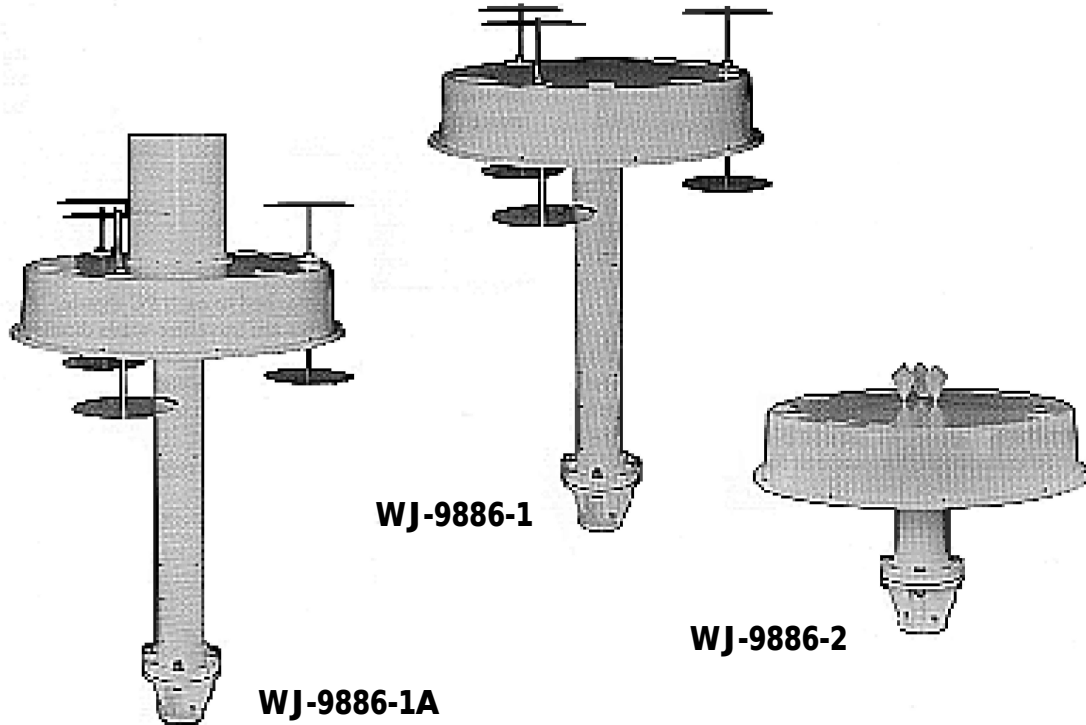


April 1994

# VHF/UHF DF Antenna Series WJ-9886



## Description

The WJ-9886 Antenna Systems, which can interface directly with the WJ-8986A N-Channel Direction Finding (DF) Receiver/Processor, fulfill a variety of needs and applications. Each system is comprised of several array types:

- External top-hats
- Internal hop-hats
- Internal traveling-wave dipoles
- Monocones

## Features

- Perform in various applications
- Interface directly with WJ-8986A N-Channel DF Processor
- Interface to WJ-8996-1 with adapter box
- Cover wide range of frequencies
- Provide maximum gain
- Light weight

### WATKINS-JOHNSON COMPANY

700 Quince Orchard Road, Gaithersburg, Maryland 20878-1794  
Phone: (800) WJHELPS or +(301) 948-7550  
FAX: +(301) 921-9479 Email: [wj.helps@wj.com](mailto:wj.helps@wj.com) Website: [www.wj.com](http://www.wj.com)

All International sales of WJ equipment are subject to USA export license approval.

This material provides up-to-date general information on product performance and use. It is not contractual in nature, nor does it provide warranty of any kind.

Different combinations of these arrays create the three antenna systems in this series. Each antenna covers a wide range of frequencies, while providing maximum gain along with light weight, durability and low cost.

The WJ-9886-1 and WJ-9886-1A antennas fit applications where good performance outweighs the need for a low-profile design. Both of these antennas have exceptional performance, yet maintain a moderate overall size. The WJ-9886-2 is a low-profile antenna with good performance, which can be mounted on various fixed or mobile platforms.

All three of the WJ-9886 antennas can be configured with three, four, or five elements per array, for use

with a three-, four-, or five-channel DF system, respectively. Three-channel DF systems work well in fixed-site applications where antenna placement is optimized. However, in mobile roof-mount applications, or where the antenna system is co-located near reradiating structures, a four- or five-channel DF system should be used for improved DF performance.

Cables to connect a WJ-9886 antenna to a DF system are not provided with the antenna. However, the mating connector for the control connector jack is provided for customer wiring. If cables are desired, make this known when placing an order.

## WJ-9886-1 Description

The WJ-9886-1 antenna has two bays of vertically polarized elements. The low frequency dipole elements are etched on fiberglass printed circuit (PC) cards that are enclosed within the antenna dome. The PC cards serve as a substrate for the elements, as well as structural support for the complete antenna assembly. To enhance performance at low frequencies,

external top-hats are attached to each PC dipole. The high frequency elements are traveling-wave dipoles that are also printed on fiber-glass substrate. These elements comprise an array that is enclosed within the antenna's mast section, along with the antenna switch matrix assembly.

## Specifications

<b>Frequency Range</b> .....	3-elements .....	20 to 1000 MHz		
	4-elements .....	20 to 1100 MHz		
	5-elements .....	20 to 1200 MHz		
<b>Type</b> .....	2, 4 or 5 Baseline Interferometer			
<b>Polarization</b> .....	Vertical			
<b>Element Length</b>				
Lower Bay .....	23 in (58.42 cm), Dipoles with external top-hats			
Upper Bay .....	11.0 in (27.94 cm), Traveling-wave dipoles			
<b>Baseline</b>				
		<u>3-Elements</u>	<u>4-Elements</u>	<u>5-Elements</u>
Lower Bay .....	31 in (78.74 cm)	25 in (63.50 cm)	21 in (53.34 cm)	
Upper Bay .....	5.0 in (12.70 cm)	4.1 in (10.41 cm)	3.4 in (8.64 cm)	
<b>Antenna Transfer Function</b> .....				
(typical values not including preamplifier gain)	Lower	Upper		
	<u>(MHz)</u>	<u>(MHz)</u>		
	20 0.08	201 0.03		
	50 0.10	500 0.03		
	100 0.26	1000 0.02		
	200 0.17			
<b>Operating Temperature Range</b> .....	-20 to +60°C			
<b>Humidity</b> .....	Water resistant			
<b>Weight</b> .....	Approximately 70 lbs (31.67 kg)			
<b>Wind</b> .....	100 mph with 0.5 in (1.27 cm) radial ice			

## WJ-9886-1A Description

The WJ-9886-1A antenna uses the same array configuration as the WJ-9886-1 antenna, with the addition of a third array covering up to 2000 MHz. This array is located above the main antenna dome in a separate cylindrical radome. It consists of monocone elements above a suspended ground plane. The area of this ground plane is effectively increased by the low-frequency top-hats that extend above the main dome co-planar to the ground plane.

**Table 1. Field Strength for ±5° Jitter\***

Bay**	Frequency (MHz)	Field Strength (μV/m)
Lower	20	13.34
	50	3.76
	100	0.60
	200	0.84
Middle	201	5.96
	500	3.51
	1000	5.43
Upper	1001	10.84
	1500	9.44
	2000	9.33

\* Typical sensitivity data for a WJ-8986 NDF System using a WJ-9886-1A Antenna (Resolution bandwidth = 1.56 kHz; integrated count = 50 samples)

\*\* Bay-switching frequencies may be increased for 5-channel systems to achieve a larger electrical aperture and better sensitivity.

## Specifications

<b>Frequency Range</b> .....	20 to 2000 MHz		
<b>Type</b> .....	3, 4 or 5 Baseline Interferometer		
<b>Polarization</b> .....	Vertical		
<b>Element Length</b>			
Lower Bay .....	23 in (58.42 cm), Dipoles with external top-hats		
Middle Bay .....	11.0 in (27.94 cm), Traveling-wave dipoles		
Upper Bay .....	2.75 in (6.99 cm), Monocones		
<b>Baseline</b>	<u>3-Elements</u>	<u>4-Elements</u>	<u>5-Elements</u>
Lower Bay .....	31 in (78.74 cm)	25 in (63.50 cm)	21 in (53.34 cm)
Middle Bay .....	5.0 in (12.70 cm)	4.1 in (10.41 cm)	3.4 in (8.64 cm)
Upper Bay .....	2.35 in (5.97 cm)	2.35 in (5.97 cm)	2.35 in (5.97 cm)
<b>Antenna Transfer Function</b> .....	Lower Bay	Middle Bay	Upper Bay
(typical values not including preamplifier gain) .....	<u>(MHz)</u>	<u>(MHz)</u>	<u>(MHz)</u>
	20 0.08	201 0.03	1001 0.02
	50 0.10	500 0.03	1500 0.01
	100 0.26	1000 0.02	2000 0.02
	200 0.17		
<b>Operating Temperature Range</b> .....	-20 to +60°C		
<b>Humidity</b> .....	Water resistant		
<b>Weight</b> .....	Approximately 75 lbs (33.93 kg)		
<b>Wind</b> .....	100 mph with 0.5 in (1.27 cm) radial ice		

## WJ-9886-2 Description

The WJ-9886-2 has the same low frequency, 20 to 200 MHz, configuration as the WJ-9886-1 and WJ-9886-1A. However, the element top-hats are enclosed within the main dome, providing a significantly smaller vertical profile. The

high-frequency elements, covering 200 to 1200 MHz, are monocones that protrude through the top of the main dome enclosure. The ground plane for this array is contained within the dome, with an effective area increased by the low-frequency upper-top-hats.

## Specifications

<b>Frequency Range</b> .....	3-elements .....	20 to 1200 MHz		
	4-elements .....	20 to 1000 MHz		
	5-elements .....	20 to 1700 MHz		
		(2000 MHz with some degraded performance)		
<b>Type</b> .....	2, 4 or 5 Baseline Interferometer			
<b>Polarization</b> .....	Vertical			
<b>Element Length</b>				
Lower Bay .....	8 in (20.32 cm), Dipoles with external top-hats			
Upper Bay .....	4.5 in (10.43 cm), Monocones			
<b>Baseline</b>				
		<u>3-Elements</u>	<u>4-Elements</u>	<u>5-Elements</u>
Lower Bay .....	31 in (78.74 cm)	25 in (63.50 cm)	21 in (53.34 cm)	
Upper Bay .....	4.0 in (12.16 cm)	4.0 in (10.16 cm)	4.0 in (10.16 cm)	
<b>Antenna Transfer Function</b> .....				
(typical values not including preamplifier gain)	Lower	Upper		
	(MHz)	(MHz)		
	20 0.02	201 0.03		
	50 0.06	500 0.06		
	100 0.10	1200 0.09		
	200 0.13			
<b>Operating Temperature Range</b> .....	-20 to +60°C			
<b>Humidity</b> .....	Water resistant			
<b>Weight</b> .....	Approximately 70 lbs (31.67 kg)			
<b>Wind</b> .....	100 mph with 0.5 in (1.27 cm) radial ice			