R2590 Communications System Analyzer

High-end Analyzer at a Low-end Price



GENERAL DYNAMICS Decision Systems

R2590 Communications System Analyzer



Big solutions on a small budget.

The R2590 system analyzer sets a new standard for value in two-way communications testing. The unit's light weight (28 lbs.), small footprint (7" x 13.5" x 12") and optional battery with two hours of run time combine to make it as valuable in the field as on the bench.

Here are just a few of the features that are standard on every R2590:

- **1GHz RF Signal Generator** with AM/FM/PM modulation, 1Hz resolution, and output range from -10dBm to -125dBm
- **Duplex Generator** with a fully adjustable (0 Hz to 1GHz) frequency offset
- 1GHz RF Receiver with 2µV sensitivity and 1Hz resolution, frequency error meter with actual frequency display, and AM/FM demodulation meters
- Broadband and Selective Power Meters
- **1GHz Spectrum Analyzer** with powerful analytical tools usually found only in expensive stand-alone instruments
- **50kHz Oscilloscope** with voltage and frequency measurements

- *Audio Modulation Synthesizer,* including: Dual tone generator, sub-audible tone generator, DTMF generator, and external modulation input
- Signal Strength Indicator
- SINAD Meter with AUTO Mode
- CTCSS, DCS, and DTMF Decoder
- 6.4" color LCD Display with external VGA output
- **RS232 Port** for computer control and "flash" software updates

Additional optional features include:

- CLEARCHANNEL[™] LTR
- Paging encoder: 2 tone, 5/6 tone, programmable sequence, POCSAG
- Tracking Generator
- Cable Fault/Antenna Analyzer with Return Loss Bridge
- Internal battery with up to 2 hours of run time

Powerful, portable, and priced to fit within your budget, the R2590 is the new standard for two-way communications service monitors.

Standard System Features

Feature	Description	Benefits
	The R2590 comes complete with a powerful, yet very easy to use spectrum analyzer. Independent Start, Stop, and Span settings permit ready adjustment of the displayed spectrum from a 5 KHz window to a full 1 GHz span width. A fully adjustable reference level, and a set of four individual markers allows for precise measurements of levels and frequencies. <i>Stop, Average, Peak Hold</i> functions and one-button measurements such as Occupied Bandwidth make for a powerful analyzer that	The R2590 comes packed with features typically found on stand-alone spectrum analyzers, and much more.
(Contract Opt 7	Our unique 'Scanning Spectrum Audio' function replaces the typical 'look and listen' capability by tuning the receiver (and the recovered audio) to an adjustable marker frequency, rather than the center frequency of the spectrum display.	This feature is handy when attempting to identify a variety of signals without the need to continually change the center frequency of the spectrum display.
Tracking Generator (option)	View the performance characteristics of many RF devices with this convenient tracking generator. A sweep range from 5 KHz to 1 GHz, with a resolution of 1 Hz, permits accurate device alignment.	Allows the operator to quickly and easily diagnose critical problems with receiver front ends, IFs, helical filters, cavities, combiners and duplexers.
AMJ/FM Receiver	With a typical sensitivity of less than 2 microvolts at the antenna port, the R2590 can be used for the off-the-air monitoring of remote transmitters. Variable squelch aids in picking up weak signals, but can be set tighter to ensure the proper S/N ratio for measurement accuracy.	This feature reduces service costs by enabling frequent preventative maintenance checks for system degradation or interference identifica- tion without ever leaving the shop.
AMJFMJPM Generator Several State St	The R2590 includes a 250 KHz to 1 GHz AM/FM/PM signal generator that has an adjustable output level from –125 dBm to –10 dBm. The generator output port is fuse-protected, assuring against damage by the inadvertent application of power, therefore saving a trip to the repair shop. Selectable metering includes a 'One Button' SINAD measurement with adjustable target setting. The R2590 will automatically determine the RF level needed to produce a specified SINAD reading.	This flexible signal generator reduces receiver test time by displaying all the necessary control information simultaneously. The wide range of output levels cover all manner of troubleshooting situations. The R2590 simplifies routine measurements with 'One Button' convenience.
Full Band Duplex Offset Generator Dure Dure <t< td=""><td>Full output level control from –125 dBm to –10 dBm over the entire frequency range of the instrument is available from the duplex offset generator. Duplex frequency offsets are also fully variable, from 0 Hz to 1 GHz in 1 Hz steps.</td><td>The duplex generator provides enhanced capability to service equipment such as repeaters and full duplex radios. The 1 Hz frequency offset resolution extends functionality to cross-band repeaters and component level receiver and transmitter troubleshooting.</td></t<>	Full output level control from –125 dBm to –10 dBm over the entire frequency range of the instrument is available from the duplex offset generator. Duplex frequency offsets are also fully variable, from 0 Hz to 1 GHz in 1 Hz steps.	The duplex generator provides enhanced capability to service equipment such as repeaters and full duplex radios. The 1 Hz frequency offset resolution extends functionality to cross-band repeaters and component level receiver and transmitter troubleshooting.

Standard System Features – continued

Feature	Description	Benefits
Broadband and Selective Power Meters	The built-in power meter automatically switches from a selective meter at low power levels, to a true RMS broadband meter at higher power levels. Accurate power meter measurements can be made up to 150 Watts.	Accurately make true RMS power meter measurements without a stand-alone power meter, or bulky external attenuators. The R2590 can safely dissipate up to 200 watts of RF power, 150 watts continuously (@20°C).
Electronic Software Updates	A high speed serial port and flashable memory permit programming firmware updates from an external PC. The standard bi-directional RS232 port is also available for remote control of the R2590 by an external controller.	Quick and easy access to future software updates.
Cable Fault/Antenna Analyzer (Option)	The return loss bridge included with the Antenna Analyzer option is specially designed to interface to the R2590. It plugs directly into the 'antenna in' and 'generate out' ports – no external cables peeded	Quickly and easily verify the tuned frequencies of an antenna. Visually determine the operating characteristics of an antenna.
Hind and American Ame	In conjunction with the tracking generator feature, it allows you to view the frequency characteristics of an attached antenna, while providing a one-button measurement for both SWR and return loss.	
0.00-n. 0.00-n. Inter 423.45 m. Operation Centigure Centigure Centigure Centigure	The Cable Fault feature assists the technician with isolating cable defects and anomalies. A high precision, FFT based Frequency Domain Reflectometer (FDR) allows fault analysis out to 800 feet, with a resolution down to 4 inches.	This feature allows validation of cable performance by detecting high insertion loss and faulty connectors and couplers, while also verifying cable lengths. In addition, quick setup, and fully automatic operation, maximize your on-site productivity.
High Stability Oscillator (Option)	The standard oscillator in the R2590 is an OCXO rated at a temperature stability of .2 ppm. With a warm-up time of less than 3 minutes, you can quickly be assured of accurate test results.	Be assured of accurate frequency measurements within minutes of turn-on. Current consumption of the high stability oscillator is comparable to the standard oscillator causion minimal offect on
	The optional high stability oscillator is also an OCXO, yet increases the temperature stability to .02 ppm. Accuracy is guaranteed within 5 minutes of turn-on.	battery life.
Audio Modulation Synthesizer	The standard audio modulation synthesizer includes dual tone, DTMF, and PL/DPL (CTCSS/DCS) generators. The dual tone generators are fully adjustable up to 25 KHz in .1 Hz steps.	This feature ensures overall system performance by providing readily available built-in modulation sources.
	The optional paging encoder adds support for 5/6 tone, 2-tone, a user defined programmable sequence, plus digital paging formats.	
Internal Battery/External DC Operation	The R2590 can be powered from a variety of AC and DC sources. When on the bench, the AC mains will automatically accept from 100 VAC to 240VAC (50 to 60 Hz). At remote locations, the R2590 can be powered from external DC sources. For the ultimate in versatility, the internal battery option will power the unit for up to 2 hours. The built-in charger keeps the battery fully charged when plugged in to an AC source.	The R2590 was designed to go where you go. Typical power consumption when used with a DC power source is only 35 watts, assuring extended operation when used in remote field locations.

Standard System Features – continued

Benefits

Feature

CLEARCHANNEL LTR (Option)

1			1000000000		Mode
Frequ 857	Receive Incy 162500		Frequency B12.362500	MH2	(Mobile)
Power 18.7	1	uV dBm	Power 0.04 -136.0	uv	Repeater
Devia	llon	Hz	Deviation 1.000	KHZ	Capture Mobile Settings
Area Geto Home			Waiting For Capture Key (F3 or F9) Mey up the unit under test and press F8 if capturing data from a repeator of greas F9 if capturing		ок
Group Free Check	*um 0	December			
05	Since Case	605	data from a	mobile.	Tz Data
Receiver 1	EM Narr 20KH2 LP	tr Attess Descrit 2	OdB mr ta SKH2 LP Devi	20KHZ LP	
	Auto	Audio	DTMF	Generate	Config

Description

The CLEARCHANNEL LTR trunking option adds the capability to simulate an LTR repeater system. Complete versatility is provided by selectable messaging parameters including; Area, Goto/In Use, Home, Group, and Free.

An "Auto Setup" function simplifies data entry by automatically capturing the repeater and mobil data settings. Selectable messaging types, such as Continuous, Idle, Busy, Oneshot, and Handshake, permit comprehensive troubleshooting of LTR repeater systems.

One button configuration of the R2590 minimizes setup errors, and allows more time for troubleshooting the LTR radio system.



Technical Specifications

RF SIGNAL GEN	IERATOR	PAGING ENCODER 5/6 Tone:	(OPTIONAL) FIA. CCIB. ZVEI1. ZVEI2. DZVEI. PZVEI.
FREQUENCY Range:	250 KHz – 1.0 GHz	Two-tone:	EEA, NATEL, MODAT Motorola, GE, Reach, and NEC
Resolution: Accuracy:	1 Hz Refer to Master Oscillator	Custom: Digital:	9 tone programmable sequence POCSAG
INPUT PROTECTION	0.25 \//		
RF I/O Port:	200 W	RF RECEIVER	
OUTPUT Generate Port:	-80 dBm to -10 dBm	FREQUENCY Range:	250 KHz – 1.0 GHz
RF I/O Port: Accuracy:	-125 dBm to -60 dBm ±4 dB	Resolution: Accuracy:	1 Hz Refer to Accuracy of Master Oscillator
DUPLEX GENERATOR Bange	250 KHz — 1 0 GHz	ANTENNA INPUT	
Frequency Resolution:	1 Hz	Antenna Port:	10 W (with audible alarm)
Frequency Offset:	0 to 1 GHz in 1 Hz steps	SENSITIVITY (FM):	<2.0 µV typical
	Same as Signal Generator	FREQUENCY ERBOR METER	
SPECIRAL PORITY Spurious: Harmonics:	-30 dBc	Type of Displays: Resolution:	Auto ranging plus actual frequency 1 Hz
FM MODULATION	20 000	Range:	0 Hz to 10 KHz
Deviation Range:	0 to 250 KHz	FM DEVIATION MEASUREMENT	
Residual FM:	20 Hz max @ 300 Hz - 3 KHz from fc	Demodulation Range:	Up to ±80 KHz
Internal Frequency Range:	See Modulation Synthesizer	Accuracy: Frequency Response:	±10% Selectable 300 Hz LP, 300 Hz HP, 4KHz LP, 4KHz HP, 20 KHz LP, 0.3 – 4.0 KHz BP
Frequency Range:	0 Hz to 5.0 KHz	De-emphasize:	1 KHz Notch Selectable 680 uS, 470 uS, 68 uS
Modulation Sensitivity:	User Adjustable	AM DEMODULATION	
AM MODULATION		MEASUREMENTS	0 to 90%
Range: Accuracy:	0-90% Same as Master Oscillator	Accuracy:	±10%
Residual AM: Internal	1.0% max @ 300 to 3 KHz from fc	Frequency Response:	Selectable 300 Hz LP, 300 Hz HP, 4KHz LP, 4KHz HP, 20 KHz LP, 0.3 – 4.0 KHz BP
Frequency Range: External	See Modulation Synthesizer		
Frequency Range:	0 Hz to 5.0 KHz	METERING AND	
Modulation Sensitivity:	User Adjustable		
PHASE MODULATION		Range:	250 KHz – 1.0 GHz
Kange: Accuracy:	Same as Master Oscillator	Frequency Resolution: Frequency Span:	1 Hz 5 KHz to 1.0 GHz (0 KHz)
Resolution:	.01 radians	Resolution	
Frequency Range:	See Modulation Synthesizer	Sweep Time:	50 mS to 30 S
External Frequency Range:	0 Hz to 5.0 KHz	Dynamic Range: Reference Level:	80dB -50 dBm to +60 dBm (0.1 dBm steps)
Éxternal Modulation Sensitivity	Llear Adjustabla	Video Bandwidth Filters:	1 KHz to 3 MHz (1-3-10 sequence)
		Vertical Resolution:	.25 dB
		Log Linearity: Additional Functions:	±2 dB (-90 dB to -20 dB) Video Average (2 to 255 traces), Freeze
	ATION SYNTHESIZER		Peak Hold, Track Peak, Occupied
DUAL MODULATION Source			(N=0 to -70.0 dBm), Full Band
Frequency Range:	200 Hz to 25 KHz	Markers (4):	Peak Search
Tone Distortion:	0.1 Hz <1% THD (sine waveform)	Marker Audio:	Continuous, Toggle
Wave shapes:	Sine	SIGNAL STRENGTH	
SUB-AUDIBLE TONE GENERATOR:		(Antenna Port)	
Frequency Range:	30 Hz to 300 Hz	Range: Sensitivity:	250 KHz – 1.0 GHz -85 dBm
Tone Distortion:	u. ۱ nz <1% THD @ 100 Hz	Accuracy:	±4 dB
Formats:	PRIVATE LINE (CTCSS), and DIGITAL	POWER METER	
DTMF GENERATOR		(KF I/U Port) Measurement Range:	0.25W to 150W (Broadband Meter),
Digits:	0-9, *, #, A, B, C, D.	Innut Imnedance	5 MHz to 1 GHz.
Duration: Pause:	u to 5 S in 1 mS steps 0 to 5 S in 1 mS steps	Accuracy:	±1.5 dB (input level <+35 dBm), ±15%
Twist:	-20.0 to +20.0 dB in 0.1 dB steps		(input level >3W to 50W), ±10% (input level >50W). 125 MHz to 1 GHz.

150W (@ 20°C) 250W for limited periods. High temperature overload warning.

Maximum Continuous Rating: Intermittent Rating:

TRACKING GENERATOR (O	PTIONAL)	POWER AND EN	IVIRONMENTAL
Range: Sweep Range: Display Range:	250 KHz – 1.0 GHz Tracking or Fixed Generator output 5 KHz to 1.0 GHz +60 to -130 dBm	Display: Line Voltage: AC Input Fuse: DC Input	6.4" Diagonal TFT color LCD 100 - 240 VAC (50 to 60 Hz) 1 amp Slow-blow fuse
OSCILLOSCOPE Frequency Response: Vertical Input Range: Coupling: Maximum Input: Sweep Ranges: Trigger: Additional Functions:	0 to 50 KHz (-3 dB point) 5 mV to 50 V per division AC, DC 100 Vpk 20 µS to 10 mS per division Automatic, normal AC Voltmeter (RMS and pk to pk), DC Voltmeter, Frequency and	DC Input DC Current Draw: DC Input Polarity: Battery Option: Dimensions: Weight: Temperature:	3 amps max. Tip positive, sleeve ground 7 AH, 12 V, up to 2 hours run time 7.0" high x 13.5" wide x 12" deep, (17.7 cm x 34.2 cm x 30.5 cm) 28 pounds (Base model excluding options and accessories) 0 to +50°C (operating), -40 to +85°C (storage)
Markers: SINAD METER Input Level: Range: Resolution: Accuracy:	Delta Voltage, Frequency, and Time .5 V to 10 V pk-pk 1 to 20 dB 0.1 dB ±1 dB at 12 dB SINAD	REAR PORTS RS232: VGA: AC Input:	Bi-directional port for instrument control and software updates. Baud rates to 115,200 bps, DB-9 Drives a standard VGA Display Monitor, DB15 1 AMP slo-blow fused
TONE DECODE Modulation Types:	PRIVATE LINE (CTCSS), and DIGITAL PRIVATE LINE (DCS and DCS Inv with error display), DTMF	DC Input: Tone Out: Demod Out: 10 MHz Reference:	External DC power source, 2.5 mm Tone generator output, BNC Receiver demodulation, BNC Selectable internal/external reference oscillator signal, BNC
Standard: Optional:	Aging 1 ppm/yr, Temperature 0.5 ppm Aging .5 ppm/yr, Temperature .05 ppm	FRONT PORTS Antenna: Generate: Scope / Ext Mod In: RF I/O: MIC: HEADPHONE:	Low level RF inputs (<0 dBm), BNC High Level RF Output, BNC (fused) External modulation and Oscilloscope input, BNC Bi-directional RF, type "N" External modulation input, RJ-45 1/8" headphone jack for private

R2590 Model Nomenclature

<u>Part No.</u>	Description
R2590A	Communications System Analyzer Includes US power cord and operators manual.
R2590AP	R2590 Plus package Includes the R2590A and the following options as standard equipment: RLN5303A, RLN5304A, RLN5308A, and the RLN5378A.
Options and accessories	
RLN5303A	High Stability Oscillator Replaces standard internal frequency reference
RLN5304A	Tracking Generator Tracked and fixed generator output with selectable sweep from 5KHz to 1 GHz.
RLN5305A	Paging Protocols Includes 5/6 tone (EIA, CCIR, ZVEI1, ZVEI2, DZVEI, PZVEI, EEA, NATEL, MODAT), 2-tone (Motorola, Reach, GE, NEC), custom 9 tone programmable sequence, and POCSAG.
RLN5306A	CLEARCHANNEL LTR™
RLN5308A	Cable Fault/Antenna Analyzer Includes return loss bridge. Requires option RLN5304A.
RLN5333A	Internal Battery 12V, 7 AH. Provides typical run-time of 2 hours
RLN5378A	Accessory Kit Includes antenna, microphone, BNC to N adapter, serial programming cable, oscilloscope probe, and DC power connection kit.
1580384M96	Canvas case with accessory pocket

R2590 Communications System Analyzer

Service, maintenance and technical support

For support on General Dynamics test equipment contact:

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Service is also available in other areas around the world. Please contact your local General Dynamics sales or service representative for the facility nearest you.

"Test Drive" the R2590 today!

Download the R2590 simulator program by visiting our Website: www.gdc4s.com/cte



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