



137.10

# WJ-8626A-1 HF HANDOFF RECEIVER



### FEATURES

- 5 kHz to 30 MHz Frequency Coverage
- Tuning Resolution of 10 Hz Using Low Phase Noise Synthesizers
- AM, FM, CW, USB and LSB Detection Modes
- $\pm 8$  kHz BFO Tunable in 100 Hz Steps
- One-Quarter Rack Size
- Five Selectable IF Bandwidths
- WJ-9040 System Compatible

### DESCRIPTION

The WJ-8626A-1 HF Receiver is a fully synthesized, digitally controlled receiver covering the 5 kHz to 30 MHz frequency range in 10 Hz steps. This surveillance handoff and monitoring receiver is designed to conform to the WJ-9040 System characteristics of low power consumption, modular construction, and high performance, while occupying only one quarter of a standard 19-inch equipment frame.

The WJ-8626A-1 features high dynamic range, low noise amplifiers in the tuner section which produce a +20 dBm third order intercept point, and high sensitivity. Fully synthesized, low noise local oscillators convert RF frequencies to 42.905 MHz, 10.7 MHz, and then to the final IF frequency of 455 kHz. This results in Image and IF rejection of greater than 90 dB, local oscillator re-radiation of less than -87 dBm, and minimal spurious response.

The WJ-8626A-1 demodulates AM, FM, CW, LSB, and USB signals using up to five selectable IF bandwidth filters. Typically, a nominal 2.85 kHz symmetrical filter is used for the SSB detection modes. This is accomplished by offsetting the local oscillator and BFO frequencies. Other filters, including discrete sideband filters, may be used in place of the 2.85 kHz filter for special user applications. The symmetrical filter is also available for use in the other detection modes.

Other features include 90 dB of dynamic range using either manual or automatic gain control and 80 dB of squelch range. Numerous outputs are provided to facilitate interface with external processing and display equipment. These outputs include simultaneous AM and FM audio, selected video, prefiltered and filtered IF, Carrier Operated Squelch and Relay (COS and COR), signal strength, and other receiver-generated signals.

A single connector on the receiver rear panel is used to carry control information and route DC power voltages to the WJ-8626A-1 Receiver. This connector mates with the WJ-9040 EFR100 Equipment Frame backplane. The backplane interfaces the receiver to the equipment frame power supply (EPS100A) and Input/Output Module (IOM108). All control and status monitoring information is routed to and from the WJ-8626A-1 via the IOM108 I/O module. The IOM108 serves as the interface between the system controller, either local or external, and the receiver. The EPS100A accepts 110 VAC or 220 VAC, 47 to 400 Hz, and converts it to the DC voltages necessary to drive the receiver.

## CAPABILITIES AND APPLICATIONS

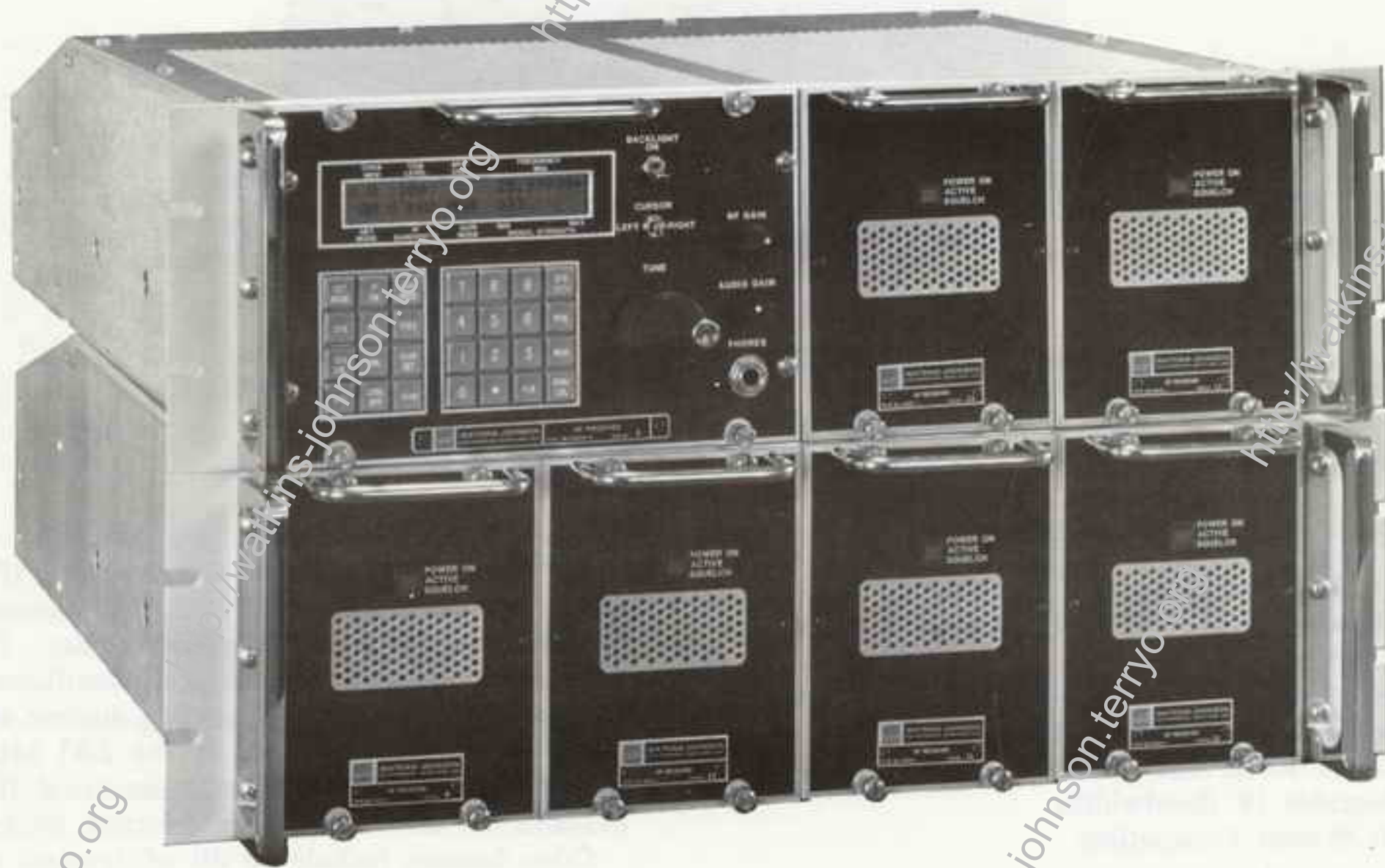
The WJ-8626A-1 may be used as either a remotely controlled HF receiver with channel scan capability (via the DIO option in an IOM108), or as a handoff receiver controlled by the WJ-8626A-4 HF Receiver/Controller.

The unit operates in conjunction with an IOM108 I/O Module which will store up to 99 channels for later recall and execution.

The handoff mode of operation utilizes a WJ-8626A-4 Master Receiver and results in extremely compact handoff

systems due to the small size of the WJ-8626A-1 Receiver.

Preselection is available through a separate quarter-rack switched suboctave HF preselector. This unit (PHF-10X) houses up to three preselectors and, when used in conjunction with the WJ-8626A-1 Receivers, results in three HF receivers with preselection in a single 19-inch frame.



WJ-9040 Master/Handoff Configuration

## FUNCTION 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. The signal is then mixed up to 42.905 MHz by the first LO, amplified, and band-limited by a 28 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. The 455 kHz signal monitor output is taken directly after this conversion and, therefore, is 17 kHz wide. 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  $455 \pm 8$  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 are also available.

The time base circuitry converts an external 50 MHz reference input from the WJ-9040 System to lower timebase frequencies 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 (tunable to 0 Hz)
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) .....	Optional; any five listed in IF Options table, or any three with discrete LSB and USB
Detection Modes .....	Standard: FM, AM, CW, LSB and USB
Gain Control Modes .....	Manual, AGC fast, AGC slow
AGC and Manual Range .....	90 dBm, minimum
AGC Threshold .....	3.2 microvolts, typical
AGC Attack Time .....	15 ms, maximum
AGC Release Time .....	AM, FM = 100 ms, maximum
Synthesized BFO .....	CW, SSB = 2 to 4 seconds, nominal
IF Rejection .....	±8.0 kHz in 100 Hz steps
Image Rejection .....	Greater than 90 dB
Sensitivity .....	Greater than 90 dB
IF Output .....	See IF Options and Sensitivity Table
Signal Monitor Output .....	455 kHz, 20 mV into 50Ω, minimum, at 3.2 microvolt input level, IF bandwidth limited
Third Order Input Intercept Point .....	455 kHz, center frequency, 17 kHz bandwidth, 50Ω output impedance
Video Amplifier Response .....	+20 dBm minimum, for signals separated by 30 kHz minimum
Video Output Level .....	Within 3 dB from 20 Hz to 1/2 IF bandwidth
Video Distortion .....	350 mV rms into 75 ohms
Signal Strength Output .....	Less than 5% total harmonic distortion in AGC or Manual Gain modes
Squelch/COR .....	Shaped DC AM detector output 0 to +10 VDC
Digital Control .....	Adjustable threshold from noise level to 80 dB above noise. COR holds a nominal 4 seconds after carrier disappears
Environmental Conditions:	72 Bit Serial Word (WJ-9940 System compatible)
Temperature, Operating .....	0 to +50°C
Temperature, Non-Operating .....	-40 to +70°C
Power Consumption .....	Approximately 13 watts DC input
Size .....	5.2 inches (132 mm) high, 4.0 inches (102 mm) wide and 14.38 inches (365 mm) deep
Weight .....	Approximately 10 lbs. (4.5 kg)

## IF OPTIONS AND SENSITIVITY LEVELS

	3 dB IF Bandwidth	IF Shape Factor (Typical) 50 dB:3 dB	RF Input Level	
			Microvolts	dBm
WJ-9926A-200	200 Hz	10:1	0.50	-113
WJ-9926A-500	500 Hz	7:1	0.64	-111
WJ-9926A-1K	1 kHz	5:1	0.80	-109
WJ-9926A-2K	2 kHz	3:1	1.0	-107
WJ-9926A-3K	3 kHz	3:1	1.4	-104
WJ-9926A-4K	4 kHz	3:1	1.6	-103
WJ-9926A-6K	6 kHz	3:1	2.0	-101
WJ-9926A-8K	8 kHz	3:1	2.2	-100
WJ-9926A-12K	12 kHz	3:1	2.9	-98
WJ-9926A-16K	16 kHz	2:1	3.2	-97
WJ-9926A-USB	2.85 kHz	1.8:1	0.7	-110
WJ-9926A-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)				
WJ-9926A-3.2K	3.2 kHz	1.4:1	0.8	-109
(May be used for SSB with 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-1 HF RECEIVER CONNECTIONS

Twenty-five (25) Pin D Series Connector supporting the standard WJ-9040 System digital control I/O, DC input voltages and System Pooled 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 Connector

Pin Assignments:

- A Ground
- B FM Audio Output
- C AM Audio Output
- D Signal Strength Output (Analog 0 to + 10V, 10 mA)
- 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 5V)
- H CW/SSB Audio Output
- J Squelched Audio Output

Control Output for  
Optional Preselector ..... 7 Pin SRE Female Connector

## OPTIONS

**WJ-8626A-X/WBO**—10.7 MHz signal monitor output, 100 kHz wide. (Certain specifications will degrade with use of this option.)

**WJ-8626A/SMO30**—The standard signal monitor output is expanded to a 30 kHz bandwidth.

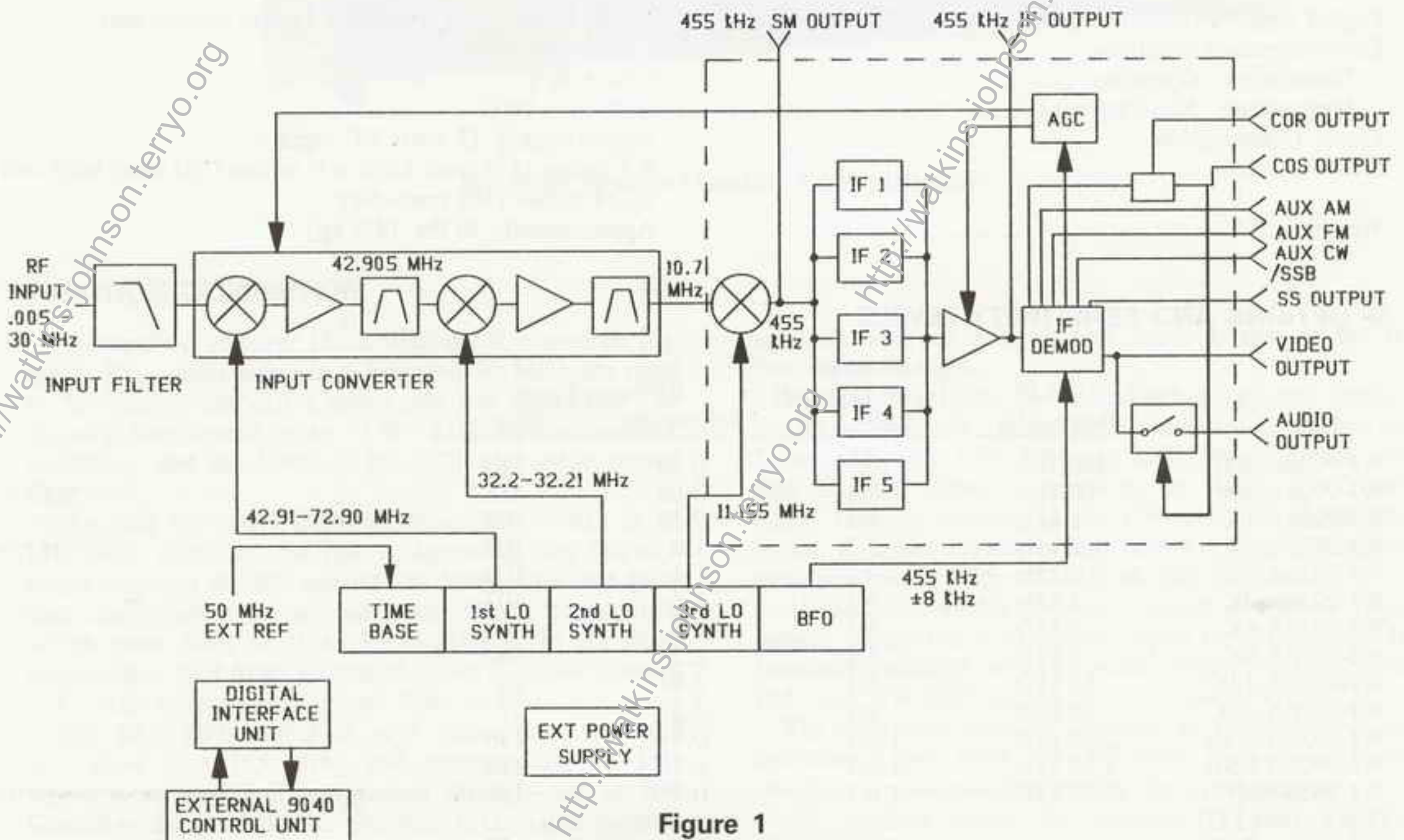


Figure 1  
WJ-8626A-1 HF Receiver  
Simplified Block Diagram