

# R-150

## WIDE RANGE RECEIVER



**100 HZ to 1 GHz FREQUENCY RANGE**

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## R-150 RECEIVER OVERVIEW

*The R-150 receiver is a light weight, low power portable receiver with exceptional sensitivity and very low noise. The R-150 tunes over a frequency range of 100 Hz to 1 GHz and includes 33 bandwidths from 50 Hz to 200 MHz in a modified 1:2:5 sequence.*

*The receiver includes AM and FM Demodulation, Pulse Stretch and Slideback controls, and an accurate peak-reading DVM to measure video signal level and provide encoded data via the IEEE-488.2 bus.*

*The R-150 receiver will accept additional plug-in modules to enhance capabilities or to tailor the receiver for particular applications.*

*The receiver can also be supplied in a portable configuration that includes collapsible side handles and a folding stand. Ears are available for rack mounting. The R-150 may be used in conjunction with software and a computer system for automated measurement and monitoring applications.*

### HIGHLIGHTS

- Frequency Ranges of Operation
  - ... 100 Hz to 1 GHz
- Noise Figure Typical
  - ... 5 dB midrange, 8 dB maximum
- Dynamic Range
  - ... Greater than 60 dB
- Tuning
  - ... Keypad input, tuning knob, and tuning push buttons; selectable resolution; automatic scans
- Input Attenuator
  - ... 0 – 70 dB in 10 dB Steps
  - Manual or automatic (auto-range operation)
- Gain
  - ... Single knob optimally adjusts internal gains
- IF Bandwidths
  - ... 33 filters, 50 Hz to 200 MHz in modified 1:2:5 sequence
- Built-in preselector
- Demodulation Modes
  - ... AM and FM
- Video Output Modes
  - ... Linear, Log, Aux-video (with pulse stretch and slideback) and Z-axis
- Visual and Audible Alarms
  - ... Warn of incorrect operations and out-of-spec conditions
- Panel Displays
  - ... Separate LED displays for Frequency, Attenuation, Gain, Bandwidth & DVM (video level)
- Indicators
  - ... 30 LED mode/status lightbars, high-low power line warning (power line condition indicated on front panel)
- Portable low weight and small size
- Carrying handles with optional rack-mount kits available

## R-150 WIDE-RANGE RECEIVER SPECIFICATIONS

Characteristics	Specification
<b>Frequency</b>	
Frequency range	100 Hz to 1 GHz
Tuning resolution	0.1 Hz below 250 kHz 1.0 Hz from 250 KHz to 15 MHz 100 Hz from 15 MHz to 1 GHz
Internal reference frequency 100 MHz	OCXO
Aging per year (after 30 days continuous operation)	$10^{-6} + 1$ PPM/year +0.05 PPM 0°C to 60°C
Temperature drift (+5°C to +45°C)	$5 \times 10^{-8}$ , 0°C to 60°C
Frequency display	8 digit
Frequency display response referred to 1 GHz <50 kHz 50 kHz to 1 GHz	+/- 0.5 dB +/- 4.0 db
Spectral purity, SSB phase noise IF = 500 MHz, (RBW=1 Hz) 10 kHz 100 kHz, span >100 kHz	-90 dBc -90 dBc
Residual FM, RBW = 1 kHz, Sweep time = 100 mS	<-120 dBm
<b>IF Filters</b>	
Bandwidth accuracy	10%
RBW 6 dB Filters, Hz	50, 100, 200, 250, 300, 400, 500, 640, 800
RBW 6 dB Filters, kHz	1, 1.3, 1.6, 2, 2.5, 3, 4, 5, 6.4, 8, 9, 10, 13, 16, 20, 30, 100, 120, 500
RBW 6 dB Filters, MHz	1, 3, 10, 15
<b>Internal Preselector</b>	
Selectable, on and off switch	125 kHz to 280 kHz
Selectable, on and off switch	280 kHz to 450 kHz
Selectable, on and off switch	450 kHz to 720 kHz
Selectable, on and off switch	720 kHz to 1.2 MHz
Selectable, on and off switch	1.2 MHz to 2 MHz
Selectable, on and off switch	2 MHz to 3.7 MHz
Selectable, on and off switch	3.7 MHz to 5.9 MHz
Selectable, on and off switch	5.9 MHz to 10.9 MHz
Selectable, on and off switch	10.9 MHz to 16.5 MHz
Selectable, on and off switch	15 MHz to 200 MHz
Selectable, on and off switch	200 MHz to 350 MHz
Selectable, on and off switch	350 MHz to 550 MHz
Selectable, on and off switch	550 MHz to 750 MHz
Selectable, on and off switch	750 MHz to 1 GHz

## R-150 Wide Range Receiver

Characteristics	Specification
<b>Level</b>	
Display range	>30 dB linear, >70 dB logarithmic
RF inputs N-type female	Two with remote/local select
Max input DC voltage AC coupled	50 V
Max input CW RF power RF Attenuation 0 dB	1 W
Inter-modulation 1 dB compression of input mixer f>15 MHz, RF Attenuation 0 dB preselection	-17 dBm
Third Order Intercept Level	-65 dBm
Displayed Average Noise Level (DANL) (sensitivity)	RF attenuation 0 dB, S/N = 0 dB, RBW = 10 Hz, VBW = 1 Hz, span = 0 Hz, 50 Ohm termination
LO radiation from input port	<- 90 dBm
Impulse overshoot	<2% for BW <20 kHz <10% for BW <120 kHz
Without preamplifier 20 Hz to 9 kHz 9 kHz to 200 MHz 200 MHz to 1 GHz	-55 dBuV -58 dBuV -55 dBuV
Immunity to interference Image frequency Intermediate frequency	>80 dB >80 dB
<b>Input</b>	
VSWR	Better than 2:1
Impedance	50 Ohms nominal
Maximum RF	1 Watt average CW
LO leakage	< -90 dBm
<b>Residual Response</b>	
Residual responses	<-120 dBm
IF rejection	At least 80 dB
Attenuator	0 to 70 dB in 10 dB steps
<b>Band Selection Automatic</b>	
Band frequency ranges Low Frequency Extender (LFE) Band 1 Band 2 Band 3	100 Hz to 1 kHz 1 kHz to 249.99 kHz 250 kHz to 15 MHz 15 MHz to 1 GHz

## R-150 Wide Range Receiver

Characteristics	Specification
<b>Oscillator</b>	
Type	Oven-controlled quartz
Aging	1 PPM per year
Stability	0.05 PPM, 0°C to 60°C
Output	>0 dBm
Receiver frequency stability and accuracy	.05 PPM after 30 minutes
<b>IF</b>	
IF filter shape factor	<4:1
IF output level	At least 10 dBm into 50 Ohms
AGC	Keypad selectable
Demodulation/detection modes	AM, BFO, CW, FM
Video outputs:	Separate AM/FM, Aux, Video and Z-axis outputs; AM has linear and log modes; Aux. Video has pulse stretch and slideback; Z-axis has adjustable level and inversion.
Video BW	More than ½ selected IF BW
Video linear dynamic range	At least 70 dB
Video outputs	1 volt minimum (50 Ohms)
Z-axis	Adjustable to 2 vrms and reversible
Audio	>1 vrms (8 Ohms); flat 20 Hz to 20 kHz
Signal monitor output	15 MHz maximum BW
IF center frequency	21.4 MHz
Wide BW IF center frequency	1450 MHz
IF bandwidth	50 Hz, 100 Hz, 200 Hz to 10 MHz (in 1-2-5 sequence) plus 15, 40, 100 and 200 MHz. Additional narrow BW filters in 1.0–1.25-1.6-2.0-2.5-3.2-4.0-5.0-6.4-8.0 sequence in "Alternate BW" mode. IF Impulse response: overshoot <2% for BW <20 kHz, 12% for BW >20 kHz.
<b>Level Display</b>	
Noise figure typical 100 Hz to 20 kHz 20 kHz to 600 MHz 600 MHz to 1 GHz	8 dB 5 dB 8dB
Video linear dynamic range	>50 dB
Video output level (50Ω)	0 to 3 V
Signal monitor at 21.45, 20 MHz bandwidth	-107 dBm to 10 dBm
Demodulation mode	AM, FM

Characteristics	Specification
<b>Connectors and Controllers</b>	
Front Panel	2 N-type input connectors, selectable. The front panel has been engineered for clarity and ease of operation. A full compliment of analog controls, push-button switches, keypad, and alpha numeric displays are provided. All of these features are easy to learn and help the R-150 user accomplish tasks with efficiency.
Rear Panel	Connectors BNC female Signal Monitor, IF Out, Z-axis, reference clock IEEE-GPIB-488.2 IEEE bus remote control Fuse 2 Amp, chasis GND 2 N-type input connectors, selectable
<b>Power/Safety</b>	
Line voltage	117/230VAC +15%
Power dissipation	120 Watts
Power consumption	300 W
Safety	UL
Test marks	CE, UL
Recommended calibration interval	Operation with internal reference 1 year
<b>Physical</b>	
Weight	42 lbs. ( 19 kgs.)
Size	5.25"h x 17"w x 22"d (133mm x 432mm x 560mm)
Volume	1.1 cu. ft.