RF Logic RF257 Automatic Modulation Meter Owner's Manual

Electronic Product Design
Automatic Modulation Meter Model RF257
Operator Manual

Model RF257 Automatic Modulation Meter

The model RF257 modulation meter has been designed to simplify the task of modulation measurement. The model RF257 always locks to the highest level signal available, ignoring spurious signals and harmonics. AM and FM measurements can be made over the full frequency range of 1.5MHz to 2.0GHz. The unit operates usefully with reduced sensitivity to at least 4GHz.

FM measurement of peak positive, peak negative or mean deviation, with 5 deviation ranges from 1kHz to 100kHz

full scale. AM measurement of peak, trough or mean in percentage modulation with 5 ranges from 1% to 100% full scale. The audio measurement bandwidth is selectable and the demodulated audio is available at the front panel. The IF is available on a BNC connector on the rear panel.
The unit is small and lightweight, making it ideal for the bench or fieldwork, especially with the internal battery option installed.

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AC MAINS OPERATION

WARNING
INCORRECT SUPPLY RANGE SELECTION COULD CAUSE SERIOUS DAMAGE TO THE INSTRUMENT

Two AC power ranges are available, 102V – 130V and 205V – 260V. Make sure any main connection is removed from the unit. Remove the four bottom case screws and remove the cover. Select the appropriate range on the mains selector switch. This is located adjacent to the main transformer on the bottom PCB inside the instrument and is identified as W1. Replace the bottom cover and screws.
Connect the power lead to the local AC supply socket. The instrument is switched on by switching the front panel rotary switch to 'ON'. The instrument is immediately ready for use; no warm-up time is required. At power on, the RF257 defaults to the FM 100kHz range with the mean detector and the 3.5kHz filter selected.

Input Signal.
Connect the signal source to the 'INPUT' socket, the 'LOCK' LED should immediately illuminate if the signal is within the range 2mV to 1V. The 'LOCK' LED shows that the instrument is correctly tuned to the incoming signal. The measuring circuits are inhibited when the 'LOCK' indicator is not lit. DO NOT APPLY MORE THAN 1V (2.8V p-p), the input circuitry will be damaged.
The instrument locks to the highest level signal applied to the input. It will not lock to a harmonic or other spurious signal provided that the intended carrier has the highest level signal and that it is within the specified frequency range. The tuning mechanism provides a continuous dynamic frequency lock that permits accurate modulation measurements to be taken even on a slowly sweeping carrier.
In general, the instrument provides good selectivity against interference from spurious signals. However, the broadband nature of the input circuit implies that the possibility of such interference cannot be completely eliminated. If it is suspected that the reading is being affected by high-level interfering signals, make a check by disconnecting and reconnecting the signal source several times; any change in the modulation reading implies interference. Normal harmonic levels, even in the worst case, are unlikely to have any effect on measurements.

FM Measurement.

Select the FM mode with the 'MODE FM' push button.
Select the appropriate 'RANGE' with the < > pushbuttons. Five ranges are available with full-scale deviations of 1,

3, 10, 30, and 100kHz.
Select the required ‘AF FILTER’ with the < > pushbuttons. Five filter functions are available; three bandpass filters with nominal upper cut-off frequencies of 60kHz, 15kHz, and 3.5kHz; a psychometric filter complying to the CCITT standard and a 750 µs de-emphasis network.
Select the required ‘DETECTOR’ mode with the ‘+’, ‘MEAN’, and ‘-‘ pushbuttons. ‘+’ gives peak positive deviation, ‘-‘ gives peak negative deviation, and ‘MEAN’ gives the average of peak positive and peak negative deviations.

AM Measurement.
Select the AM mode with the ‘MODE AM pushbutton.
Select the appropriate ‘RANGE’ with the < > pushbuttons. Five ranges are available with full scale modulation percentages of 1%, 3%, 10%, 30%, and 100.0%. The modulator is highly linear and allows accurate AM readings up to 100%.
Select the required ‘AF FILTER’ with the < > pushbuttons. Five filter functions are available; three bandpass filters with nominal upper cut-off frequencies of 60kHz, 15kHz, and 3.5kHz; a psychometric filter complying with the CCITT standard and a 750 µs de-emphasis network.
Select the required ‘DETECTOR’ with the ‘+’, ‘MEAN’ or ‘-‘ pushbuttons. ‘+’ gives peak percentage modulation, ‘-‘ gives trough percentage modulation, and ‘MEAN’ gives the
average between the peak and trough modulation.

AM Measurement.
Select the AM mode with the ‘MODE AM pushbutton. Select the appropriate ‘RANGE’ with the < > pushbuttons. Five ranges are available with full scale modulation ercentages of 1%, 3%, 10%, 30%, and 100.0%. The demodulator is highly linear and allows accurate AM readings up to 100%. Select the required ‘AF FILTER’ with the < > pushbuttons. Five filter functions are available; three bandpass filters with nominal upper cut-off frequencies of 60kHz, 15kHz, and 3.5kHz; a psychometric filter complying to the CCITT standard and a 750 µs de-emphasis network. Select the required ‘DETECTOR’ with the ‘+’, ‘MEAN’ or ‘-‘ pushbuttons. ‘+’ gives peak percentage modulation, ‘-‘ gives trough percentage modulation, and ‘MEAN’ gives the average between the peak and trough modulation.

Demodulated Audio Output.
The demodulated audio output is available on the front panel via a BNC connector. This is a 600 Ω output impedance with a level of 0dBm for FSD.
IF Output.
The IF output is available on the rear panel via a BNC connector. This is approximately 420kHz at a level of 100mV with a nominal 50 Ω output impedance.

RF257 SPECIFICATION

RF Input

Frequency Range	1.5MHz to 2.0GHz and useful response, with reduced sensitivity, to at least 4GHz.
Impedance	50 Ω nominal.
Level	2mV to 1V rms Full specification for noise, accuracy, etc applies over the input range 10 mV to 1.0V
Max Input	0.5W continuous.
Tuning	Automatic tuning selects the largest available signal. Correct operation requires spurious signals to be >10dB below the wanted signal.
Acquisition	Typically < 100ms. Settling time for the AF circuits is additional and is typically 1s for a reading > 75% of the meter range.
L.O Feedout	-60dBm typically.

FM Measurement

FSD Ranges	Five ranges with full-scale deviations of 1kHz, 3kHz, 10kHz,30kHz, and 100kHz.
Modes	Peak Positive, Peak Negative and Mean deviation.
Accuracy	± 2% of Full scale ± 1% of reading with a 1kHz tone. See audio filter specification for additional error due to AF response. Residual FM is additional.
Residual FM	<20Hz at 100MHz <100Hz at 500MHz <200Hz at 1000MHz Measured with 3.5kHz AF bandwidth.
Distortion	<1% at 100kHz deviation with a 1kHz tone.

AM Measurement

FSD Ranges	Five ranges with full scale indications of 1%, 3%, 10%, 30%, 100%.
Modes	Peak, Trough, and Mean of peak and trough.
Accuracy	± 2% of Full scale ± 2% of reading with a 1kHz tone. See audio filter specification for additional error due to AF response. Residual AM is additional.
Residual	AM <0.5% (15kHz bandwidth selected)
Distortion	<1% for 80% AM with a 1kHz tone.

Audio Filters

60kHz Filter	250Hz – 60kHz ± 0.5 dB 12Hz – 72kHz ± 3 dB typically. HF roll off at 80 dB/decade.
15kHz Filter	250Hz – 15kHz ± 0.5 dB 12Hz – 19.5kHz ± 3 dB typically. HF roll off at 60 dB/decade.
3.5kHz Filter	250Hz – 3.5kHz ± 0.5 dB 12Hz – 4.0kHz ± 3 dB typically. HF roll off at 100 dB/decade.
Psophometric	Complies with CCITT Volume V P53
De-emphasis	750µs de-emphasis. 3 dB bandwidth typically 12Hz – 212Hz. HF rolls off at 12dB/decade.

Front Panel

AF Output	Front panel BNC. Level 0dBm approx. for FSD. Impedance 600 Ω nominal.
Display Type	Moving coil meter with 60mm mirror scale.
Overload	Fully protected against over-ranging.

Rear Panel

IF Output	Rear panel BNC. Level 100mV, 50 Ω nominal. The frequency is approximately 420kHz.

Power Requirements

AC Line	Internal selection of line voltage
115V	102V to 130V
230V	205V to 265V
Power	6VA Approx.
Frequency	48 to 60Hz.
Fuse	100mA fast blow on the rear panel.

Environmental Temperature

Operating	0°C to 55°C. Full specification over the range 5°C to 45°C.
Storage	-20°C to 55°C.
Humidity	Max 95% RH at 30°C.

Mechanical

Size	H105, W215, D305 mm
Weight	Approx. 1.7kg. Approx. 2.6kg with battery option.

Internal Battery (Option -03)

Discharge Time	>8 hours. Typically, 10 hours for a fully charged battery.
Recharge Time	14 hours.
Battery Test	Pressing the Bat Chk push button displays the battery condition on the display. A reading o f between 8 and 10 is required for normal operation.
Fuse	1A slow blow on rear panel.

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Documents / Resources

	RF Logic RF257 Automatic Modulation Meter [pdf] Owner's Manual RF257, Automatic Modulation Meter, RF257 Automatic Modulation Meter

References

- RF Logic Limited