ASTRONICS
TEST SYSTEMS

ELEVATING LMR Test

Freedom Communications System Analyzer Family

TEST SOLUTIONS

FREEDOM

OUR TRADITION OF INNOVATION

Our heritage in LMR test equipment dates to the late 1970's and the first all-in-one radio test solution: The R2001. Since then, our products have been the unquestioned benchmark in LMR test equipment. The R2600 series, introduced in 1989, was the industry standard for nearly a quarter-century. A few years later, the R2670 followed – the first test set supporting APCO Project 16 and Project 25. And in 2004, we invented the concept of automated radio testing and alignment with our revolutionary "AutoTune" option for radios from a variety of OEMs.

1979
The R2001 – the industry's first LMR service monitor – is introduced.

1989
R2600 – 2nd generation platform is introduced.

1992
R2670A introduced. The R2670 was the first analyzer to test both APCO Project 16 and Project 25.

2000
R2670B introduced – the first analyzer with full color LCD display.

2004
"AutoTest" – the first automated test and alignment software for LMR radios – is introduced.

2009
R8000A introduced – the first fully portable, software-defined LMR test set.

In 2009, we introduced the first portable, software-defined LMR test set - the R8000, now in its third generation. In 2016 we achieved another industry first with the R8100, the only full-featured communications analyzer with an internal battery. The R8600 Radio Test Hub, the only test instrument designed for the rigors of a 24/7 radio production environment, was introduced in 2017.

In 2019, we announced the most transformative product the industry has ever seen: the R9000 6GHz Communications System Analyzer. In addition to the capabilities of an LMR test set, the R9000 includes interference analysis, a real-time spectrum analyzer and bandwidth sufficient to support the FirstNet nationwide public safety LTE network.

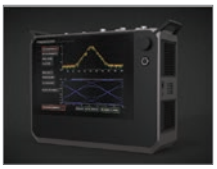
In 2020 we made history again with the R8200, which features a Vector Network Analyzer and an unmatched suite of premium features, including remote control, extended generate port output range and our revolutionary Process Automation Toolkit (PAT).

2012
R8000B introduced. The first LMR service monitor with lab grade spectral purity.

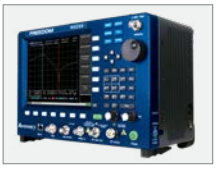
2016
R8000C and R8100 introduced – R8100 is the first full featured LMR service monitor with an internal battery.

2017
R8600 Introduced – the first LMR test set designed for 24/7 manufacturing operation.

2018
Process Automation Toolkit Introduced – the first product to bring customized automated testing to non-programmers.



2019
R9000 introduced – the first LTE capable radio test instrument. Includes 6GHz capability, multi-touch display, and standard VNA.



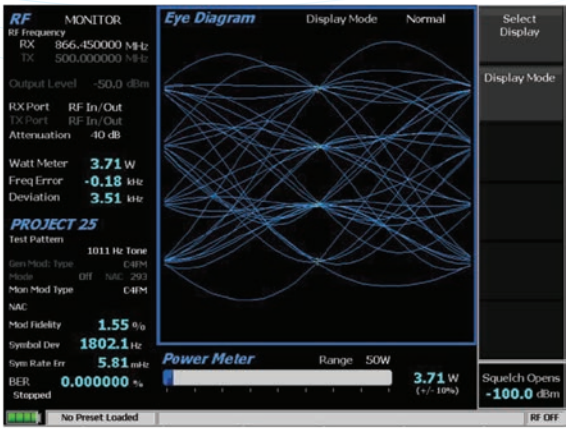
2020
R8200 Introduced – the first service monitor with built-in VNA for measurements such as Distance to Fault (DTF), Return Loss, and Voltage Standing Wave Ratio (VSWR).

THE R8100 AND R8000:

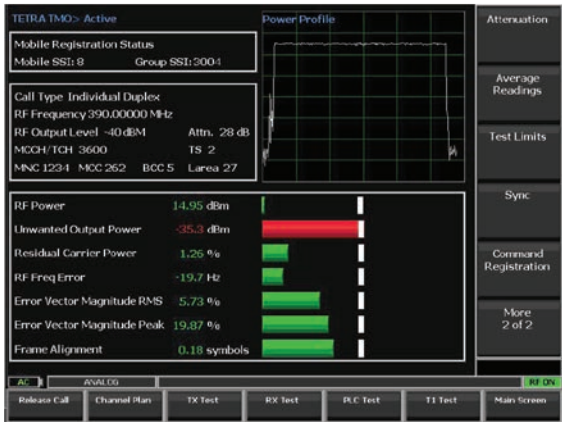
THE ONLY CHOICE FOR DIGITAL LMR TESTING AND ANALYSIS

The R8000 and R8100 comprehensively support every major LMR protocol. Our test suites for both P25 Phase 1 and 2 are fully compliant with the TIA/EIA specification and employ every modulation and test pattern called out in the specification. And our P25 Phase 1 trunking option allows the test set to emulate a base station and trunking controller.

Our analyzers also lead the way in testing the new 6.25kHz and 6.25kHz channel equivalent technologies. Our NXDN™ and DMR test modes fully conform to the applicable specifications. NXDN "Type C" Trunking simulates the functions of an NXDN central controller. Comprehensive TETRA and dPMR test options are also offered.



APCO P25 Phase1 Eye Diagram



TETRA TMO

The R8200

THE ULTRA-PORTABLE SOLUTION FOR SUBSCRIBER AND INFRASTRUCTURE TESTING

The Freedom R8200 from Astronics Test Systems represents a major step in the evolution of the LMR service monitor. The R8200 is the first and only test instrument that combines comprehensive digital and analog LMR testing with the ability to measure important RF network characteristics such as Distance to Fault (DTF), Return Loss, and Voltage Standing Wave Ratio (VSWR).

The R8200 is also the only service monitor with the ability to display RF parameters in a Smith Chart for more complicated network analysis. The R8200 also enables users to return communications assets to the field faster by reducing set-up time associated with multiple, stand-alone instruments. And because the R8200 is built on the proven, industry standard R8000/R8100 platform, it can be purchased with the knowledge that it is backed by the world-class service and technical support capabilities of Astronics Test Systems. Comprehensive subscriber and infrastructure radio testing in one, portable tester – the next generation of Freedom LMR test instruments from Astronics.

THE R8600

RADIO TEST HUB

The R8600 Radio Test Hub is designed to meet the demanding requirements of RF production environments. Able to withstand 150 Watts of continuous RF power input, the R8600 was explicitly engineered to provide a cost-effective solution for 24/7 manufacturing use. Once deployed, it requires minimal operator intervention beyond making the physical RF connections.

The Radio Test Hub provides reliable, cost-effective, easy-to-operate testing for manufacturers of LMR radios and other RF devices. It is also ideal for those with intense automated testing requirements.

The R9000

THE NEW WORLD OF COMMUNICATIONS TEST EQUIPMENT

We invented the LMR test set and have led the way in new technology for the industry every step of the way. Continuing that tradition, we introduced our R9000 6GHz LTE-Ready Communications System Analyzer.

With a standard Vector Network Analyzer (VNA), real-time Spectrum Analyzer, color multi-touch display, 6GHz frequency range, and full suite of LMR test capabilities, the R9000 represents a quantum leap in communications testing. The R9000 is the only LMR test instrument with the ability to process the instantaneous signal bandwidth required for LTE/FirstNet.

BENEFITS

- 6GHz Frequency Range
- Fully portable (less than 17 pounds) targeting better than 4 hour battery life
- Full-color multi-touch display
- LTE capable (25MHz instantaneous bandwidth; 160MHz in future releases)
- Vector Network Analyzer (VNA)
- Interference Analyzer
- Industry-best spectral purity (-110 dBc/Hz @20khz offset)
- Configurable connector access (front and top access models available)

STANDARD FEATURES

- Frequency Range from 10MHz to 6GHz
- Analog modulation and demodulation (AM, FM and Single SideBand)
- 50 W continuous input power and up to 150W peak input power
- Output level to -130 dBm
- Spectrum Analyzer
- Signal Generator
- Oscilloscope
- Vector Network Analyzer
- Integrated Audio Generators
- I/Q Recorder and Playback
- Audio Quality Tests (SINAD, THD)

OPTIONS

- All major digital LMR protocols: P25 Phases 1 &2, TETRA, DMR, NXDN, and dPMR
- Interference Analyzer
- LTE test options
- AutoTunes: Test and Alignment

FEATURES AND CAPABILITIES

AutoTune™

AUTOMATED RADIO TEST AND ALIGNMENT

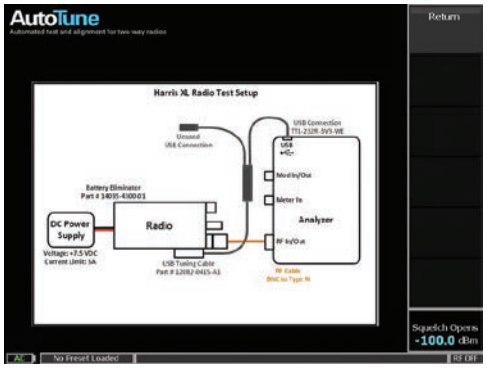
Our AutoTune option performs all recommended factory test and alignment procedures in a fraction of the time needed to perform them manually. Just select your radio model and connect as shown on the unit, choose the tests and alignments you wish to perform, then enter your operator ID and press the "start button."

AutoTune is available for every major LMR radio brand.

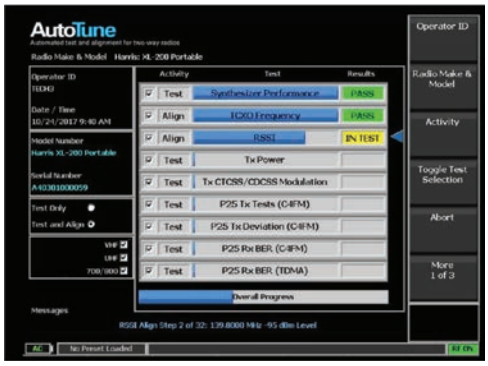
BENEFITS

- Test time reduced by over 80%
- Consistent manufacturer specified alignments among radios
- Accurate and repeatable test results
- Pass/Fail indicators flag radio defects
- Little or no technical expertise required
- Results can be exported for archival and analysis

The test set automatically reads key radio information such as model number and serial number, and makes the measurements and alignments needed to bring the radio within factory specifications. Within minutes you have a complete record of your test session stored on the unit in comma delimited form for quick and easy recall. Over time you will build a complete test history for every radio – ideal for large fleets with formal Preventative Maintenance programs. Test reports can be conveniently viewed on the unit or exported for further analysis using spreadsheets and other data manipulation programs.



Harris XL-200P AutoTune Setup Diagram



Harris XL-200P AutoTune Status Screen

Process Automation Toolkit ("PAT")

THE NEXT FRONTIER IN AUTOMATED RADIO TESTING

Our revolutionary Process Automation Toolkit, or PAT, transforms radio service and brings automated testing within the reach of every technician. With PAT, virtually every function of the R8100/R8000 analyzer can be incorporated into a test script using a simple point-and-click interface. Test modes, functions, and protocols can be automated with a few mouse clicks!

No longer does automated radio testing require a dedicated programmer with in-depth knowledge of a particular programming language. PAT allows you to create and store virtually any test script in a few minutes and execute the test in seconds.

APCO 25

THE INDUSTRY'S MOST COMPREHENSIVE TEST SOLUTION

Whether your system is P25 Phase 1 conventional, Phase 1 trunked, or Phase 2, Astronics Test Systems has the total solution. Our P25 options generate and receive every test pattern called out in the P25 standard. Hear recovered audio with our Phase 1 vocoder option. Choose from multiple available graphical displays: eye diagram, distribution plot, constellation, or power profile. Includes the most complete set of P25 measurements available in the market: Frequency Error, Deviation, Power Level, Modulation Fidelity, Symbol Rate, Symbol Deviation, and more.

Our P25 Trunking option simulates a trunking controller with all the control and voice channel protocols needed for P25 radio service. All standard-compliant test patterns for Bit Error Rate (BER) testing are included, as are all compliant modulations.

TETRA

UNPARALLELED TEST CAPABILITY FOR EVERY TETRA FORMAT

Freedom analyzers boast an unparalleled suite of test capabilities: TMO and DMO subscriber testing, comprehensive T1 testing, and base station monitoring. Whether you are monitoring system performance or doing maintenance and repair of TETRA handsets, we have a test option that meets your needs. Red/Green Pass/Fail bars provide quick visual confirmation that all radio parameters are within specifications. Our TMO test option measures RF Power, Unwanted Output Power, Residual Carrier Power, Frequency Error, EVM (RMS and Peak), Frame Alignment, and much more.

DMR/NXDN

For nearly 10 years, Freedom analyzers from Astronics have featured the most complete set of tests available for the rapidly growing DMR and NXDN technologies.

Our DMR option tests any repeater or handset compliant with the ETSI DMR Tier 2 conventional radio transmission protocol. Available graphical displays include spectrum analyzer, power profile, and constellation. Freedom analyzers are also capable of running BER tests using manufacturer-provided radio programming software.

Our DMR repeater test option enables the technician to test a live repeater without putting the repeater in test mode, eliminating the need to take down the system for maintenance.

Avionics Ramp Test

An industry first - avionics ramp test capability in an LMR service monitor. An all-in-one solution for radio shops with the need to test avionics radios, our ramp test option includes:

- ILS (Instrument Landing System) Localizer/Glide Slope
- VOR (VHF Omni-directional Range)
- Marker Beacons
- Non-Directional Beacons / Automated Direction Finding
- SELCAL (Selective Calling System)
- Morse Code Identification

Positive Train Control (PTC)

Astronics Test Systems is the only test equipment manufacturer offering test solutions for both major PTC protocols: PTC-ACSES used by commuter railroads and PTC-ITCR used by long-haul carriers.

Working with radio manufacturers, we have developed an extensive portfolio of tests to measure the integrity of signals generated and received by PTC radios.

Accessories

INCLUDED WITH EVERY UNIT

- Telescoping Antenna
- Microphone
- Oscilloscope Probe
- Power Cord & AC Adapter
- Internal Lithium Ion Battery (R8100 only)
- Vehicle Power Adapter

Additional Accessories
SOLD SEPARATELY


Transit case with wheels

Soft carrying case


Spare internal battery and charger for R8100


VSWR Bridge Kit

Part Number	Description	R8000C 1GHZ Premier	R8100	R8200	R8600
R8-PAT	Process Automation Toolkit	Optional	Optional	√	√
R8-CF	Cable Fault Locator	√	√	NA	√
R8-TG	Tracking Generator	√	√	√	√
R8-Remote	Remote Control Software	√	Optional	√	√
R8-ESA	Enhanced Spectrum Analyzer / Dual Scope	√	√	√	NA
	Vector Network Analyzer, Single Port	NA	NA	√	NA
R8-SSB	Single Side Band	Optional	Optional	Optional	Optional
R8-GEN_EXT	Extended Generator Output Range	Optional	Optional	√	Optional
R8-3G	3 GHz Operation	Optional	Optional	Optional	Optional
R8-P25	APCO Project 25 Phase 1	Optional	Optional	Optional	Optional
R8-P25TRNK	APCO Project 25 Phase 1 Trunking (Requires R8-P25)	Optional	Optional	Optional	Optional
R8-P25_II	APCO Project 25 Phase 2	Optional	Optional	Optional	Optional
R8-P25_VOC	P25 Vocoder	Optional	Optional	Optional	Optional
R8-P25_EXP	P25 Explicit Mode Trunking	Optional	Optional	Optional	Optional
R8-DMR	DMR conventional (Tier 2)	Optional	Optional	Optional	Optional
R8-DMR_RPTR	DMR Live Repeater (Requres R8-DMR)	Optional	Optional	Optional	Optional
R8-NXDN	NXDN	Optional	Optional	Optional	Optional
R8-NXDNTYPC	NXDN "Type C" Trunking	Optional	Optional	Optional	Optional
R8-TETRA_BSM	TETRA Base Station Monitoring	Optional	Optional	Optional	Optional
R8-TETRA_BST1	TETRA Base Station T1 Test	Optional	Optional	Optional	Optional
R8-TETRA_TMO	TETRA TMO Subscriber Test	Optional	Optional	Optional	Optional
R8-TETRA_DMO	TETRA DMO Subscriber Test	Optional	Optional	Optional	Optional
R8-DPMR	dPMR (Digital Private Mobile Radio)	Optional	Optional	Optional	Optional
R8-PTC_ACSES	Positive Train Control - ACSES	Optional	Optional	Optional	Optional
R8-PTC_ITCR	Positive Train Control - ITCR	Optional	Optional	Optional	Optional
R8-AVIONICS	Avionics Ramp Test Option	Optional	Optional	Optional	Optional
R8-AT_TRBO	AutoTune for MOTOTRBO Mobiles and Portables (Except SL300)	Optional	Optional	Optional	Optional
R8-AT_XTL	AutoTune for XTL Series Mobiles	Optional	Optional	Optional	Optional
R8-AT_XTS	AutoTune for XTS Series Portables	Optional	Optional	Optional	Optional
R8-AT_APX	AutoTune for APX Series Mobiles and Portables	Optional	Optional	Optional	Optional
R8-AT_APX8000	AutoTune for APX 8000/8500	Optional	Optional	Optional	Optional
R8-AT_KWNX	AutoTune for Kenwood NX Series Mobiles and Portables	Optional	Optional	Optional	Optional
R8-AT_XG-75	AutoTune for Harris XG-75/P7300/M7300 Series Mobiles and Portables	Optional	Optional	Optional	Optional
R8-AT_XM100	AutoTune for Harris XM100 Radios	Optional	Optional	Optional	Optional
R8-AT_XL200	AutoTune for Harris XL200 Radios	Optional	Optional	Optional	Optional
R8-AT_KNG	AutoTune for BK KNG Portables	Optional	Optional	Optional	Optional
R8-AT_KNGS	AutoTune for BK KNG-S Series Portables	Optional	Optional	Optional	Optional
R8-AT_HYTERA	AutoTune for Hytera DMR Radios	Optional	Optional	Optional	Optional
R8-AT_TDFM9	AutoTune for Technisonic TDFM 9000 Series Radios	Optional	Optional	Optional	Optional
R8-3Y	Three Year Service Plan	√	Optional	Optional	Optional
R8-5Y	Five Year Service Plan	Optional	Optional	Optional	Optional
BATT8100	Lithium Ion Battery	NA	√	√	NA
CHRG8100	Desktop Quick Charger for R8100 battery	NA	Optional	Optional	NA
R8-SC	Soft Carrying Case	√	Optional	Optional	Optional
R9-TGC	Transit Case with foam molding for Glove Case	Optional	Optional	Optional	Optional
R8-HC	Protective glove case with LCD protection - R8000	Optional	NA	NA	NA
R8-GC	Protective glove case with LCD protection - R8100	NA	Optional	Optional	NA
R8-VSWR	Antenna Return Loss Bridge Kit	Optional	Optional	Optional	Optional
R8-FT7	Drive Test Software Package (STI Field Test 7)	Optional	Optional	Optional	Optional

ORDERING INFORMATION

MODEL	DESCRIPTION MODEL
R8200	Ultra-Portable Communications Analyzer with VNA
R8100	Ultra-Portable Communications Analyzer
R8000C	Communications Analyzer, 1GHz
R8000C-1GHz Premier Package	Communications Analyzer, 1GHz Premier Package
R8000C-3GHz Premier Package	Communications Analyzer, 3GHz Premier Package
R8600	Radio Test Hub

Certifications

These certifications represent our commitment to quality, safety, environmental standards, and efficiency.

Complies With
UL 61010-1
CSA C22.2 No. 61010-1

Astronics Corporation (NASDAQ: ATRO) serves the world's aerospace, defense, and other mission critical industries with proven, innovative technology solutions. We work side-by-side with customers, integrating our array of power, connectivity, lighting, structure, interior, and test technologies to solve complex challenges. For 50 years, we've delivered creative, customer-focused solutions with exceptional responsiveness. Today global airframe manufacturers, airlines, military branches, completion centers, and Fortune 500 companies rely on the collaborative spirit and innovation of Astronics.

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