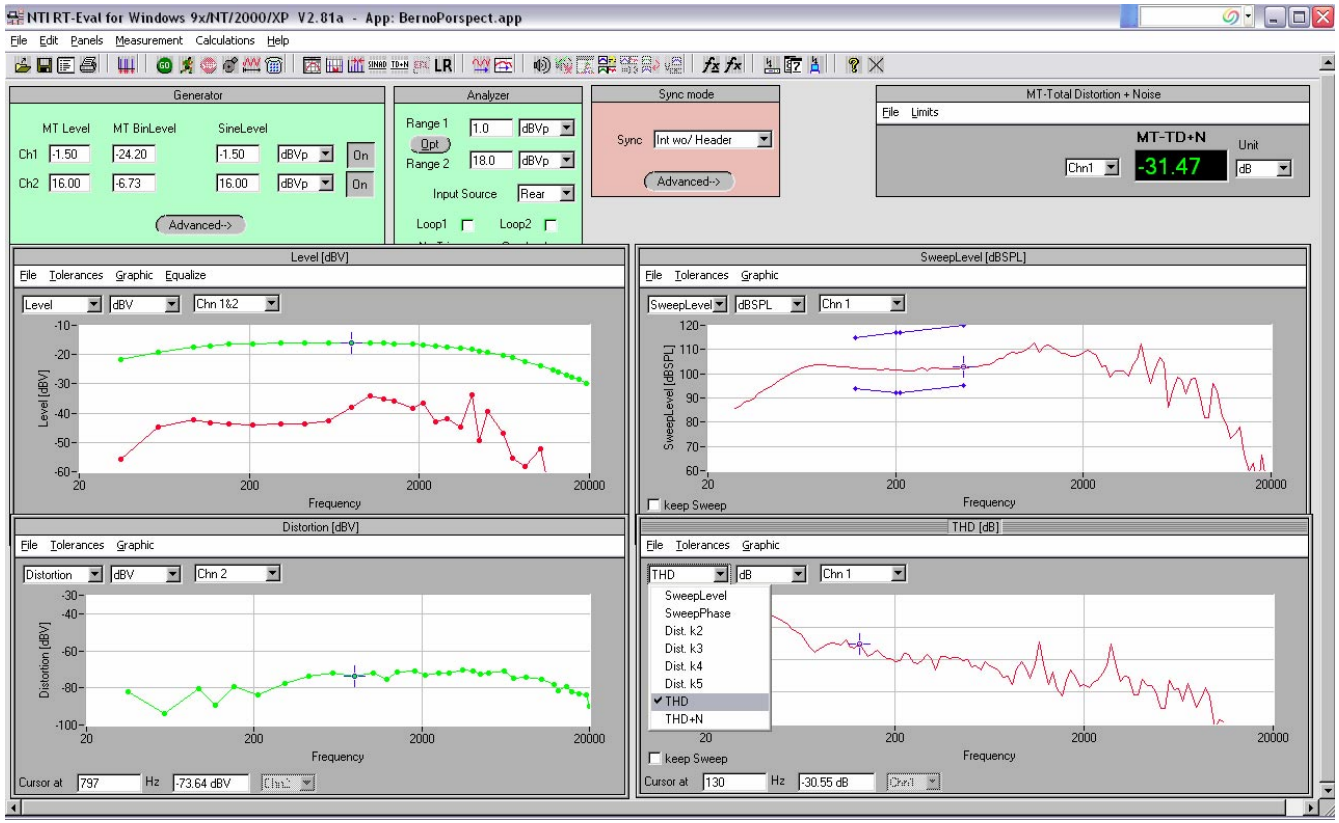
Integration of Customized Testing

Evaluation Software RT-Eval™

Source Code Generation
The integration software package RT-Eval™ offers a simple graphical user interface to control every function of the RT-2M.

- RT-Eval™ supports automatic source code generation for automated test sequences.
- The integration into the customer's environment is reduced to «cut and paste».
- RT-Eval™ enables system configuration into virtually any environment.

Easy Programming
LabView™ and LabWindows™ NI-VISA driver libraries complement the powerful tools to operate the RT-2M audio analyzer in a proprietary environment, drastically reducing the time-consuming code writing.



Rear view RT-2M Audio Analyzer:



Turnkey Test Software

- RT-Speaker™ for automated speaker testing
- RT-Microphone™ for automated microphone testing
- RT-Compliance™ speaker testing to IEC 60268-5
- RT-ATS™ for mobile phone testing
- RT-TTS™ for transducer testing based on impedance measurements

Accessories

RT-2M

Measurement Microphone M2010 & M2015
Compact and accurate measurement microphones for acoustics, R&D and production. They are optimized for a flat, free-field response in the audio range.



Impedance Box RT-IB
The impedance box is especially tailored for the impedance response- & resonance frequency testing of speakers.



Firmware Options
- PureSound™, Rub&Buzz Test
- PureSound™, Sound Correlation

Input Switcher IS-1002
IS-1002 is a multi-functional audio input switcher with 10 input channels and 2 output channels, featuring individual power supplies for microphones on each input channel.



Output Switcher OS-0210
OS-0210 is an advanced, multi-functional audio output switcher with 2 input channels and 10 output channels with maximum input current rating of 6 Ampere.



Further Accessories
- PureSound Audio Amplifier
- 70/100V RT-IB Impedance Box
- Environmental Sensor
- TA2010 Mobile Phone Test Adapter
- Artificial Ear & Mouth
- Vibration Alert Sensor
- Sound Level Calibrator
- RT-Speaker DC Resistance Measurement Kit with external multimeter

RT-2X

RT-2X Analyzer
Functionally 100% compatible to the RT-2M Analyzer



Features additional interfaces for digital voice communication testing:

POTS and Digital Interfaces
Flexible interface configuration

LCL/RL Interface
for POTS interfaces

ISDN BRI Interface
S-bus interface for send and receive of audio test signals

E1 / T1 / J1 Interface
Telephone date streams in time division multiplexed format

PCM / DAI Interface
Common 3-wire data interface with communication data rate of 64 kHz – 2.048 MHz; additionally meeting standard GSM 3GPP ETSI TS51.010 / GSM, with 8 kHz frame synchronization

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Specifications RT-2M

Generator

Multitone Arbitrary:
- 2 Independent Channels
- Multitone Signal, 1 - 31 frequencies, min. frequency spacing 5.85Hz
- Transmission Time 260 – 960ms
- Level Range -60 dBVp to +29 dBVp in 0.1 dB steps

Stepped Sweep:
- 2 Independent Channels
- Frequency Resolution 1 – 500 steps
- Frequency Range 20 Hz – 20 kHz
- Level Range -63 dBV to +26 dBV in 0.1 dB steps
- Level Accuracy < ±0.1 dB @ 1 kHz

Sweep/Chirp:
- 2 Independent Channels
- Frequency Range 5 Hz – 6 kHz
- Level Range -63 dBV to +26 dBV in 0.1 dB steps
- Level Accuracy < ±0.1 dB @ 1 kHz

Analyzer
- 2 Independent Channels
- Frequency Range 20 Hz – 20 kHz
- Level Range -80 dBVp to +40 dBV (0.07 mV to 70.7 V)
- Level Accuracy < ±0.1 dB @ 1 kHz
- Residual Distortion < -86 dB @ level > -20 dBV
- Residual Noise < -100 dBV
- Residual Input Idle Channel Noise < -18 dBrnc
- Phase Accuracy (A-B) ±1 deg
- Residual Interchannel Crosstalk typ. < -80dB @ level > -20 dBV
- Selectable Input Impedance per Channel 100 kohm, 600 ohm
- Phantom Power 15/48 VDC

General
- Dimensions 1 rack unit high 483 x 318 x 44 mm (19" x 12.5" x 1.75")
- Weight 7 kg (15 lbs.)
- Control Interfaces GPIB (IEEE-488.2), RS232
- Mains Power 100 - 230VAC / 50 - 60 Hz
- Calibration interval 1 year recommended
- Operating Temperature +5 to +45 °C (+40 to +110 F)
- Relative Humidity < 90 % non condensing

Functions
- Level & Frequency (full band or selective)
- Distortion (THD, HD, IM & MT-SINAD)
- Noise & Idle Channel Noise
- Gain, Phase & Crosstalk
- PureSound Rub&Buzz
- Sound Correlation
- DTMF

Optional Measurements
- Transient Steepness (Rub & Buzz, Sound Correlation)

Optional Measurements RT-2X
- Echo Return Loss (ERL)
- Singing Return Loss (SRL high, low)
- Long. Convertion Loss (LCL)
- Long. Conv. Transfer Loss (LCTL)
- Return Loss (RL)

Filters:
- C-Message (ANSI)
- CCITT Psophometric (ITU O.41)
- A-Weighting (IEC 61672)

Trigger:
- Internal or External
- Threshold

Standard Software & Drivers
- RT-EVAL Evaluation Software
- National Instruments™ LabView™ and LabWindows™ NI-VISA Drivers

All information are subject to change without notice.

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Less noise • More sound

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Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

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