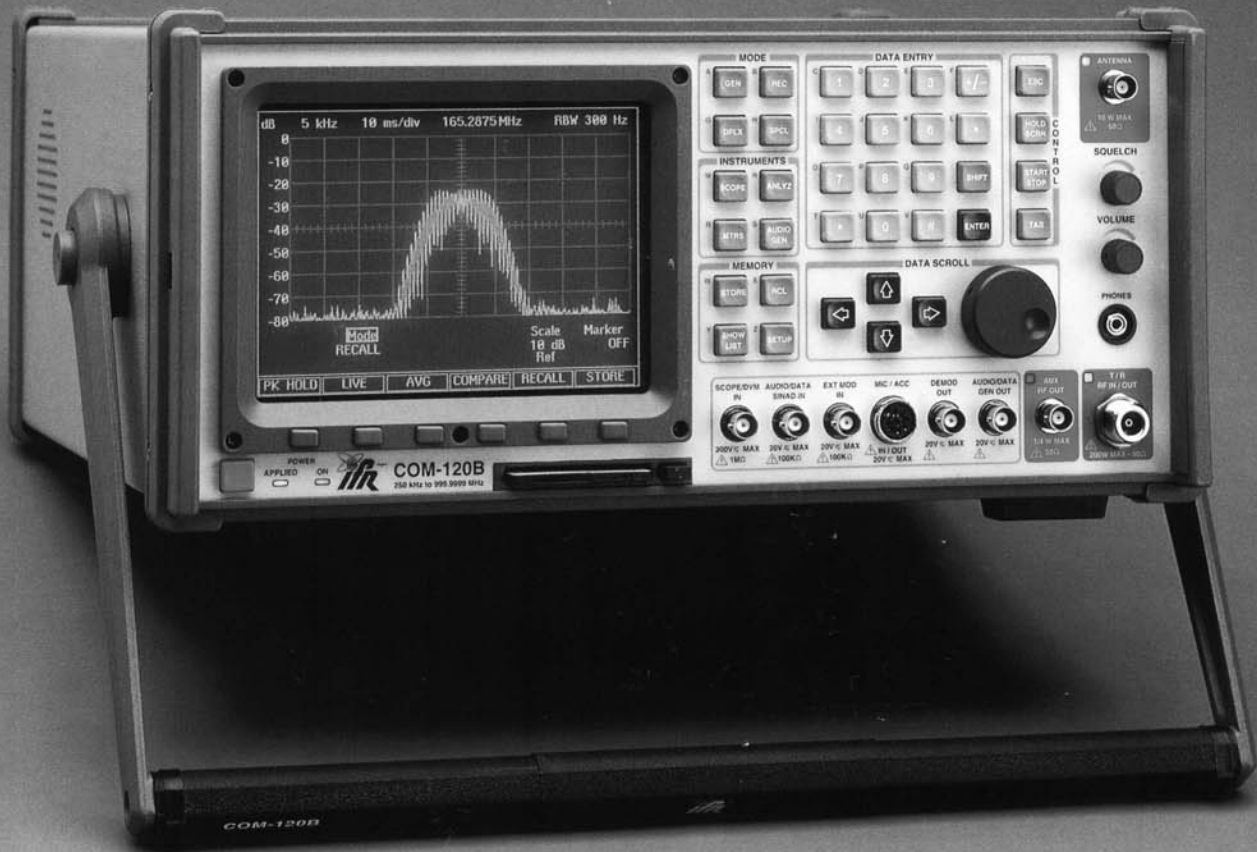
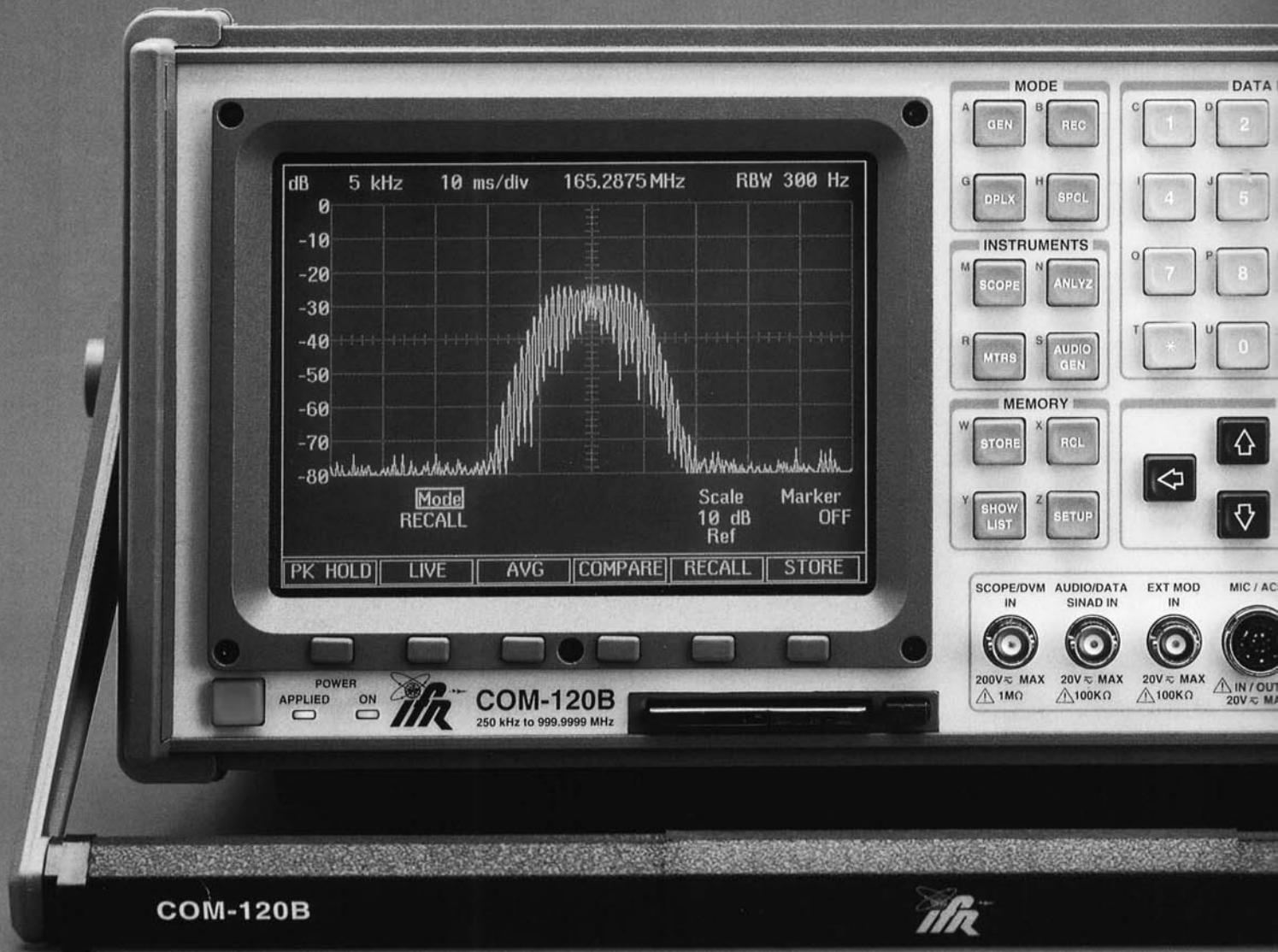




The COM-120B Communications Service Monitor



*Fast as lightning plus
a full scan spectrum analyzer*



COM-120B

Full scan spectrum

LTR® trunking, AMPS cellular plus lightning-fast operation to meet today's

The new COM-120B provides the speed and measurement resources necessary to accommodate most of today's wireless communications test requirements. The lightning-fast operation is the result of a new generation digital controller which was optimized specifically for speed. The many standard features of the COM-120B will meet the needs of most users. Some of the standard

features include the most commonly used analog and digital signaling formats, cross-band duplex, 2 μ V receiver, digitized full scan spectrum analyzer and oscilloscope. For more demanding applications additional capabilities are provided as options including analog/digital signaling, tracking generator, CLEARCHANNEL LTR® trunking, AMPS cellular and EDACS® trunking. For those



analyzer, PCMCIA, EDACS® and CLEARCHANNEL communications test requirements.

requiring automated test capability, several applications software packages are available including EASYCOM-FM®, EASYSWEEP® and EASYSCAN®. The software is available to run either with the PCMCIA memory card or through the RS-232 interface using a PC controller.

Standard Features

- RF Generator
- Auxiliary RF Generator
- 1 kHz AF Generator
- Variable Frequency Function Generator
- DCS (encode/decode)
- DTMF (encode/decode)
- 2-tone (encode/decode)
- 2 μ V Receiver
- Frequency Selective RF Counter
- RF Frequency Error Meter
- AF Frequency Counter
- FM Deviation Meter
- ϕ M Deviation Meter
- AM Modulation Meter
- RF Power Meter
- RF Level Meter
- SINAD Meter
- Distortion Meter
- Spectrum Analyzer
- Oscilloscope
- DVM
- RS-232
- PCMCIA Type II
- 0.2 PPM TCXO
- Store and Recall Front Panel Setups
- Store and Recall 100 RF Frequencies

Optional Features

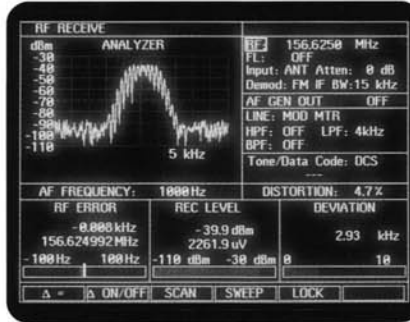
- Internal Rechargeable Battery
- 0.01 PPM OCXO Time Base
- 30 kHz IF Filter
- SSB Receive Filter
- Internal Generate Amplifier
- 2nd Variable Function Generator
- Data Generator/BER Meter
- RCC Signaling
- Analog/Digital Signaling (encode/decode)
- Tracking Generator
- IEEE 488
- CLEARCHANNEL LTR*
- AMPS Mobile Station Test
- EDACS*

The logical implementation of cursor movement and softkeys greatly enhances ease of operation of the COM-120B



RF GENERATOR SCREEN

The RF Generator screen provides the test resources necessary to verify receiver performance. These include the RF source, modulation source, DVM and SINAD Meter. Each meter displayed on the screen can be expanded to provide additional capabilities such as AVERAGE, UPPER and LOWER LIMITS and PEAK HOLD.



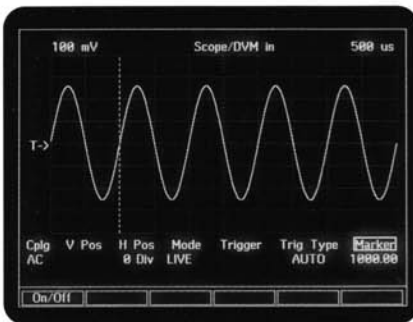
RECEIVER SCREEN

The Receiver screen displays the data necessary to evaluate transmitter performance. Meters include RF Power, RF Frequency, Modulation, AF Frequency and Distortion. A Spectrum Analyzer or Oscilloscope is also displayed on the screen. The 2 μ V antenna input is also available for "over the air" monitoring. The antenna input is protected to 10 watts to minimize damage if accidentally keyed into. Other features include automatic FIND and SCAN.



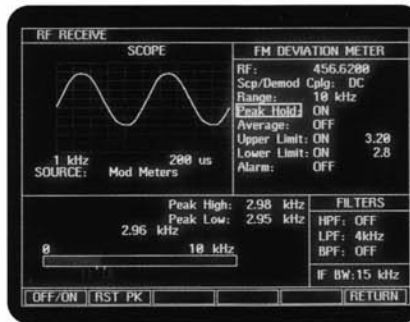
DUPLEX SCREEN

The Duplex screen provides control of the instrument's RF generator and receiver while displaying measured results from the UUT. Offsets up to 1000 MHz with 2.5 kHz resolution can be selected. The Oscilloscope or Spectrum Analyzer along with the bar graph meters can also be accessed from this screen.



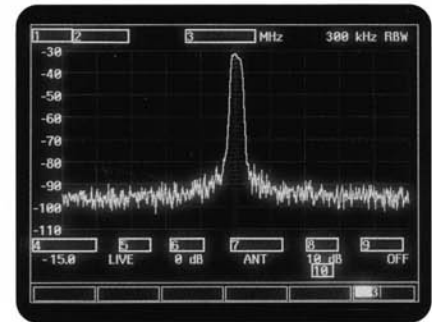
OSCILLOSCOPE

The 50 kHz digitized Oscilloscope can be displayed as an integral part of the Generator/Receiver screen or as a stand-alone scope. Selectable inputs include Demod Audio, RF Power, Function Generators and the External Scope Input. The Scope functions include MARKER, STORE, RECALL and AVERAGE. The Scope information is available to the user through either the standard RS-232 interface or the optional IEEE 488.



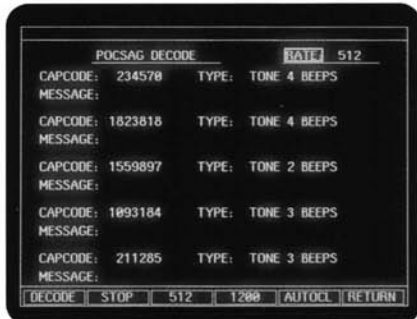
DEVIATION METER

All meters can be displayed in the stand-alone mode. This allows the user to specify UPPER and LOWER LIMITS, enable an AUDIO ALARM, select PEAK HOLD and AVERAGE.



TAB FUNCTION

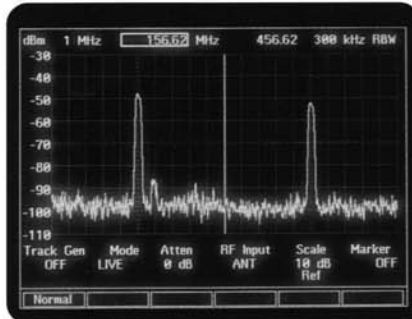
A Tab function has been included which significantly decreases the keystrokes necessary to move from one function to another. Simply depress the TAB key and then the number representing the desired cursor location. The cursor automatically moves to that location.



POCSAG

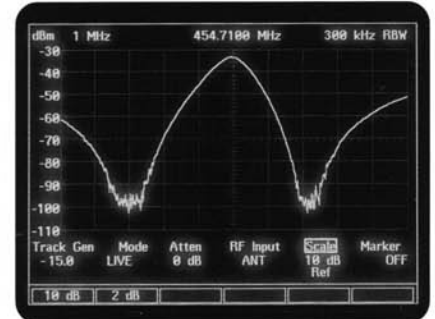
The standard COM-120A will encode and decode 2-tone sequential as well as DCS and DTMF. In the event enhanced signaling capability is required, an analog/digital signaling option is available. The option provides the following formats:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZVEI
EURO	5/6 TONE	POCSAG



SPECTRUM ANALYZER

The full scan Spectrum Analyzer can be displayed in a stand-alone mode or as part of the RF Generator screen or Receiver screen. The stand-alone mode includes a split screen function which displays two different center frequencies simultaneously. This mode also provides various display functions including LIVE, AVERAGE, PEAK HOLD, STORE and RECALL. A marker is also available and the digitized display can be ported to several different I/O interfaces.



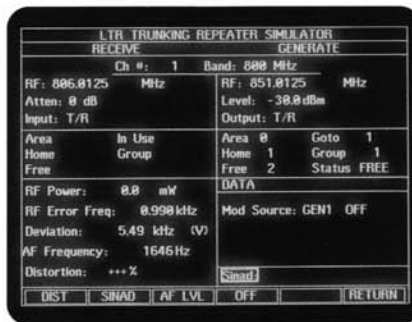
TRACKING GENERATOR

Among the options available in the COM-120A is an internal Tracking Generator. The generator and Spectrum Analyzer can be used to display amplitude versus frequency measurements of devices such as filters, duplexers, cavities, etc. The Tracking Generator can also be used to display return loss when used in conjunction with a return loss bridge.



EDACS®

An EDACS® trunking option is available which provides both repeater and mobile testing. An auto-test function provides a quick analysis of the critical performance parameters of the UUT. A hard copy of the test results can be obtained by connecting a printer to the instrument. Manual test modes are also available for the transmitter and receiver to allow more detailed analysis of specific operating parameters. In addition, the scope and spectrum analyzer can be accessed while operating in the manual test mode.



CLEARCHANNEL LTR®

CLEARCHANNEL LTR® is also available. The option configures the instrument to simulate an LTR repeater system. The test set can perform simple encode/decode functions, Home Repeater access and Next Repeater access.



CELLULAR

AMPS Mobile Station Test can be installed in the COM-120A. To meet the wide variety of test requirements, the option has been designed to include both automatic and manual test functions. Hardcopy results from the test sequence are available through the RS-232 interface.

COM-120B specifications

RF GENERATOR

Frequency Range:	250 kHz to 999.9999 MHz
Resolution:	100 Hz
Accuracy:	Same as Master Oscillator
Supplemental Characteristic Tunable Range:	Tunable from 100 Hz to 999.9999 MHz (characteristics below 250 kHz are not specified)
Output (T/R and AUX Connector) Range (T/R):	-130 to -20 dBm (Simplex mode) -130 to -40 dBm (Duplex mode)
Range (AUX):	-130 to -13 dBm
Resolution:	0.1 dB
Accuracy:	±2 dB (>-90.1 dBm, < 400 MHz) ±2.5 dB otherwise
VSWR:	<1.15:1 (0.25 to ≤ 100 MHz) <1.23:1 (>100 to ≤ 400 MHz) <1.38:1 (>400 MHz)
Spectral Purity Residual FM:	<20 Hz (rms, 0.3 to 3 kHz BW)
Residual AM:	<0.5% (rms, 0.3 to 3 kHz BW)
Harmonics:	<-26 dBc
Nonharmonics:	<-50 dBc (≤1000 MHz) <-40 dBc (>1000 MHz)
Input Protection (T/R):	50 W CW continuous 100 W CW (90 sec/3 min) 150 W CW (30 sec/3 min) 200 W CW (15 sec/3 min)
(AUX):	Up to 0.25 W

MODULATION

Frequency Modulation Range:	100 Hz to 100 kHz
Resolution:	10 Hz (0.01 kHz to 2.55 kHz) 50 Hz (2.60 kHz to 12.75 kHz) 100 Hz (12.8 kHz to 25.5 kHz) 500 Hz (26.0 kHz to 100.0 kHz)
Accuracy:	±5% + residual FM (1 kHz rate, GEN1, GEN2, EXT MOD) ±10% + residual FM (DATA GEN) ±15% + residual FM (DTMF GEN)
Distortion:	<2% (1 kHz sinewave, 10 kHz deviation, 0.3 to 3 kHz BW)
Supplemental Characteristic Rate:	10 Hz to 20 kHz—FSK rates up to 40 kbps
EXT MOD Sensitivity:	2 kHz/V _{pk} ±10% (FM Narrow) 10 kHz/V _{pk} ±10% (FM Wide)
Amplitude Modulation Range:	30% to 90%
Resolution:	1%
Accuracy:	±5% + residual AM (1 kHz rate, GEN1, GEN2, EXT MOD, ≤400 MHz and <+7 dBm or >400 MHz and <0 dBm) ±15% + residual AM (DTMF GEN, ≤400 MHz and <+7 dBm or >400 MHz, <0 dBm)
Distortion:	<2% (30% to 90% modulation, 1 kHz rate, 0.3 to 3 kHz BW)
EXT MOD Sensitivity:	9% to 11%/V _{pk}
Supplemental Characteristic Rate:	100 Hz to 10 kHz
Phase Modulation Range:	0.1 to 10 radians peak
Resolution:	0.1 radian
Accuracy:	±5% + residual PM (1 kHz rate, GEN1, GEN2, EXT MOD) ±15% + residual PM (DTMF GEN)
EXT MOD Sensitivity:	2 rad/V _{pk} ±10%
Supplemental Characteristic Rate:	100 Hz to 6 kHz

AUDIO/DATA GENERATORS

AF Generator #1 Frequency Range:	5 Hz to 20 kHz (sinewave only) 5 Hz to 10 kHz (other waveshapes)
Frequency Resolution:	0.1 Hz
Frequency Accuracy:	See Master Oscillator ±0.1 Hz
Output Range (High Lvl):	0.01 V _{pk} to 2.5 V _{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01 V _{pk}
Output Accuracy (High Lvl):	±3% full range ±5 mV _{pk} (≤10 kHz, ≥0.03 V _{pk}) ±7% full range ±5 mV _{pk} (>10 kHz, ≥0.03 V _{pk})
Output Range (Low Lvl):	1 mV _{pk} to 250 mV _{pk} (into 150 Ω)
Output Resolution (Low Lvl):	1 mV
Output Accuracy (Low Lvl):	±4% full range ±0.25 mV _{pk} (≤10 kHz, 0.03 V _{pk} < level ≥1 mV _{pk}) ±7% full range ±0.25 mV _{pk} (>10 kHz, 0.03 V _{pk} < level ≥1 mV _{pk})
THD:	<0.7% (1 kHz sinewave, 2.5 V _{pk} , 150 Ω load) <1% (for all other frequencies and levels)
Waveshape:	Sine, Ramp, Square, Triangle
AF Generator #2 Frequency Range:	1 kHz (sinewave)
Frequency Accuracy:	±0.2 Hz
Output Range (High Lvl):	0.01 V _{pk} to 2.5 V _{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01 V _{pk}
Output Accuracy (High Lvl):	±3% full range ±5 mV _{pk} (≥0.03 V _{pk})
Output Range (Low Lvl):	1 mV _{pk} to 250 mV _{pk} (into 150 Ω)
Output Resolution (Low Lvl):	1 mV
Output Accuracy (Low Lvl):	±4% full range ±0.25 mV _{pk} (0.03 V _{pk} < level ≥1 mV _{pk})
DTMF Generator Output Range (High Lvl):	0.01 V _{pk} to 2.5 V _{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01 V _{pk}
Output Accuracy (High Lvl):	±10% full range ±5 mV _{pk} (≥0.03 V _{pk})
Output Range (Low Lvl):	0.1 mV _{pk} to 25 mV _{pk} (into 150 Ω)
Output Resolution (Low Lvl):	0.1 mV
Output Accuracy (Low Lvl):	±10% full range ±0.25 mV _{pk} (0.03 V _{pk} < level ≥1 mV _{pk})
Modes:	Continuous, single shot
Supplemental Characteristics Digits:	16 (0-9, *, #, A, B, C, D)
Mark/Space Timing:	25 to 999 msec
Mark/Space Timing Resolution:	1 msec
Mark/Space Accuracy:	±20%
RECEIVER Frequency Range:	250 kHz to 999.9999 MHz
Resolution:	100 Hz
Supplemental Characteristic Tunable Range:	Tunable from 100 Hz to 999.9999 MHz (characteristics below 250 kHz are not specified)
Sensitivity:	2 μV (10 dB SINAD, >2 MHz, 1 kHz tone, 3.3 kHz deviation, 15 kHz IF BW, C-Message weighted filter, 10 kHz FM deviation meter range, 15°C ≤ to ≤ 35°C) ≤2.5 μV otherwise
Antenna Input Protection:	10 W CW (5 sec with alarm)
Selectivity:	300 kHz 15 kHz
Supplemental Characteristic Adjacent Channel Rejection:	RX Bandwidth (3 dB) >30 dB Down 300 kHz ±485 kHz 15 kHz ±15 kHz

Demodulation Output

FM:	0.20 $V_{pk}/kHz \pm 10\%$ (10 kHz range) 0.10 $V_{pk}/kHz \pm 10\%$ (20 kHz range) 0.04 $V_{pk}/kHz \pm 10\%$ (50 kHz range) 0.02 $V_{pk}/kHz \pm 10\%$ (100 kHz range)
AM:	1.13 $\pm 0.06 V_{rms}$ (80% modulation)
ϕM:	0.2 $V_{pk}/rad \pm 10\%$

SELECTIVE RF COUNTER

Frequency Range:	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B)
Supplemental Characteristic Tunable Range:	100 Hz to 999.9999 MHz (characteristics below 250 kHz are not specified)
Resolution:	1 Hz
Accuracy:	Same as Master Oscillator ± 2 Hz
RF Level:	0 to 53 dBm (T/R connector) -60 to 0 dBm (ANT connector)

RF FREQUENCY ERROR METER

Meter Range:	0 Hz to 100 kHz
Meter Accuracy:	Same as Master Oscillator ± 2 counts
Meter Resolution:	1 Hz (10 sec gate time) 10 Hz (1 sec gate time)
RF Frequency Range:	250 kHz to 999.999999 MHz (The received frequency must be within the IF bandpass of the COM-120B)
RF Level:	0 to 53 dBm (T/R connector) -60 to 0 dBm (ANT connector)

AF FREQUENCY COUNTER

Frequency Range:	10 Hz to 20 kHz
Accuracy:	Same as Master Oscillator ± 1 count
Resolution (1 sec gate time):	0.1 Hz (1 sec gate time, 10 Hz to 500 Hz) 1 Hz (1 sec gate time, >500 Hz to 20 kHz) 0.1 Hz, (10 sec gate time)

Supplemental Characteristic

Input Signal Level	
SCOPE/DVM Input:	90 mV _{p-p} (50 mV range, any waveform)
AUDIO/DATA Input:	450 mV _{p-p} (any waveform)

FREQUENCY MODULATION METER

Ranges:	10 kHz, 20 kHz, 50 kHz, 100 kHz full scale
Resolution:	10 Hz (10 kHz range) 100 Hz (20 kHz, 50 kHz, 100 kHz ranges)
Accuracy:	$\pm 5\%$ full scale ± 50 Hz ± 1 count + source residual FM (300 kHz IF BW, 1 kHz tone, 5 kHz deviation, C-Message weighted filter)
Modulation Rate:	0 to 20 kHz
Carrier Range:	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B)
Carrier Level:	0 to 53 dBm (T/R connector) -60 to 0 dBm (ANT connector)

 ϕM METER

Ranges:	1 rad, 2 rad, 5 rad, 10 rad peak full scale
Resolution:	0.01 rad (1 and 2 radian ranges) 0.1 rad (5 and 10 radian ranges)
Accuracy:	$\pm 5\%$ of full scale ± 0.1 rad ± 1 count + source residual PM (300 kHz IF BW, 1 kHz tone, 1.0 rad deviation, C-Message weighted filter)
Modulation Rate:	100 Hz to 6 kHz
Carrier Range:	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B)
Carrier Level:	0 to 53 dBm (T/R connector) -60 to 0 dBm (ANT connector)

AM MODULATION METER

Range:	1% to 100%
Resolution:	0.1%

Accuracy:	$\pm 5\%$ of full scale ± 1 count + source residual AM (300 kHz IF BW, 1 kHz tone, 50% AM depth, C-Message weighted filter)
Modulation Rate:	50 Hz to 10 kHz
Carrier Range:	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B)
Carrier Level:	0 to 53 dBm (T/R connector) -60 to 0 dBm (ANT connector)

Supplemental Characteristic

AGC Attack Time:	50 msec
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RF POWER METER

Meter Ranges:	2 mW to 200 W in a 1-2-5 sequence
Resolution:	1% of full scale or 0.1 mW whichever is greater
Accuracy:	$\pm 10\% \pm 0.1$ mW ± 1 count (>200 mW or temperature 15°C to 35°C) $\pm 15\% \pm 0.1$ mW ± 1 count (<200 mW or 15°C < temperature \leq 35°C)
Frequency Range:	1.5 MHz to 999.9999 MHz
RF Level Range:	2 mW to 200 W average power
Supplemental Characteristic Usable Level:	0.2 mW to 200 W average power (characteristics below 2 mW not specified)
Operating Conditions:	50 W CW continuous (50°C) 100 W CW (90 sec/3 min, 50°C) 150 W CW (30 sec/3 min, 50°C) 200 W CW (15 sec/3 min, 50°C)
VSWR:	1.15:1 (0.25 to 100 MHz) 1.23:1 (100 to 400 MHz) 1.38:1 (>400 MHz to 999.9999 MHz)
Alarms:	Audible and visual (if applied power exceeds 200 W in the 200 W range or power term module temperature exceeds 105°C)

RECEIVE LEVEL METER

Range:	-101 to -30 dBm (15 kHz IF BW) -80 to -30 dBm (300 kHz IF BW)
Supplemental Characteristic Accuracy:	± 3 dB
Frequency Range:	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B)

DISTORTION METER

Range:	1% to 20%
Resolution:	0.1%
Accuracy:	$\pm 0.5\%$ distortion ± 1 count (1 to 10%) $\pm 2\%$ distortion ± 1 count (>10% to 20%)
Signal Frequency:	1 kHz
Supplemental Characteristic Signal Level:	0.03 to 200 Vrms (SCOPE/DVM input) 0.15 to 15 Vrms (AUDIO/DATA IN)

SINAD METER

Range:	3 to 30 dB
Resolution:	0.1 dB
Accuracy:	± 1 dB ± 1 count (at 12 dB)
Signal Frequency:	1 kHz
Supplemental Characteristic Signal Level:	0.03 to 200 Vrms (SCOPE/DVM input) 0.15 to 15 Vrms (AUDIO/DATA IN)

DIGITAL VOLTMETER

Ranges:	50 mV to 200 V in a 1-2-5 sequence
Range (DC):	10 mV to 200 VDC (SCOPE/DVM input)
(AC):	10 mV to 200 Vrms (SCOPE/DVM input) 150 mV to 15 Vrms (AUDIO/DATA IN)
Resolution:	3 $\frac{1}{2}$ digit
Accuracy:	$\pm 5\%$ full scale ± 5 mV ± 1 count (SCOPE/DVM input) $\pm 7\%$ full scale ± 5 mV ± 1 count (AUDIO/DATA IN)
Frequency:	DC, 50 Hz to 20 kHz

Input Impedance: 1 M Ω (unbalanced, SCOPE/DVM input)
100 k Ω (unbalanced, AUDIO/DATA IN)

OSCILLOSCOPE

Bandwidth (3 dB): 50 kHz

Vertical

Ranges: 10 mV to 200 V per division
(1-2-5 sequence)

Max Input: 200 V_{pk}

Accuracy: 5% full scale

Resolution: 1% full scale

Coupling: DC, AC, GND

Supplemental Characteristic

Resolution: 256 data points, 8 major divisions

Horizontal

Ranges: 100 μ sec to 100 msec per division
(1-2-5 sequence)

Resolution: 1% full scale

Accuracy: 1% full scale

Supplemental Characteristic

Resolution: 500 data points, 10 major divisions

Input Impedance: 1 M Ω , unbalanced

SPECTRUM ANALYZER

Center Frequency: 250 kHz to 999.9999 MHz

Supplemental Characteristic

Tunable Range: 100 Hz to 999.9999 MHz (characteristics below 250 kHz are not specified)

Resolution: 100 Hz

Frequency Span

Ranges: 1 kHz to 100 MHz per division in a 1-2-5 sequence + zero span

Accuracy: $\pm 5\%$ of span width

Operational Modes: Normal, Split Screen

Frequency Span

Modes:

Scan Width	Res Bandwidth
100 MHz/div	3 MHz
50 MHz	3 MHz
20 MHz	3 MHz
10 MHz	3 MHz
5 MHz	300 kHz
2 MHz	300 kHz
1 MHz	300 kHz
500 kHz	30 kHz
200 kHz	30 kHz
100 kHz	30 kHz
50 kHz	30 kHz
20 kHz	3 kHz
10 kHz	3 kHz
5 kHz	3 kHz
2 kHz	300 Hz
1 kHz	300 Hz
0 kHz	30 kHz

Level

Display: Log, 2 and 10 dB per division

Vertical Resolution: 1 dB

Dynamic Range: 60 dB

Bandwidth Switching Error: <3 dB

Log Linearity: ± 2 dB (referenced to -40 dBm)
 ± 3 dB ($\leq 15^\circ\text{C}$, $\geq 35^\circ\text{C}$)

Input Attenuator: 0, 30 dB (ANT connector)

INPUT/OUTPUT CONNECTORS

RS-232C

Operations Mode: Off, PC (input/output)

Baud Rate: 100, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400

Stop Bits: 1, 2

Parity: Odd, Even, None

Handshake: None, Xon/Xoff, CTS/RTS

MASTER OSCILLATOR

TCXO

Frequency: 10 MHz

Uncertainty: ± 0.1 PPM

Temperature Stability: ± 0.2 PPM (0 to 50 $^\circ\text{C}$)

Aging: ± 0.5 PPM/year

POWER REQUIREMENTS

Line Voltage: 90 to 135 VAC (50 to 400 Hz)
200 to 265 VAC (50 to 60 Hz)

DC Input: 12 to 30 VDC

Power Consumption: **AC:** 180 W maximum
DC: 150 W maximum

Supplemental Characteristic

Power Consumption (AC): 110 W typical

Power Consumption (DC): 90 W typical

GENERAL CHARACTERISTICS

Operating Temperatures 0 $^\circ$ to 50 $^\circ\text{C}$

Dimensions: 40.0 cm (15.75") wide, 19.0 cm (7.5") high, 42.9 cm (16.875") deep (without bail handle and front panel cover)
44.0 cm (17.32") wide, 19.0 cm (7.5") high, 53.7 cm (21.125") deep (with bail handle and front panel cover)

Weight: 17.3 kg (38.5 lbs)
(without options, lid, accessories)

COM-120B options

- 01 Internal Battery.** Provides self-contained DC power when no primary AC power is available.
- 02 0.01 PPM Oven Time Base.** The oven time base replaces the standard TCXO and is recommended for customers maintaining 800/900 MHz systems.
- 03 30 kHz IF Filter.** The 30 kHz filter is required when ordering Option 15 (AMPS Mobile Station Test).
- 04 #2 Variable Function Generator.** The generator replaces the standard fixed 1 kHz generator.
- 05 Generate Amplifier.** An internal 26 dB amplifier for those requiring additional RF output level.
- 07 Data Generator/BER Meter.** The Data Generator/Bit Error Rate Meter is available for testing digital characteristics of transceivers.
- 08 SSB Receive Filter.** The SSB filter is available for customers requiring the capability to monitor SSB signals.
- 09 RCC Signaling.** Provides MTS, IMTS and Tone Remote Control signaling.
- 11 Audio/Digital Signaling.** Provides encode/decode capability for the following formats:

CCIR	EURO	DZVEI	NATEL	EAA	CCIRH
5/6 Tone	DDZVEI	ZVEI	EIA	CCIRH4	POCSAG
- 12 Tracking Generator.** Tracking Generator and Spectrum Analyzer provide amplitude vs frequency display when sweeping cavities, duplexors, etc.
- 13 IEEE 488.** Provides the parallel GPIB interface.
- 14 CLEARCHANNEL LTR[®].** Provides test capability for LTR[®] repeaters and mobiles.
- 15 AMPS Mobile Station Test.** Auto and manual test facilities to verify proper operation of AMPS mobiles, portables and portables.
- 16 EDACS[®].** Provides test capability for EDACS[®] repeaters and mobiles.

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EDACS[®] is a registered trademark of Ericsson GE Mobile Communications, Inc.
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Service Facilities IFR service centers are located in London, England; Paris, France; Toronto, Canada; Tokyo, Japan; Melbourne, Victoria, Australia; Wellington, New Zealand; Johannesburg, Cape Town and Durban, South Africa; Seoul, Korea; São Paulo, Brazil; Taipei, Taiwan, ROC; Milan, Italy; Munich, Germany; Cham, Switzerland; and our plant in Wichita, Kansas. Units sent to service centers for repair are given high priority for quick return to the owner. Calibration service is also provided at our service centers.

Metrology We offer our customers a complete calibration check service on their instruments. Standards used in our Metrology Lab are NIST traceable. IFR is a member of the National Conference of Standards Laboratories.

Warranty IFR Service Monitors are covered by a limited two-year warranty against defective parts and workmanship. (Batteries carry a 90-day warranty.)

IFR Systems Inc. reserves the right to make design changes without notice.



IFR SYSTEMS, INC.

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