

# R8000A Communications System Analyzer

*The world's first portable, full-featured communications analyzer*



General Dynamics is pleased to introduce a revolutionary product: The R8000 communications system analyzer. The R8000 utilizes leading-edge software defined radio technology to deliver a previously unimaginable result: a truly portable instrument with more functions than today's bench top analyzers.

Weighing only 14 pounds, the R8000 gives service technicians power and flexibility not previously available. This, combined with the unit's feature-packed spectrum analyzer, makes the R8000 ideal for taking to sites for infrastructure maintenance and interference measurement. The unit's bright 8.4" color LCD is well visible in sunlight and features wide viewing angles, making the R8000 your best choice for on-site work.

There has simply never been a communications analyzer that combines this level of portability and power. See how the R8000 can change the way you perform radio and radio system service forever.

**GENERAL DYNAMICS**  
SATCOM Technologies

# R8000 Series Communications System Analyzers

## The Ultimate Radio Service Tool

### A Compact and Lightweight Solution

You no longer need to lug multiple pieces of heavy equipment to perform service at remote locations. The R8000 has everything you need in one compact, 14 lb. package! Among the instruments included in the R8000 are:

- Spectrum Analyzer
- Signal Generator
- Sensitive Measurement Receiver
- Tracking Generator (optional)
- SINAD Meter
- Distortion Meter
- Modulation Scope
- Oscilloscope
- Frequency Error Meter
- Cable Fault Locator (optional)
- FM Deviation Meter
- AM Modulation Meter
- Receive Signal Strength Meter
- Broadband and Narrowband Power Meters
- Audio Counter
- Audio Generator
- AC / DC Voltmeters
- MOTOTRBO™ signal quality test (optional)

*MOTOTRBO is a registered trademark of Motorola, Inc.*



<b>Weight:</b>	14 lbs.
<b>Frequency Range:</b>	250 kHz to 3GHz (1GHz standard, 3GHz optional)
<b>Size:</b>	9.4" high x 12.7" wide x 7.5" deep
<b>Display:</b>	8.4" LCD, visible in sunlight, with wide viewing angle
<b>Spec. An. Noise Floor:</b>	-120dBm
<b>RF Input:</b>	50W 5 Min, 150W maximum

### Superior Spectrum Analyzer

The R8000 comes equipped with a spectrum analyzer comparable to those found on stand-alone instruments costing as much or more. With a noise floor below -120dBm, super-fast signal acquisition, 4 markers (2 standard), an available variable vertical scale down to 1dB per division, the R8000 is the ideal tool for tracking and measuring elusive interfering signals.

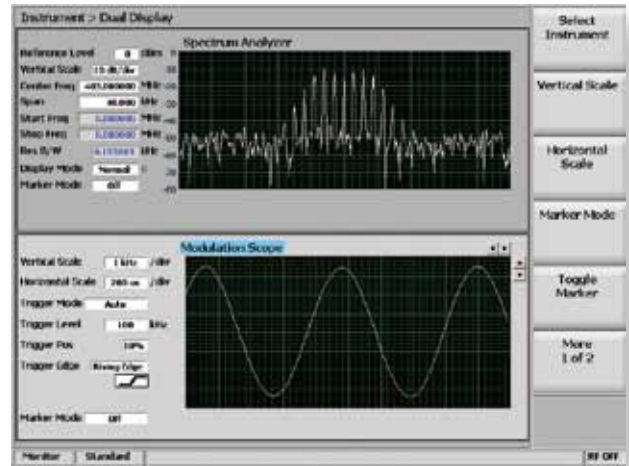
### Upgradable and Expandable

The software-based architecture of the R8000 lets you add software options and upgrades in the field. So if your needs change down the line, simply order the feature or protocol you need, and program it into your unit via one of its 4 standard USB ports.



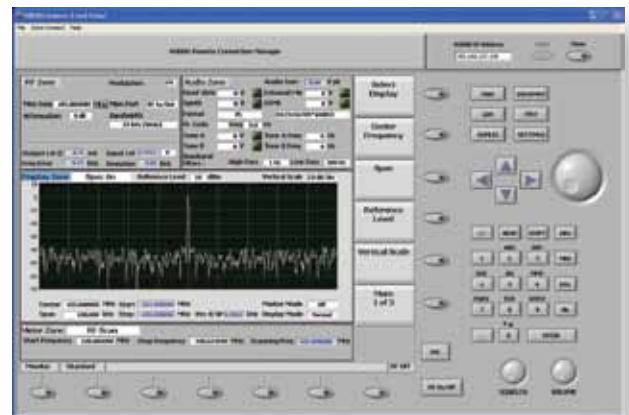
**“DualScope”™ display lets you see carrier signal and demodulated audio simultaneously**

Our DualScope display allows you to view the RF spectrum analyzer and modulation scope simultaneously, giving you the ability to analyze RF characteristics of the carrier signal and recovered audio from the same screen. The complete functionality of both instruments is available in DualScope mode, and all associated measurements are displayed. With DualScope, you no longer need to go back and forth from the spectrum analyzer to the modulation scope to see everything you need – it’s all on one screen! DualScope is included with Enhanced Spectrum Analyzer/Oscilloscope option R8-ESA.



**Operate the R8000 from your PC with optional Remote Control software**

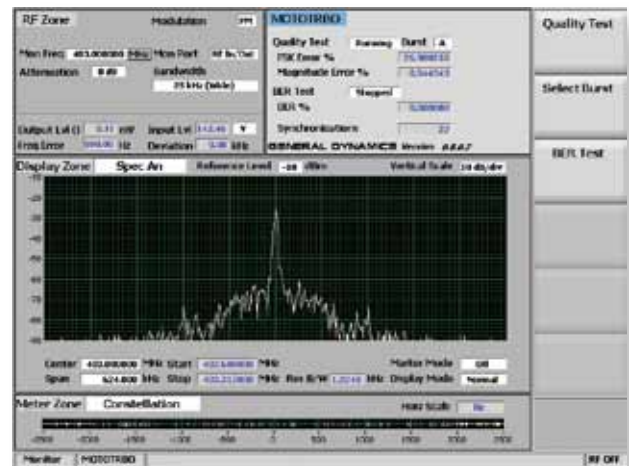
The R8000 virtual keyboard includes every key on the R8000 itself. Just assign an IP address to the unit, and operate every function of the box from a remote PC. Monitor channel activity, measure interference, track site performance, all from any networked PC with our remote control software installed.



**MOTOTRBO test option**

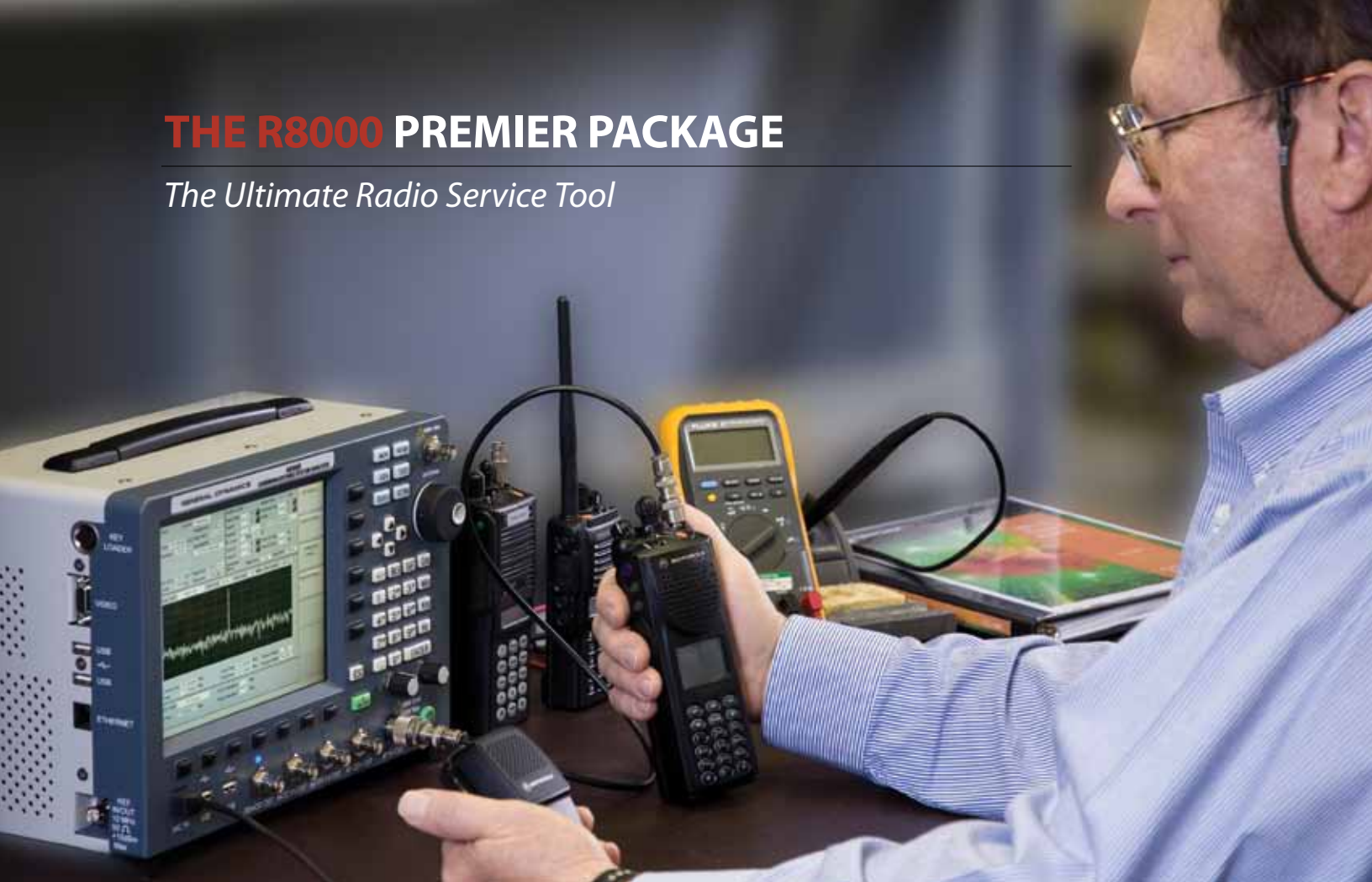
With the R8000, you can now test the digital signal quality of your MOTOTRBO radios. Simply put the analyzer in TRBO mode to test Bit Error Rate (BER), FSK and magnitude error, and receive audio quality.

The R8000’s constellation display provides a quick graphic look at the FSK signals. Actual signal points are plotted against ideal IQ points. If the signal points line up with the ideal IQ points, the signal is good. If not, further investigation is required.



# THE R8000 PREMIER PACKAGE

*The Ultimate Radio Service Tool*



**The R8000 PREMIER PACKAGE is the best value available in communications test equipment.**

It includes all the capabilities of a standard R8000A, PLUS:

- 3GHz operation of all RF features
- Remote control software for operating the unit from a networked PC
- Tracking Generator for accurate tuning of cavities, duplexers, and filters
- Enhanced Spectrum Analyzer and Scope Package, including DualScope and 1dB vertical scale per division
- Cable Fault Locator
- Soft Carrying Case

Whether you choose the *PREMIER PACKAGE*, or the standard R8000, you will own the new standard in communications test equipment. Nothing in the industry offers anything close to the combination of features, portability, expandability, and cost effectiveness of the R8000 by General Dynamics. And because it's a General Dynamics product, you know you can count on world-class reliability and after-sale support.

The software-based architecture of the R8000 will allow rapid introduction of new protocols and feature enhancements, and the product has been designed in such a way that these new features can be easily added to existing units. So you can be assured that your communications analyzer will always be upgradable should your needs so require.



Contact your local representative for a demonstration today!  
To find your General Dynamics test equipment representative, go to <http://www.gdsatcom.com/ctereps.html>

# Specifications

## OPERATING/DISPLAY MODES

AM/FM Monitor	Frequency Counter
AM/FM Generator	Frequency Error Meter
Audio Synthesizer	Digital Voltmeter
Spectrum Analyzer	Power Meter
Duplex Generator	Oscilloscope
Tracking Generator (Opt.)	Signal Strength Meter
DualScope (Opt.)	SINAD/Distortion Meter
AM Modulation Meter	FM Deviation Meter
Cable Fault Locator (Opt.)	

## GENERAL

<b>Displayed Average Noise Level (DANL):</b>	-120 dBm (50 Ohm input termination)
<b>Dynamic Range:</b>	80 dB
<b>Input Related Spurious Residual Spurious (non-input related):</b>	-60 dBc max -70 dBm

<b>POWER</b>	
<b>DC Power Requirements:</b>	24VDC @ 5.0 A max (AC adapter included)
<b>Battery Power:</b>	Optional External Battery
<b>Battery Operation:</b>	1 hour minimum

<b>MECHANICAL / ENVIRONMENTAL</b>	
<b>Weight:</b>	<14 lbs (6.4 kg)
<b>Diminensions:</b>	9.4"(23.9 cm) high 12.7"(32.3 cm) wide 7.5"(19.1 cm) deep
<b>Operating Temperature:</b>	0° to 50° C
<b>Storage Temperature:</b>	-30° to +80° C

<b>WARRANTY</b>	
<b>Standard Warranty:</b>	One year
<b>Three Year Service Plan:</b>	Optional
<b>Five Year Service Plan:</b>	Optional

## GENERATOR (Receiver Test)

<b>Port Protection Limit:</b>	50W for 30 seconds
<b>Frequency Range:</b>	250 kHz to 1 GHz
<b>Extended Frequency Range (Optional):</b>	250 kHz to 3 GHz
<b>Frequency Resolution:</b>	1 Hz

<b>OUTPUT LEVEL GENERATE PORT</b>	
<b>Range:</b>	+5 dBm to -95 dBm
<b>Resolution:</b>	0.1 dB
<b>Accuracy:</b>	±2 dB

<b>OUTPUT LEVEL RF I/O PORT</b>	
<b>Range:</b>	-30 dBm to -130 dBm
<b>Resolution:</b>	0.1 dB
<b>Accuracy:</b>	±1 dB to 1GHz; ±2dB > 1 GHz

<b>SPECTRAL PURITY</b>	
<b>Harmonic Spurious:</b>	-20 dBc max
<b>Non-Harmonic Spurious:</b>	-35 dBc max
<b>Residual FM:</b>	27 Hz max, 300 Hz to 3 kHz
<b>Residual AM:</b>	1.0% max, 300 Hz to 3 kHz
<b>SSB Phase Noise (20kHz Offset):</b>	-75 dBc/Hz

<b>FM MODULATION</b>	
<b>Deviation Accuracy:</b>	5% of setting
<b>Deviation Range:</b>	0 to 75 kHz
<b>Deviation Resolution:</b>	10 Hz
<b>Modulation Bandwidth:</b>	5 Hz to 20 kHz

<b>AM MODULATION:</b>	
<b>AM Depth Range:</b>	0 to 90%
<b>Resolution:</b>	1% of setting
<b>Modulation Bandwidth:</b>	100 Hz to 10 kHz
<b>Accuracy:</b>	5% of setting

<b>MODULATION TYPES</b>	1 kHz Tone Private Line Digital Private Line Single Tone DTMF External Inputs from microphone and BNC
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## RECEIVER (Transmitter Test)

<b>Frequency Range:</b>	250 kHz – 1GHz (3 GHz optional)
<b>SENSITIVITY</b>	
<b>Narrowband FM:</b>	2.0 uV for 10 dB EIA SINAD
<b>Wideband FM:</b>	10 uV for 10 dB EIA SINAD
<b>AM:</b>	10 uV for 10 dB EIA SINAD
<b>RF I/O PORT</b>	
<b>VSWR:</b>	< 1.20:1
<b>Max Power:</b>	50 W for 5 minutes 150 W for 30 seconds (30 sec. on, 5 min. off)
<b>Absolute Max Power:</b>	150 W
<b>Alarm:</b>	Internal temperature alarm
<b>ANTENNA PORT</b>	
<b>Maximum Power:</b>	0 dBm
<b>Alarm:</b>	+10 dBm
<b>IF FILTERS:</b>	6.25 kHz, 12.5 kHz, 25 kHz, 50 kHz, 100 kHz, 200 kHz
<b>FREQUENCY ERROR MEASUREMENT</b>	
<b>Type of Display:</b>	Autoranging
<b>Resolution:</b>	1 Hz
<b>FM DEVIATION MEASUREMENT</b>	
<b>Demodulation Range:</b>	Up to ±5 kHz in Narrowband Up to ±75 kHz in Wideband
<b>Accuracy:</b>	±5% plus peak residual FM
<b>Frequency Response:</b>	Selectable per the following: Low Pass Filters: 300 Hz, 3 kHz, 20 kHz High Pass Filters: 5 Hz, 300 Hz, 3 kHz
<b>Demodulated Output Level:</b>	0.8 V peak per 1 kHz peak deviation in Narrowband and per 10 kHz deviation in Wideband
<b>Demodulation Output Impedance:</b>	100 ohms nominal
<b>Deviation Alarm:</b>	Audible, set via keypad in 100 Hz increments
<b>AM MODULATION MEASUREMENTS</b>	
<b>Demodulation Range:</b>	0 to 100%
<b>Accuracy:</b>	±5% for levels below 80%
<b>Frequency Response:</b>	Selectable per the following: Low Pass Filters: 300 Hz, 3kHz, 20kHz High Pass Filters: 5 Hz, 300 Hz, 3 kHz
<b>Demodulated Output Level:</b>	0.8 V peak per 10% AM Modulation
<b>Output Impedance:</b>	100 ohms nominal
<b>RECEIVE SIGNAL STRENGTH LEVEL METER</b>	
<b>Frequency Range:</b>	250 kHz – 1GHz (3 GHz optional)
<b>Accuracy:</b>	±2 dB
<b>Sensitivity:</b>	-120 dBm
<b>BROADBAND POWER METER (T/R PORT)</b>	
<b>Frequency Range:</b>	250 kHz – 1GHz (3 GHz optional)
<b>Measurement Range:</b>	0.1 W to 150 W
<b>Input Impedance:</b>	50 Ohms w/ max. VSWR of 1.5:1
<b>Accuracy:</b>	±10%
<b>Protection:</b>	Over temp alarms
<b>FREQUENCY COUNTER</b>	
<b>Frequency Range:</b>	5 Hz to 100 kHz
<b>Period Counter Range:</b>	5 Hz to 20 kHz
<b>Input Level:</b>	0.1 V rms min
<b>SINAD METER</b>	
<b>Accuracy:</b>	±1 dB @ 12 dB SINAD
<b>Input Level:</b>	0.1 V rms min

## RECEIVER (Transmitter Test) (Cont.)

**DISTORTION METER**  
**Range:** 1% to 20%  
**Distortion Accuracy:** The greater of:  
 $\pm 0.5\%$  of distortion or  
 $\pm 10\%$  of reading  
**Input Level:** 0.1 V rms min

**OPTIONAL DIGITAL  
DEMODULATION  
METERS** MOTOTRBO™

## SPECTRUM ANALYZER

**SWEEP**  
**Frequency Range:** 250 kHz – 1GHz (3 GHz optional)  
**Frequency Resolution:** 1 Hz  
**Span Accuracy:** 5%  
**Update Rate:** ~10 times per second  
(depending on span)

**AMPLITUDE**  
**Level Accuracy:**  $\pm 2$  dB  
**Scales (dB/div):** 10 (1, 2, & 5 w/ ESA option)  
**Log Linearity Accuracy:**  $< 0.1$  dB  
**Reference Level**  
**Resolution:** 1 dB  
**Reference Level Range:** +60 to -70 dB  
**Antenna Port**  
**Dynamic Range:** 80 dB  
**T/R Port Dynamic Range:** 80 dB  
**Typical Noise Floor**  
**Performance:** -120 dBm  
**Residual Phase Noise:** -75 dBc/Hz @ 20 kHz offset

**RESOLUTION  
BANDWIDTH** Auto Selected

**Harmonic Spurious  
(Antenna Port,  
No Attenuation):** -20 dBc max  
**Non-Harmonic Spurious  
(Antenna Port,  
No Attenuation):** -60 dBc max  
**Residual Spurious  
(Input Terminated):** -70 dBm  
**Markers:** Delta, Absolute Level, and Frequency  
**Modes:** Standard, Average, Freeze,  
Max Hold, and Peak Hold

## OSCILLOSCOPE

**VERTICAL INPUT**  
**Input Impedance:** 1 Meg Ohm / 600 Ohm (Selectable)  
**Range:**  $\pm 100$  VDC,  $\pm 70$  Vrms AC  
**Accuracy:** 5% of full scale  
**Bandwidth:** 0 to 50 kHz

**HORIZONTAL SWEEP**  
**Range:** 20 uSec to 1 Sec / div. (Selectable)

**TRIGGER SELECTION** Normal, Auto (Free Running), Single Sweep

**SPECIAL FUNCTIONS**  
**Markers:** Delta Voltage, Delta Frequency,  
Delta Period

## AUDIO MODULATION SYNTHESIZER

**Modulation Types:** 1 kHz tone, Private Line, Digital Private Line (w/ DPL Invert), Single Tone, DTMF, Two-Tone Paging, 5/6 Tone Paging, External inputs from both a supplied microphone and BNC input.

**Modulation Output**  
**Amplitude Flatness:** 5 Hz to 20 kHz  $\pm 1$  dB  
**Modulation Output Level:** Programmable to  $\pm 8$  V peak  
**1 kHz Tone Distortion:** Not to exceed 1% THD  
**External Mod In**  
**Input Impedance:** 600 Ohms

# Specifications (Cont.)

## TRACKING GENERATOR

**Frequency Range:** 250 kHz – 1GHz (3 GHz optional)

## DIGITAL VOLTMETER (DVM)

**Input Impedance:** 1 M Ohm  
**Voltage Range:** 1 V, 10 V, 70 V full scale  
**Frequency Range:** 50 Hz to 20 kHz  
**DC Accuracy:** 1% full scale  $\pm 1$  LSB  
**AC Accuracy:** 5% full scale  $\pm 1$  LSB

## TIMEBASE

**Output Frequency:** 10 MHz  
**Stability:** Aging:  $\pm 0.1$  ppm / year  
Temp.:  $\pm 0.01$  ppm  
**Output Level:** Minimum 0 dBm into 50 Ohms  
**Warm Up:** 3 minutes: within  $\pm 0.1$  ppm

## DISPLAY

**FRONT PANEL DISPLAY**  
**Resolution:** 800 x 600  
**Size:** 8.4" (21.3 cm) Full Color LCD

**EXTERNAL DISPLAY** VGA

## REMOTE INTERFACE (Optional Feature)

**Remote Front Panel** Available over Ethernet



# Ordering Information



Item #	Description
R8000A	Communications System Analyzer, 1GHz
R8000A-Premier	Premier Package, w/ highlighted options (*)

### Accessories included with every unit:

• Antenna	• Microphone	• Power Cord
• Oscilloscope Probe	• Users Manual CD	

Options	Description
*R8-3G	3GHz Operation
*R8-Remote	Remote Control Software
*R8-TG	Tracking Generator
*R8-ESA	Enhanced Spec. An./ Oscilloscope
*R8-CF	Cable Fault Locator
*R8-SC	Soft Carrying Case
R8-TC	Transit Case
R8-TRBO	MOTOTRBO™ test package
R8-3Y	Three Year Service Plan
R8-5Y	Five Year Service Plan



- 1) Bright 8.4" Color LCD with wide viewing angles
- 2) User-Friendly, softkey driven operation
- 3) Tuning Knob for quick and easy changes of numeric entries: Digital precision with an analog feel
- 4) Off-the-air antenna port for sensitive receiver measurements
- 5) VGA, Ethernet, Key Loader, and additional USB ports
- 6) One-touch mode keys take you directly to the instrument you need
- 7) Escape Key returns user to previous screen for easy navigation

## **Service, maintenance and technical support**

For support on General Dynamics test equipment contact:

**United States:**

General Dynamics SATCOM Technologies, Inc.  
3750 W. Loop 281  
Longview, TX 75604  
Phone: (480) 441-0664

**Canada:**

Navair, Inc.  
6375 Dixie Road  
Mississauga, Ontario  
Canada, L5T2E7  
Phone: (800) 668-7440

**Japan and Korea:**

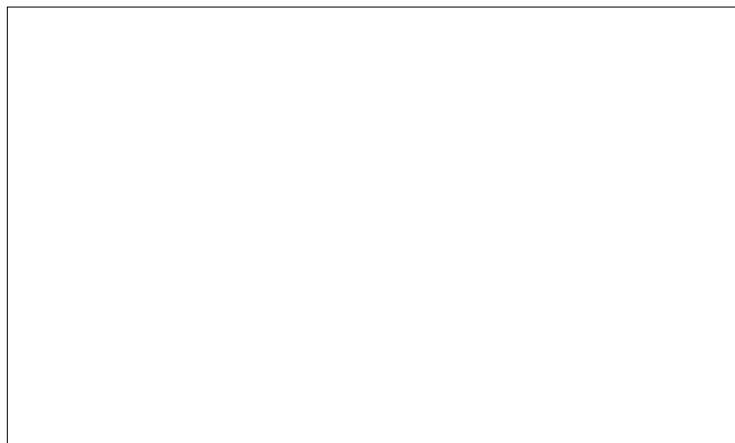
Nextec Japan Ltd.- Nextec High Tech Center  
10-8 Mitsuzawanakamachi, Kanagawa Ward  
Yokohama City, Japan 221-0851  
Phone: +81-45-410-2287

**Australia and New Zealand:**

Australian Support Center  
Motorola Australia Pty. Ltd.  
10 Wesley Court  
Tally Ho Business Park  
East Burwood, VIC 3151  
Australia  
Phone: +61-3-9847-7725

**Asia and the Pacific Rim (excluding Japan),  
Europe, Latin America,  
Middle East, and Africa:**

General Dynamics SATCOM Technologies, Inc.  
3750 W. Loop 281  
Longview, TX 75604  
Phone: (480) 441-0664



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