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Test & Measurement

- sales
- rentals
- calibration
- repair
- disposal

Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

If you click on the "Click-to-Call" logo below, you can all us for FREE!

TMG Corporate Website **TMG Products Website**

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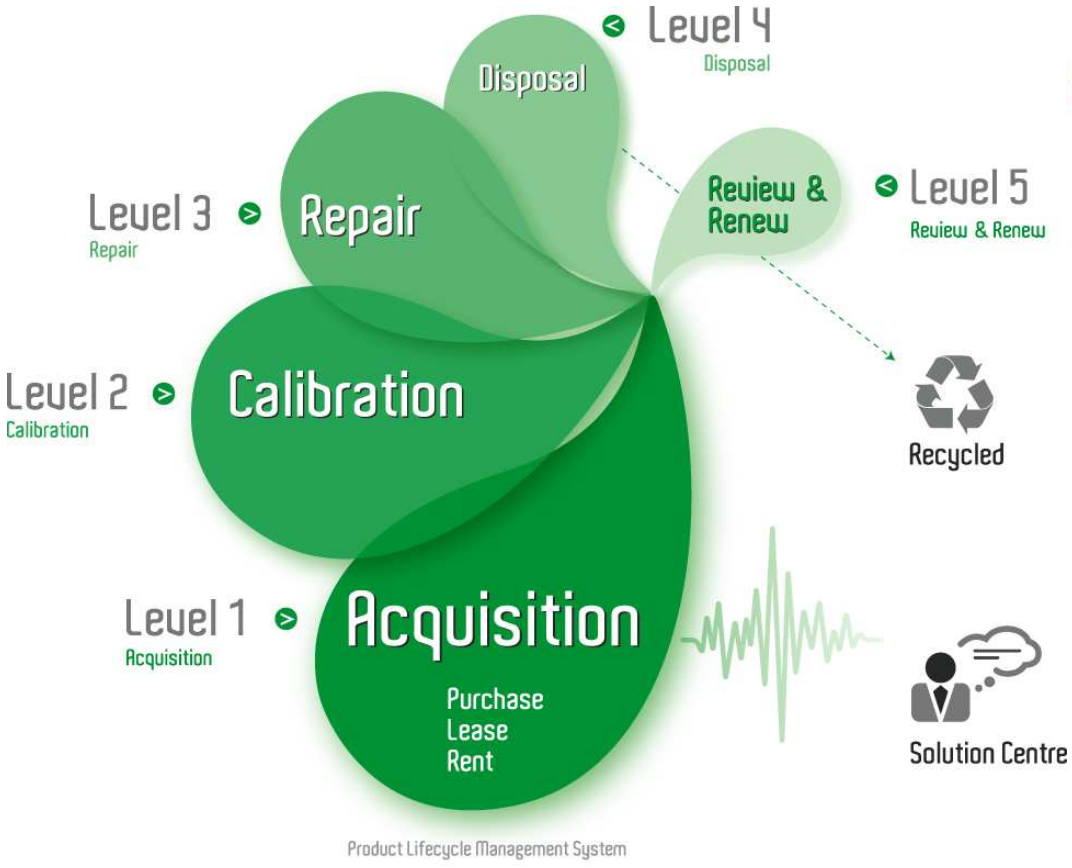
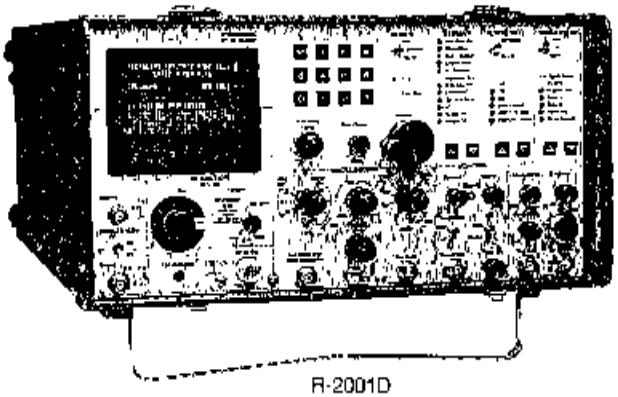


Test equipment

COMMUNICATIONS SYSTEM ANALYZER (cont'd)



R-2001D

The Motorola Communications System Analyzer is a versatile, rugged, compact, and portable test instrument, designed specifically for the service and monitoring of communications equipment. Designed to improve a technician's efficiency and accuracy, the cost of servicing can be reduced since the Communications System Analyzer performs functions that otherwise require many separate instruments. Servicing can be done faster because less time is spent unpacking, hooking up equipment for testing, disconnecting and then repacking multiple pieces of test equipment.

At the heart of the Communications System Analyzer is a Motorola microprocessor. The use of this device permits keyboard entry of data, graphic CRT displays of data, autoranging scales, fast frequency access, permanent storage of often used frequencies and codes, signalling encode and decode functions as well as the reliable, rugged operation that is essential in the field service environment.

The Communications System Analyzer performs a variety of tests normally associated with these devices:

- RF Signal Generator
- Sensitive Measurement Receiver
- Spectrum Analyzer
- Duplex Offset Generator
- Oscilloscope
- RF Frequency Counter
- AC/DC Voltmeter
- Cable Fault Finder
- RF Wattmeter
- Signal Strength Meter
- Signalling Simulator
- SINAD and Distortion Meters
- Sweep Generator

Expandable Systems Options (up to 2 per unit available)

The R-2001D is expandable with up to two System Operations, including IEEE-488 or RS-232-C control interface, Motorola Trunked Radio Test, Cellular Telephone Test, and Motorola Secure Communications test options.

Trunking

This option provides comprehensive system simulation for Trunked radio testing in the 800 MHz and 900 MHz frequency bands. It also includes test capability for UHF and VHF trunking, Motorola trunking I and II and Coverage Plus™. "Closed Cover" testing is possible thru a simple RF connection to the radio. Inbound and outbound signalling is performed as well as "off-the-air" decoding of Radio ID information. Auto test with optional printout is provided along with additional special tests for system access, Failsoft, Call Alert, Private Call and Phone Interconnect as well as Emergency and Dynamic regrouping request decoding.

Signalling verification along with radio RF spec performance data insures proper radio performance margin. Reduced dependance on radio internally accessed self test increases service efficiency, and the "off-the-air" decoding provides a unique ability to solve radio programming related problems. Eliminates the need to use valuable system air time for radio servicing and verification.

Secure Communications

This option provides full duplex encode and decode capability for Motorola format Digital Voice Privacy radio systems. Enhanced deviation measurements and convenient CRT displays of "clear" and "encrypted" waveforms are provided with push button convenience, as are the additional functions of "Bit Error Rate" and "End of Message" testing. External input and output is provided for line interface testing and a "self-test" feature verifies proper operation of the basic encryption function.

Reliable verification of systems function using actual security key (requires separate external key loader) or using special test key, if security requirements prohibit the use of the actual operating key for servicing.

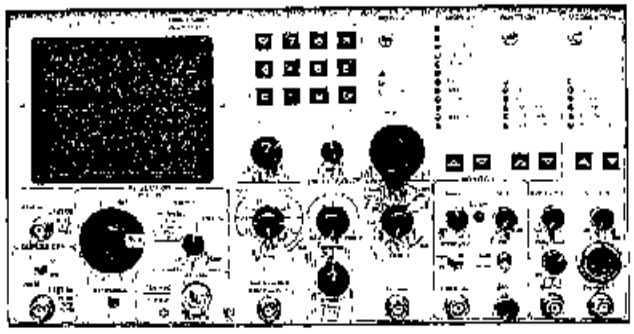
Test equipment

COMMUNICATIONS SYSTEM ANALYZER

Cellular Signalling

The R-2008D Communications System Analyzer will test and verify a cellular subscriber units response to the complex system signalling. Any radio product compliant with accepted industry standards (EIA Standard C1S-3-A) can be functionally tested. Test routines for cell initiated or mobile initiated call simulations are available. There are also test features for the 43 standard manual test commands for radios compliant with Advanced Mobile Phone Service Cellular Mobile Telephone Equipment Specification, July 1983.

With cellular, the Communications System Analyzer becomes a truly full performance service monitor. Of course the unit can be equipped with cellular at the time of order but thanks to the modular design of the System Analyzer, field retrofit kits are also available. The R-2008D includes complete test capability for EAMPS, as well as traditional AMPS signalling.



R-2008D

Specifications

Operating/Display

Modes:	AM/FM/CW/SSB Monitor AM/FM/CW/DSBSC Generate Signalling Simulator Spectrum Analyzer Duplex Generator Memory Tables Frequency Counter Digital Voltmeter Wattmeter (terminating or In-Line) Cable Fault Finder IF Display Oscilloscope Signal Strength Meter SINAD/Distortion Meter Sweep Generator

Signal Generator Mode

FREQUENCY	
Range:	10 kHz to 999.9999 MHz
Resolution:	100 Hz
Accuracy:	Refer to accuracy of master oscillator
Stabilization Time:	.2 Sec
OUTPUT	
Attenuator:	16 dB variable plus 10 dB steps over 13 ranges
Range FM:	.1μV to 1 Vrms
Range AM:	.1μV to .4 Vrms
Accuracy:	+4 dB maximum unspecified at 0 dB attenuation
SPECTRAL PURITY	
Spurious:	−40 dBc
Harmonics:	−15 dBc
FREQUENCY MODULATION	
Deviation:	75 kHz peak
Residual FM:	20 Hz max. @ 300 to 3 kHz from f_c
Residual AM:	1.0% max. @ 300 to 3 kHz from f_c
External/Internal Frequency	
Range:	5 Hz to 20 kHz, ±3 dB
Modes:	Internal, external, microphone or all simultaneously
AMPLITUDE MODULATION	
Range:	0 to 70% from 1 to 500 MHz
External/Internal Frequency	
Range:	5-Hz to 10 kHz, ±3 dB
External Input:	Approx. 150mV for 80%
Modes:	Internal, external, microphone or all simultaneously
DOUBLE SIDEBAND SUPPRESSED CARRIER	
Range:	1 MHz to 500 MHz
Carrier Suppression:	−15 dB

SWEEP GENERATOR MODE
Adjustable sweep width from 10 kHz to 10 MHz at a fixed sweep rate. Synchronized to internal scope display.

continued

Test equipment

COMMUNICATIONS SYSTEM ANALYZER (cont'd)

Specifications (cont'd)

Monitor Mode

FREQUENCY	
Range:	1 MHz to 999.9999 MHz
Resolution:	100 Hz
Accuracy:	Equal to that of master oscillator time base
FREQUENCY ERROR	
Indicator:	Autoranging CRT display. Resolution ±10 Hz for frequency error measurements on 1.0 kHz, 10.0 kHz and 100.0 kHz full scale ranges. 1 Hz resolution for frequency error less than 100 Hz. Special function control will allow direct frequency readout to 1 Hz resolution.
Input Sensitivity: (over the 1 MHz to 999.9999 MHz range)	1.5µV for 10 dB EIA SINAD (narrow band ±6 kHz mod. acceptance) 7.0µV for 10 dB EIA SINAD (wide band ±100 kHz mod. acceptance)
Spurious Response:	−40 dB typical 0 dB image at ±21.4 MHz −10 dB at LO, harmonics ±10.7 MHz
DEVIATION MEASUREMENT	
Scales:	1, 10, 100 kHz full scale
Accuracy:	±5% of reading
Peak Deviation Limit:	Set via keyboard to 100 Hz resolution (0 kHz to 99.9 kHz). Audible alarm indicates limit condition and will be active in all Monitor Modes.
AM MODULATION MEASUREMENTS	
Range:	0 to 100%
Accuracy:	±5% of full scale
SIGNAL STRENGTH METER	
Range:	1 MHz to 999.9999 MHz
Measurement Range:	−100 dBm to +52 dBm, combined specification of antenna and transceiver ports, using internal RF step attenuator
Selectivity:	30 kHz Max. @ 3 dB bandwidth
RF WATTMETER	
Range:	1 Watts to 125 Watts
Protection:	Over-temperature warning

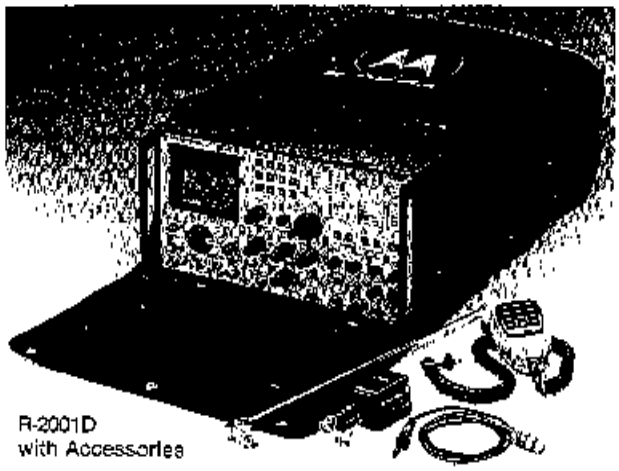
Specifications (cont'd)

General

SPECTRUM ANALYZER	
Frequency Range:	1 MHz to 1 GHz
Measurement Range:	(same as signal strength meter)
Scan Width:	100 kHz per division to 1 MHz continuously adjustable
Sensitivity:	−95 dBm minimum
DUPLEX GENERATOR	
Frequency Offset:	0 MHz to ±10 MHz and fixed ±45, (additional ±39 and ±55 MHz with trunking option)
Frequency Resolution:	5 kHz
Frequency Accuracy:	±.002% within 8 seconds after turn-on
Output Level:	−45 dBm minimum into 50 ohm load
Deviation Range:	0 to ±20 kHz peak
Frequency Response:	5 Hz to 20 kHz, ±3 dB
OSCILLOSCOPE	
CRT Size:	8 cm x 10 cm
Frequency Response:	DC to 5 MHz, 3 dB point
External Vertical Input	
Ranges:	10mV, 100mV, 1V, 10V per division
Sweep Rates:	1µs, 10µs, .1 ms, 1 ms, .01 sec., .1 sec per division
Synchronization:	Internal, normal, and automatic mode with adjustable trigger level
FREQUENCY COUNTER	
Normal Range:	10 Hz to 30 MHz
Display:	6 digit autoranging
Input Sensitivity:	50mV minimum
Period Counting Frequency Determination	
Range:	10 Hz – 100 kHz
Display:	4 digit autoranging to 3 kHz, 3 digit autoranging to 100 kHz
Auto Tune (SCAN LOCK)	
Range:	In the monitor mode, the unit has the capability to automatically find and then tune to an input signal above −30 dBm. Operates from 1 MHz to 1 GHz
Acquisition Time:	5 sec. typical to less than 1 sec. if limited scan is utilized.
Accuracy:	±1 Hz of actual input frequency ± time base accuracy
DIGITAL VOLTMETER	
Readout:	Autoranging 3 digit display, 1, 10, 100, 300 volt full scale
DC Accuracy:	±1% of full scale ± 1 LSD
AC Accuracy:	±5% of full scale
AC Bandwidth:	50 Hz to 20 kHz

Test equipment

COMMUNICATIONS SYSTEM ANALYZER



R-2001D
with Accessories

Specifications (cont'd)

SIGNALLING SIMULATOR	
Modes of Operation:	• 1 kHz fixed tone simultaneous with signalling synthesizer • Base station tone remote encode Encode Decode capability for: Single Tone Variable Frequency (PL/CTCSS) Two-Tone sequential paging Universal 10 tone sequential Digital sub-audible squelch (DPL/DCDSS) 5/6 tone paging Dual Tone Multiple Frequency (DTMF) Select V signalling Mobile Telephone Subscriber Unit Testing MTS (System Simulation) MTS (Encode) 2805 Hz (Encode)
Frequency Range:	5 Hz to 19999.9 Hz encode; 50 Hz to 9999.9 MHz decode
Tone Synthesizer Resolution:	0.1 Hz 5Hz to 19999.9 Hz
Output Level:	5 Volts RMS into 600 Ohm
External Input Impedance:	10 K Ohms minimum
SINAD/DISTORTION METER	
Input Level:	0.5 V to 10 Volts RMS
SINAD Accuracy:	±1 dB at 12 dB SINAD
Distortion Range:	1% to 20%
Distortion Accuracy:	0.5% in 1% to 10% range 2% distortion in 20% range

Specifications (cont'd)

ANALOG SYNTHESIZER	
Tuning (AST)	
Step Size:	Fully variable via cursor selection of digit to be incremented or decremented. Full wrap-around
Resolution:	32 steps per revolution
TIME BASE	
Standard TCXO:	Aging: ± 1 × 10 – 6 per year Temp: ± 1 X 10 – 5 maximum error over the 0°C to +55°C temperature range
Optional Oven Ized High Stability:	Aging: ± 1 × 10 – 7 per year Temp: ± .05 × 10 – 6 maximum error over 0°C to 55°C temperature range (Warmup to ± 5 × 10 – 7 of final frequency within 20 minutes)

Power and Environmental

AC:	100V AC to 130V AC or 200V AC to 260V AC switch selectable: 47 Hz to 63 Hz and 400 Hz
DC:	+11.0 to – 16 V DC external input
Battery Option:	13.6 Volts, 50 minutes typical
Dimensions:	6.25 In. high × 15.50 in. wide × 20.00 in. deep (21 cm × 39.4 cm × 50.8 cm)
Weight:	35.5 pounds (basic model) excluding battery pack, cover accessories (16.1 kg)

Accessories Supplied

RTL-4011A	Oscilloscope Probe
RTL-4075A	RF Detector Probe
RTL-4055A	In-Line Wattmeter Adaptor
58-84300A98	BNC to Type N Adaptor
09-92578B01	BNC "TEE" Adaptor
PPX-4097A	12V DC Power Connector Kit
RTK-4061A	Serial Interface Printer Cable
TEKA-24A	Antenna
RTM-4000B	Microphone
30-80336A36	100V AC Power Cord
15-80335A55	Sunshield
68-81069A68	Operator's Manual

continued