

Half-Rack Digital HF Receiver with Front Panel WJ-8712P



The WJ-8712P is a fully synthesized, general-purpose HF receiver for surveillance and monitoring of RF communications from 5 kHz to 30 MHz with 1-Hz tuning resolution. The unit is packaged in a 3.5 x 8.25 x 20 inch (8.89 x 20.96 x 50.80 cm) half-rack enclosure, and utilizes the same RF and Digital printed circuit boards as the WJ-8711A. By combining analog and digital signal processing, the WJ-8712P achieves high performance at low cost.

The front panel design maintains a user-friendly operator interface similar to the WJ-8711A, but in a half-rack version. All of the WJ-8712P functions are accessible through its front panel.

The WJ-8712P displays provide frequency and mode readouts in an easy-to-read format. A dedicated numeric keypad eliminates cumbersome multiple-key operations. Since the signal level is displayed on a bargraph, it provides the user with an analog-type signal strength indication.

RECEIVER CONNECTORS

I/O	Function	Type
Input	Antenna External Reference Power Mute	BNC BNC IEC 3-pin Terminal Block
Output	Signal Monitor IF Line Audio Output A Line Audio Output B Speaker dc-coupled Audio Squelch Headphone Received Signal Strength Indicator	BNC BNC Terminal Block Terminal Block Terminal Block Terminal Block Terminal Block Standard 1/4-in jack Terminal Block
Bidirectional	CSMA Remote Interface RS-232 Remote Interface Control Interface Test Port	1/8th-in miniature stereo jack 25-pin female D-shell 25-pin D-shell

SPECIFICATIONS

Frequency Range 5 kHz to 30 MHz (Tunable to 0 Hz, degraded performance below 500 kHz)

Tuning Resolution 1 Hz

Internal Reference Stability Better than 0.7 PPM (0 to 50°C)
Better than 0.2 PPM (0 to 50°C) with REF option

External Reference Frequency Accepts 1, 2, 5 or 10 MHz (± 1 PPM or better, 200 mV rms into high-impedance load); automatically switches to external reference upon application of signal

Synthesizer Lock Time >10 msec, typical

Antenna Input

Impedance 50 ohms, nominal

VSWR 2:1, max at receiver's tuned frequency

Maximum Input Signal +30 dBm

Connector BNC, female

3rd-Order Intercept Point +30 dBm typical
..... +25 dBm, min (for signals separated by 50 kHz, min)

2nd-Order Intercept Point +60 dBm, typical

Noise Figure 14 dB, max (11 dB, max with Preamplifier engaged)

Detection Modes SAM, AM, FM, CW, USB, LSB & ISB (Consult factory for additional modes)

IF FILTER SPECIFICATIONS

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3-dB Bandwidth (kHz)**	Maximum Shape Factor (3/60 dB)	Typical Group Delay Variation (100% of 3-dB Bandwidth)
0.3	1.35:1	50 μ S
1.0	1.40:1	30 μ S
3.2	1.25:1	30 μ S
6.0	1.25:1	40 μ S
16.0	1.25:1	60 μ S
USB/LSB/ISB (3.2)	1.25:1	30 μ S

IF FILTER SET (NOMINAL 3-DB BANDWIDTH IN HZ)

56	113	225	450	900	1800	3600	7200	14400
63	125	250	500	1000	2000	4000	8000	16000
69	138	275	550	1100	2200	4400	8800	
75	150	300	600	1200	2400	4800	9600	
81	163	325	650	1300	2600	5200	10400	
88	175	350	700	1400	2800	5600	11200	
94	188	375	750	1500	3000	6000	12000	
100	200	400	800	1600	3200	6400	12800	

The 900 through 3200 Hz bandwidths are available in SSB detection mode.

SENSITIVITY (500 KHZ TO 30 MHZ)

Modulation	IFBW (kHz)	S+N/N (dB)	Without Preamp Min dBm/(mV)
AM (50% mod. at 400 Hz)	6.0	10	-103/(1.58)
FM (4.8-kHz dev. 400 Hz mod)	16.0	17	-99/(2.50)
USB/LSB/ISB	3.2	10	-112/(0.56)
CW	0.3	16	-116/(0.35)

CW Sensitivity, 5 kHz to 500 kHz, without Preamp

(0.3-kHz IF Bandwidth)

50 to 500 kHz	-113 dBm/0.5 mV typical for 16 dB S+N/N
20 to 50 kHz	-105 dBm/1.27 mV typical for 16 dB S+N/N
5 to 20 kHz	-78 dBm/28 mV typical for 16 dB S+N/N

IF Output

Center Frequency	455 kHz, nominal
Output Level	-20 dBm, nominal
Output Impedance	50 ohms, nominal
Connector Type	BNC, female

Signal Monitor Output

Center Frequency	455 kHz, nominal (inverted)
Bandwidth	30 kHz (-6dB), min
Output Level	30 dB above RF input, nominal
Output Impedance	50 ohms, nominal
Connector Type	BNC, female

Gain Control Modes Manual, AGC-Fast, -Medium & -Slow

AGC Range	100 dB, min
AGC Threshold	Variable from -108 dBm (0.9 mV) in 16-kHz bandwidth Variable from -125 dBm (0.12 mV) in 300-Hz bandwidth (Threshold minimum matched with IFBW & is typically 10 dB above noise floor)
AGC Attack Time	5 msec, typical
AGC Decay Time	Fast: 10 to 100 msec Med: 100 msec to 1 sec Slow: 1 to 5 sec

Selectable Front-End Gain/Attenuation

Preamplifier Gain	10 dB (± 2 dB)
Attenuation	15 dB (± 2 dB)

BFO

Tuning Range	± 8000 Hz
Tuning Resolution	10 Hz

1st Image Rejection 90 dB, min

IF Rejection 85 dB, min (> 90 dB, typical)

LO Phase Noise -110 dBc at 1-kHz offset, typical

Reciprocal Mixing With a desired signal of 25 mV in the 3.2-kHz IFBW, the desired SNR ratio is > 20 dB, when an undesired signal 70-dB higher in amplitude & 35-kHz removed in frequency is present

Cross-Modulation With a desired signal of 10 mV, an undesired signal 86-dB higher & 30% AM modulated produces $< 10\%$ cross-modulation for frequency separation of > 50 kHz in the 1-kHz IFBW

Internal Spurious < -114 dBm referred to the RF input

Blocking	An unwanted 1 mV signal separated 20 kHz from a desired signal of 1 mV will not cause the IF output to fall by more than 3 dB
Line Audio Outputs	
Number of Outputs	2 center-tapped, balanced ISB mode: USB & LSB on separate All other modes: audio signal common to both outputs
Output Level	0 dBm, nominal into 600-ohm load
Connector Type	Screw terminals
Speaker Output	
Number of Outputs	1 ISB mode: USB & LSB selected individually, or combined
Bandwidth	100 Hz to 13 kHz
Output Level	500 mW, nominal into 8-ohm load
Total Harmonic Distortion	<3% at 1 W
Connector Type	Screw terminals
Headphone Output	
Number of Outputs	2, unbalanced ISB mode: 1 output contains USB (left channel), the other contains LSB (right channel) All other modes: audio signal common to both outputs
Output Level	Adjustable up to 10 mW into 600-ohm load
Connector Type	Standard 1/4-in stereo jack
Remote Control	RS-232 or CSMA (selectable by internal switch)
RS-232	Full-duplex, 3-wire serial interface (Rear-panel 25-pin female D-shell connector)
CSMA	Half-duplex, rear-panel miniature phone jack
Baud Rates (Both Interfaces)	75, 150, 300, 600, 1200, 2400, 4800 & 9600 (selectable by internal switches)
ENVIRONMENTAL SPECIFICATIONS	
Operating Temperature	0 to +50oC
Storage Temperature	-40 to +70oC
Humidity	95% non-condensing
Altitude	50,000 ft (15,240 meters) non-operating 24,000 ft (7,315 meters) operating
Shock	Bench handling (field service) 8 drops total onto a horizontal hard wooden surface - operating
MTBF	In excess of 13,000 hours (Estimated in accordance with MIL-HDBK 217E for ground fixed)
Power Requirements	97 to 253 Vac, 47 to 440 Hz
Power Consumption	<30 W, typical with options

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