

WJ-8626A-4 HF RECEIVER/RECEIVER CONTROLLER



FEATURES

- Half-Rack General Purpose HF Receiver/Receiver Controller
- High Dynamic Range
- Full Local or Remote Control
- Indicating Microprocessor Front Panel With 48-Character Alphanumeric Display
- Five Selectable IF Bandwidths
- AM, FM, CW, USB and LSB Detection Modes
- Extensive Uncommitted ROM and RAM for User-Defined Applications
- Master Handoff/Monitor/Control Functions With Up to 34 WJ-9040 VLF/HF/VHF/UHF Handoff Receivers

DESCRIPTION

The WJ-8626A-4 Receiver is a fully synthesized, microprocessor-controlled receiver capable of local or remote control for surveillance applications in the 5 kHz to 30 MHz frequency range. Two half-rack units, when mounted side by side in a fully equipped 19-inch WJ-9040 System Equipment Frame, occupy only 5.25 inches of vertical rack space, while maintaining the WJ-9040 System characteristics of low power consumption, modular construction and high performance. Each unit is a complete, synthesized, high dynamic range HF receiver with five selectable IF bandwidths and AM, FM, CW, USB and LSB detection modes.

SSB detection is achieved with a 2.85 kHz or 3.2 kHz filter used in conjunction with offset local oscillators. This filter also

acts as one of five selectable IF bandwidths for AM, FM or CW detection. Additional options are available which would permit a user-specified SSB bandwidth. Where optimum carrier rejection performance may be critical, separate USB/LSB filters may be provided, leaving three remaining choices for IF bandwidth selection.

In the local mode, variable tuning resolution to 10 Hz is provided with stability equal to that of the WJ-9040 Equipment Frame's 50 MHz reference. External locking of the Equipment Frame's reference is available for improved accuracy. The receiver's front panel includes both a general purpose keypad for direct entry of all parameters, and a tuning knob for sweep tuning of frequency, COS threshold, and BFO offset. Front panel versatility is enhanced with dedicated control of detection mode, IF bandwidth, gain mode, RF and audio gain. Additional dual purpose keys facilitate control of the WJ-8626A-4's memory functions in both the stand alone and Master Receiver applications.

The microprocessor-controlled, general purpose keypad and Liquid Crystal Display (LCD) provide 48-character alphanumeric and graphic display of operating status. The LCD is utilized in two modes of operation, both intended to significantly increase operator confidence and simplicity of control. In the "normal" mode all receiver parameters are displayed, including a graphic comparison of the relative signal strength vs. COS threshold and a unique center tuning feature. Channel scan and optional sector scan parameters are easily set up and modified by using the "scan set" mode. Dwell time on signals above a selected COS level, in addition to dwell on frequency once COS drops below threshold, are independently displayed on the LCD while in the "set" mode.

CAPABILITIES

The WJ-8626A-4 Receiver installed in an appropriately equipped WJ-9040 Equipment Frame offers a high degree of flexibility, primarily achieved through the NSC800 Microprocessor. The WJ-8626A-4's memory configuration provides 56 Kbytes of ROM and 8 Kbytes of RAM to allow for future software expansion. Specialized software may provide unique performance in conjunction with other WJ-9040 Receivers and ancillary devices.

The WJ-8626A-4 is capable of talk/listen communication within its own WJ-9040 Equipment Frame. An external controller may send command/control information to the unit via the IOM108, either to interrogate its status or change its tuning parameters when in a remote mode. IEEE-488 or RS-232 interface options in the IOM108 provide easy configuration with other equipment for system applications.

When used as a Master Receiver Controller (option/MH), the WJ-8626A-4 generates a high speed WJ-9040 I/O data stream from a BNC connector on the rear panel. This 50-ohm asynchronous link may be connected to any IOM108 for direct control of all receivers in that frame.

The Master Controller's capabilities would then include hand-off of tuning parameters to any configured "slave" receiver. After the initial downloading of data, that receiver can be monitored, with signal strength, COS status and center tuning continuously updated and displayed on the WJ-8626A-4 front panel. Since the WJ-8626A-4 is a true "Controller", all parameters and status of a "slave" receiver may be directly controlled without affecting the status of the Master's receiver section.

Using quarter-rack units, the WJ-8626A-4 can effectively control up to 34 WJ-9040 series, VLF, HF, VHF, or UHF Handoff Receivers.



**WJ-9040 Rack Illustration
Utilizing Handoff Receivers**

FUNCTIONAL DESCRIPTION

A simplified receiver block diagram is shown in Figure 1. RF signals between 5 kHz and 30 MHz are input to the receiver through a seven-pole low pass filter followed by optional switched suboctave preselectors. The signal is then mixed up to 42.905 MHz by the first LO, amplified, and band-limited by a 40 kHz wide crystal filter.

The first LO tunes from 42.92 to 72.91 MHz in 10 kHz steps; therefore, the first IF frequency may fall anywhere between 42.900 and 42.910 MHz. The first IF is then converted in the second mixer by the second LO, which tunes from 32.21 to 32.20 MHz in 10 Hz steps, to provide a 10.7 MHz second IF which is passed through a 17 kHz wide roofing crystal filter.

The 10.7 MHz signal is next mixed with the third LO, fixed at 11.155 MHz, and converted to 455 kHz where it is amplified and passed through one of five selectable IF bandwidths. One of these is used in conjunction with offset synthesizers to demodulate SSB. The 455 kHz SM output is taken directly after this

conversion and, therefore, is 17 kHz wide or 30 kHz with optional SMO. A predetected IF output is also available and has a bandwidth equal to that of the IF bandwidth selected.

The signal is then passed through a selected demodulator and an AGC Amplifier. Demodulation modes are either AM, FM, CW, USB, or LSB. In all modes, the AM detector output is used by the AGC, COS, and signal strength circuits. In the CW and SSB mode, the signal is mixed down to baseband via a phase-locked oscillator tuning 455 ± 8 kHz in 100 Hz steps.

All detection modes pass their signals to either a video output which has a bandwidth equal to one-half the IF bandwidth selected, or to an audio output. Auxiliary AM, FM and CW/SSB outputs as well as a front panel phones output are also available.

The time base circuitry converts an external 50 MHz reference input from the WJ-9040 System to 2 MHz for use by the synthesizers.

All receiver power is supplied by the WJ-9040 EPS100A switching power supply which is mounted in the WJ-9040 EFR100 Equipment Frame.

SPECIFICATIONS

Tuning Frequency	5.0 kHz to 30.00000 MHz
Tuning Resolution	10 Hz
Synthesizer Tuning Speed.....	15 ms, typical
Antenna Conducted Local Oscillator Radiation	-87 dBm, maximum
Antenna Input Protection	The antenna input will withstand the effects of RF power to +27 dBm and static buildup. The protection circuit automatically resets
Input Impedance	50 ohms, unbalanced, nominal
IF Bandwidths (3 dB)	2.85 kHz or 3.2 kHz recommended for SSB; plus any four of the following: 0.1, 0.2, 0.5, 1, 2, 3, 4, 6, 8, 12 or 16 kHz; USB, LSB
Detection Modes	Standard: FM, AM, CW, LSB and USB
Gain Control Modes	Manual, AGC
AGC and Manual Range	90 dB, minimum
AGC Threshold.....	3.0 microvolt, typical
AGC Attack Time.....	15 ms, maximum
AGC Release Time.....	AM, FM = 100 ms, maximum
	CW, SSB = 2 to 4 seconds, nominal
Synthesized BFO.....	±8.0 kHz in 100 Hz steps
IF Rejection	Greater than 90 dB
Image Rejection	Greater than 90 dB
Sensitivity	See IF Options and Sensitivity Table
IF Output	455 kHz, 20 mV into 50 Ω, minimum, at 3 microvolt input level, IF bandwidth limited
Signal Monitor Output	455 kHz, center frequency, 17 kHz bandwidth, 50 Ω output impedance
Third Order Input Intercept Point	+20 dBm, minimum for signals separated by 30 kHz minimum
Video Amplifier Response	Within 3 dB from 20 Hz to 1/2 IF Bandwidth
Video Output Level	350 mV rms into 75 ohms
Video Distortion.....	Less than 5% total harmonic distortion in AGC or Manual Gain modes
Phones Output	10 mW minimum into 600 Ω phones
Signal Strength Output	Shaped DC AM Detector output, 0 to + 10 Vdc
Squelch/COR.....	Adjustable threshold from noise level to 80 dB above noise. COR holds a nominal 4 seconds after carrier disappears
Digital Control	80 Bit Serial Word (WJ-9040 System compatible)
Environmental Conditions:	
Temperature, Operating	0° to + 50°C
Temperature, Non-Operating.....	-40°C to +70°C
Size	5.2 inches (132 mm) high, 8.0 inches (203 mm) wide, and 14.38 inches (365 mm) deep
Weight.....	Approximately 15 lbs.

WJ-8626A-4 OPTIONS

WJ-8626A-4/PRE	Automatically switched, ten band sub-octave preselector enhances second order intermodulation characteristics. Preselector insertion loss modifies sensitivity by -2 dB.	WJ-8626A-4/SCAN... F1/F2 Sector Scan software. Five start/stop frequencies, variable step sizes and signal lockouts programmable from receiver front panel.
WJ-8626A-4/SMO	The standard signal monitor output is expanded to a 30 kHz bandwidth.	
WJ-8626A-4/MH	Master/Handoff software allowing the control of up to 34 WJ-9040 Handoff VLF/HF/VHF/UHF Receivers.	
*WJ-8626A-4/FSK	Frequency Shift Keying option provides demodulation of binary FSK signals with shifts of less than 50 Hz to greater than 2000 Hz. Provides for tuning indicators on front panel. Bipolar EIA or RS-232/C and mon-polar TTL/CMOS 5VDC logic, compatible outputs.	

*See separate data sheet for detailed WJ-8626A-4/FSK description.

IF OPTIONS AND SENSITIVITY LEVELS

	3 dB IF Bandwidth	IF Shape Factor (Typical) 60 dB:3 dB	RF Input Microvolts	Level dBm
		W-J		
WJ-9926/100				
WJ-9926/200	200 Hz	10:1	0.50	-112
WJ-9926/500	500 Hz	7:1	0.64	-111
WJ-9926/1K	1 kHz	5:1	0.80	-109
WJ-9926/2K	2 kHz	3:1	1.0	-107
WJ-9926/3K	3 kHz	3:1	1.4	-104
WJ-9926/4K	4 kHz	3:1	1.6	-103
WJ-9926/6K	6 kHz	3:1	2.0	-101
WJ-9926/8K	8 kHz	3:1	2.2	-100
WJ-9926/12K	12 kHz	3:1	2.9	-98
WJ-9926/16K	16 kHz	2:1	3.2	-97
WJ-9926/USB	2.85 kHz	1.8:1	0.7	-110
WJ-9926/LSB	2.85 kHz	1.8:1	0.7	-110
WJ-9926/SSB	2.85 kHz	1.8:1	0.7	-110

(Uses offset LO)

SENSITIVITY

Over the frequency range of 0.2 to 30 MHz, the RF input levels and IF Bandwidths specified above will:

1. Produce a minimum AM (S+N)/N ratio of 10 dB at the audio for 50% AM modulation at a 400% Hz rate (kHz and wider IF Bandwidths).
2. Produce a minimum CW (S+N)/N ratio of 16 dB at the audio output.
3. Produce a minimum FM (S+N)/N ratio of 17 dB at the audio output (10 kHz and wider IF Bandwidth).
4. Produce a minimum USB/LSB (S+N)/N ratio of 10 dB at the audio output (SSB Filters only).

Over the frequency range of 5 kHz to 200 kHz, the following applies.

- CW Sensitivity
(1 kHz IF Bandwidth)
- 200 kHz to 30 MHz ... A 0.8 microvolt signal will produce at least a 16 dB (S+N)/N ratio at the audio output
 - 50 kHz to 200 kHz A 1.8 microvolt signal will produce at least a 16 dB (S+N)/N ratio at the audio output
 - 15 kHz to 50 kHz A 7.1 microvolt signal will produce at least a 16 dB (S+N)/N ratio at the audio output
 - 5 kHz to 15 kHz. A 128 microvolt signal will produce at least a 16 dB (S+N)/N ratio at the audio output

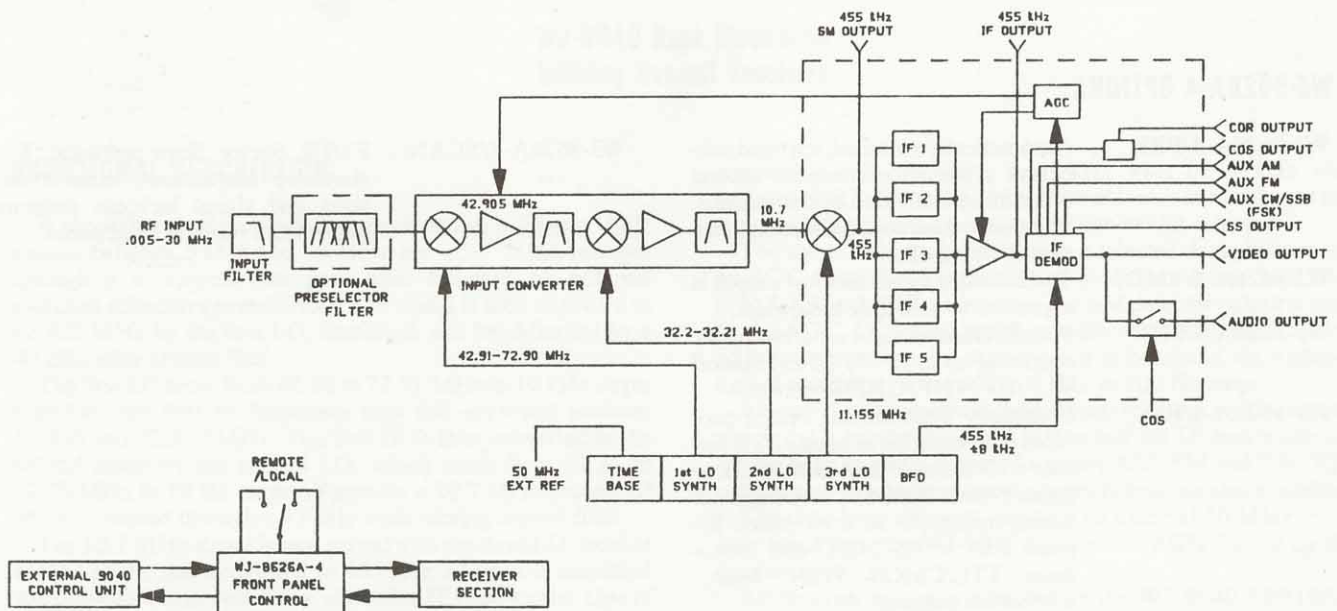
WJ-8626A-4 HF RECEIVER CONNECTIONS

Equipped with 25-Pin D Series Connector supporting the standard WJ-9040 Equipment Frame control I/O, DC input voltages, and Polled I/O structure.

RF Input SMA Female Connector
 SM Output SMA Female Connector
 Selected Video Output SMA Female Connector
 IF Output SMA Female Connector
 50 MHz Reference Input SMA Female Connector

Auxiliary I/O Connector 9 Pin SRE Female
 Pin Assignments:

- A Ground
 - B FM Audio Output
 - C AM Audio Output
 - D Signal Strength Output (Analog 0 to +10 V)
 - E Carrier Operated Relay Control (open collector, 30 mA sink to ground for switching +24 Volt maximum external voltage)
 - F Carrier Operated Squelch (0 to 5 V)
 - H CW/SSB Audio Output, (FSK option)
 - J Squelched Audio Output
 - K Tuning Sense (-5 V to +5 V Analog)
- WJ-9040 I/O (option) BNC Female Connector



WJ-8626A-4 HF Receiver
Simplified Block Diagram