



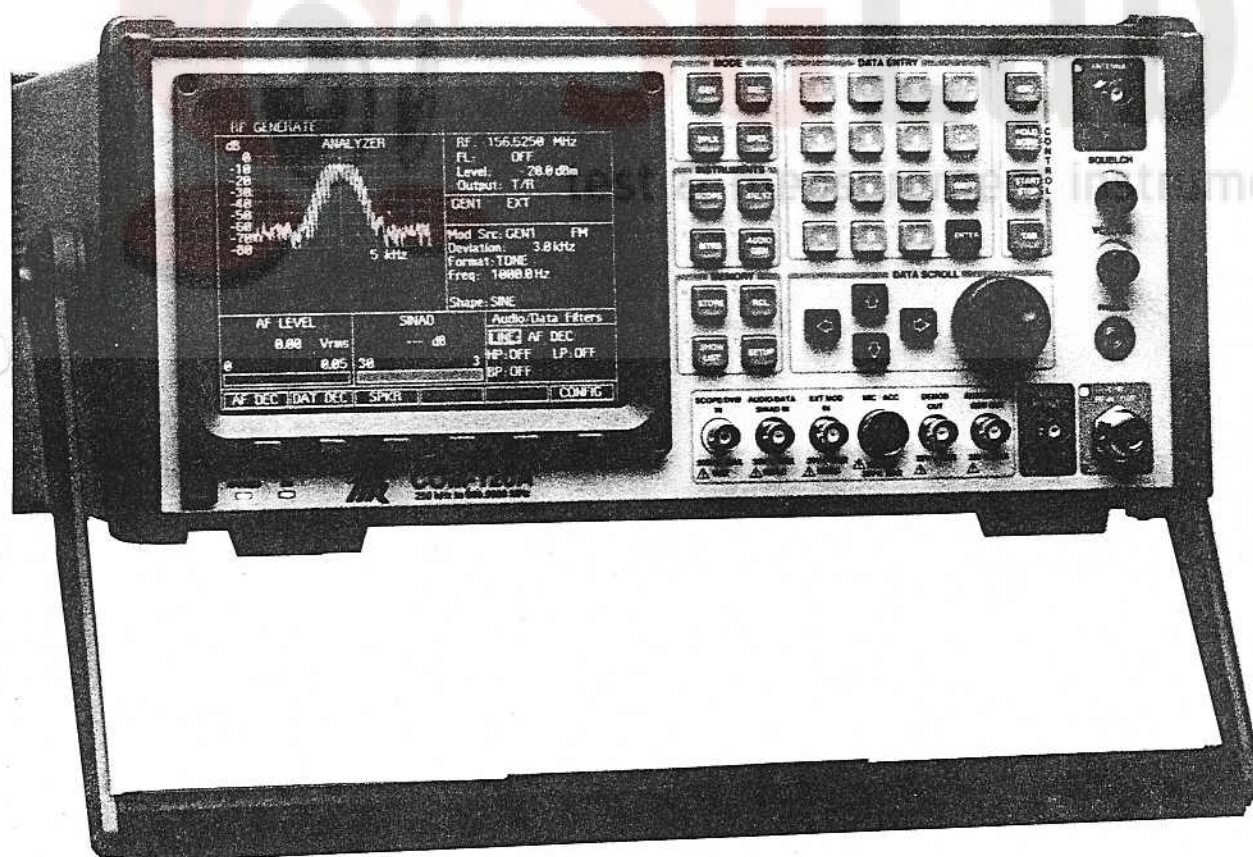
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OPERATION MANUAL



COM-120A

COMMUNICATIONS SERVICE MONITOR



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1002-8700-100
VERSION 1.04

1-10 COM-120A PRODUCT SPECIFICATIONS

NOTE: A warm-up time of 5 minutes is required for the following performance requirements.

RF measurements are referenced to 50 Ω .

Accuracy and Resolution stated in percent are referenced to measured or selected value unless otherwise stated.

Where resolution exceeds accuracy, resolution take precedence.

Specifications and features are subject to change without notice.

RF SIGNAL GENERATOR

Frequency

Range: 250.0 kHz to 999.9999 MHz

Resolution: 100 Hz

Accuracy: Same as Master Oscillator.

Output (T/R and AUX RF Connectors)

Range (T/R): -130 to -20.0 dBm (Simplex Mode)
-130 to -40.0 dBm (Duplex Mode)

Range (AUX): -130 to -13 dBm

Resolution: 0.1 dB

Accuracy: ± 2.0 dB, -20.0 to ≥ -90.0 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 3.0 kHz Bandwidth)

Residual AM: $< 0.5\%$ (rms, 0.3 to 3.0 kHz Bandwidth)

Harmonics: < -26 dBc

Non Harmonics: < -50 dBc (≤ 1000 MHz)
 < -40 dBc (> 1000 MHz)

Input Protection (T/R): Up to 200 W

(AUX): Up to 0.25 W

AUDIO/DATA GENERATORS

A.F. GENERATOR #1

Frequency Range:	5.0 Hz to 20.0 kHz (sine wave only) 5.0 Hz to 10.0 kHz (other wave shapes)
Frequency Resolution:	0.1 Hz
Frequency Accuracy:	Same as Master Oscillator ± 0.1 Hz.
Output Range (High Lvl):	0.01 to 2.5 V _{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01 V _{pk}
Output Accuracy (High Lvl):	$\pm 3\%$ of rated output ± 5 mV _{pk} (≤ 10 kHz, ≥ 0.03 V) $\pm 7\%$ of rated output ± 5 mV _{pk} (> 10 kHz, ≥ 0.03 V))
Output Range (Low Lvl):	0.1 to 25 mV _{pk} (into 150 Ω)
Output Resolution (Low Lvl):	0.1 mV
Output Accuracy (Low Lvl):	$\pm 3\%$ of rated output ± 0.25 mV _{pk} (≤ 10 kHz, ≥ 1 mV) $\pm 7\%$ of rated output ± 0.25 mV _{pk} (> 10 kHz, ≥ 1 mV)
THD:	$< 0.7\%$ (1 kHz sine wave, 2.5 V _{pk} , 150 Ω Load) $< 1.0\%$ (all other frequencies)
Wave Shape:	Sine, Square, Triangle, Ramp

A.F. GENERATOR #2

Frequency Range:	1 kHz (sine wave)
Frequency Accuracy:	± 0.2 Hz
Output Range (High Lvl):	0.01 to 2.5 V _{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01 V _{pk}
Output Accuracy (High Lvl):	$\pm 3\%$ of rated output ± 5 mV _{pk}
Output Range (Low Lvl):	0.1 to 25 mV _{pk} (into 150 Ω)
Output Resolution (Low Lvl):	0.1 mV
Output Accuracy (Low Lvl):	$\pm 4\%$ of rated output ± 0.25 mV _{pk}

DTMF GENERATOR

Digits:	≤ 16
Mark/Space Timing:	25 to 999 ms
Mark/Space Timing Resolution:	1 ms

Output Range (High Lvl): 0.01 to 2.5 V_{pk} (into 150 Ω)
Output Resolution (High Lvl): 0.01 V_{pk}
Output Accuracy (High Lvl): ±10% of rated output ±5 mV_{pk}
Output Range (Low Lvl): 0.1 to 25 mV_{pk} (into 150 Ω)
Output Resolution (Low Lvl): 0.1 mV
Output Accuracy (Low Lvl): ±10% of rated output ±0.2 mV_{pk}
Modes: Continuous, Single Shot

RECEIVER

Frequency
Range: 250 kHz to 999.9999 MHz
Resolution: 100 Hz
Sensitivity: ≤2 μV (10.0 dB SINAD, 1.0 kHz Tone, 3.3 kHz Deviation, 15 kHz IF BW, C-Message weighted filter, 10 kHz FM deviation meter range, 15 ≤ t (amb) ≤ 35° C
Antenna Input Protection: 10 W (5 sec with alarm)
Selectivity: 300 kHz, 15 kHz
Adjacent Channel Rejection: RX BW (3.0 dB) >30.0 dB Down
300 kHz ±485 kHz
15 kHz ±52 kHz

Demodulation Output

AM: 1.13 V_{rms} ±0.06 V_{rms} (80% modulation)
FM: 0.20 V_{pk}/kHz ±10% (10 kHz range)
0.10 V_{pk}/kHz ±10% (20 kHz range)
0.04 V_{pk}/kHz ±10% (50 kHz range)
0.02 V_{pk}/kHz ±10% (100 kHz range)
ΦM: 0.2 V/Rad ±10%

RF FREQUENCY ERROR METER

Frequency
Meter Range: 0 to ±100.0 kHz
Meter Accuracy: Same as Master Oscillator ±2 counts

Meter Resolution: 1 Hz (1 sec gate time)
10 Hz (0.1 sec gate time)

RF Level: 0 to 53 dBm (T/R Connector)
-60 to 0 dBm (ANTENNA Connector)

AF FREQUENCY COUNTER

Frequency

Range: 10.0 Hz to 20.0 kHz

Accuracy: Same as Master Oscillator ± 1 count

Resolution (1 sec gate time): 0.1 Hz (10 to 500 Hz)
1 Hz (>500 Hz to 20 kHz)

(10 sec gate time): 0.1 Hz

Input Signal Level: ≥ 90 mV_{pp} (SCOPE/DVM Input, 50 mV range, any waveform)
 ≥ 450 mV_{pp} (AUDIO/DATA IN, any waveform)

FM DEVIATION METER

Deviation

Range: $\leq \pm 100$ kHz (peak)

Resolution: 1% of full scale.

Accuracy: $\pm 5.0\%$ of full scale ± 50 Hz ± 1 count + source residual (500 Hz to 100 kHz deviation)

Modulation Rate: 10 Hz to 20 kHz

Carrier Range: 250.0 kHz to 999.9999 MHz

Carrier Level: 0 to 53 dBm (T/R Connector)
-60 to 0 dBm (ANTENNA Connector)

ΦM METER

Phase

Range: 0.1 rad to 10 rad (peak)

Resolution: 0.01 rad (1 and 2 radian ranges)
0.1 rad (5 and 10 radian ranges)

Accuracy: $\pm 5.0\%$ full scale ± 0.1 rad ± 1 count + source residual (300 Hz to 6 kHz rate)

Modulation Rate: 100.0 Hz to 6.0 kHz

Carrier Range: 250.0 kHz to 999.9999 MHz
Carrier Level: 0 to 53 dBm (T/R Connector)
-60 to 0 dBm (ANTENNA Connector)

AM MODULATION METER

Modulation

Range: 1% to 100%
Resolution: 0.1%
Accuracy: $\pm 5.0\%$ full scale ± 1 count + source residual
(30 to 90% depth)

Modulation Rate: 50.0 Hz to 10.0 kHz

Carrier Range: 250.0 kHz to 999.9999 MHz

Carrier Level: 0 to 53 dBm (T/R Connector)
-60 to 0 dBm (ANTENNA Connector)

AGC Attack Time: 50, ms

RF POWER METER

Frequency Range: 1.500 to 999.9999 MHz

Input Level

T/R Connector: 2 mW to 200.0 W
Ranges: 2.0 mW to 200.0 W Full Scale (1 2 5 sequence)
Resolution: 1% of full scale or 0.1 mW
Accuracy: $\pm 10\% \pm 0.1$ mW $\pm$ one count (15° to 35° C)
 $\pm 10\% \pm 0.1$ mW $\pm$ one count (>200 mW, <15° C, >35° 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)

Operating Conditions: 50 W continuous (50.0° C)
100 W (90 sec/3 min, 50.0° C)
150 W (30 sec/3 min, 50.0° C)
200 W (15 sec/3 min, 50.0° C)

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

Frequency Range: 250 kHz to 999.9999 MHz
Input Range: -101 to -30 dBm (15 kHz IF BW)
-80 to -30 dBm (300 kHz IF BW)
Accuracy: ± 3 dB

DISTORTION METER

Range: 1% to 20.0%
Resolution: 0.1%
Accuracy: $\pm 0.5\%$ Distortion ± 1 count (1.0% to 10.0%)
 $\pm 2.0\%$ Distortion ± 1 count, (>10.0% to 20.0%)
Signal Frequency: 1.0 kHz
Signal Level: 0.03 to 200 Vrms (SCOPE/DVM input)
0.15 to 15 Vrms (AUDIO/DATA input)

SINAD METER

Range: 3 to 30 dB
Resolution: 0.1 dB
Accuracy: ± 1.0 dB ± 1 count (at 12 dB)
Signal Frequency: 1 kHz
Signal Level: 0.03 to 200 Vrms (SCOPE/DVM input)
0.15 to 15 Vrms (AUDIO/DATA input)

DIGITAL VOLTMETER

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 input)
Meter Ranges: 50 mV to 200 V (1-2-5 sequence)
Resolution: 3.5 digit
Accuracy: $\pm 5\%$ full scale ± 5 mV ± 1 count (SCOPE/DVM input)
 $\pm 7\%$ full scale ± 5 mV ± 1 count (AUDIO/DATA input)
Frequency: DC, 50 Hz to 20 kHz
Input Impedance: 1 M Ω (SCOPE/DVM input)
100 K Ω (AUDIO/DATA input)

OSCILLOSCOPE

Vertical Bandwidth (3 dB): 50 MHz

Input

Ranges: 10 mV to 50 V/Div (1-2-5 sequence)

Max Input Voltage: 200 V

Accuracy: $\pm 5\%$ of full scale

Resolution: 1% of full scale

Coupling: DC, AC and GND

Horizontal Sweep

Rate: 100 μ s/Div to 100 ms/Div (1-2-5 sequence)

Accuracy: $\pm 1\%$ of full scale

Impedance: 1 M Ω

SPECTRUM ANALYZER

Operational Modes: Normal, Split Screen

Frequency Span

Modes:	Scan Width	Resolution Bandwidth
	1 MHz/Div	300 kHz
	500 kHz/Div	30 kHz
	200 kHz/Div	30 kHz
	100 kHz/Div	30 kHz
	50 kHz/Div	30 kHz
	20 kHz/Div	3 kHz
	10 kHz/Div	3 kHz
	5 kHz/Div	3 kHz
	2 kHz/Div	300 Hz
	1 kHz/Div	300 Hz
	Zero Scan	30 kHz

Accuracy: $\pm 5\%$ of Span Width

Level

Display: Log, 2 and 10 dB/Div

Vertical Resolution: 1 dB

Range (Dynamic): 60 dB

Bandwidth Switching Error: < 2 dB

Log Linearity: ± 2 dB (referenced to -40 dBm)
 ± 3 dB (≤ 15 degrees C, ≥ 35 degrees C)

Input Attenuator: 0 and 30 dB

INPUT/OUTPUT (I/O) CONNECTORS

RS-232 Connector

Operations Mode: Off, PC (Input/Output), Printer (Output)
Baud Rates: 100, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 3840
Stop Bits: 1, 2
Parity: Odd, Even and None
Handshake: None, Xon/Xoff, CTS/RTS

MASTER OSCILLATOR

TCXO

Frequency: 10 MHz
Temperature Stability: ± 0.2 ppm (0 to 50° C)
Aging: ± 0.5 ppm per year

POWER REQUIREMENTS

Line Voltage: 90 to 265 VAC (50 to 400 Hz)
DC Input: 10.4 to 32 Vdc
Power Consumption: 85 W (typical DC Operation)
109 W (typical AC Operation)

GENERAL CHARACTERISTICS

Dimensions: 7.3" H, 15.75" W, 16.875" D
(w/o bail handle and front panel cover)
7.5" H, 17.32" W, 21.125" D
(with bail handle and front panel cover)

Weight: 42 lbs

Display

Type: EL (Electroluminescent)
Size: 560 column by 400 row (active area of 5.597" x 3.997")
Resolution: 100 dots/in