

Wrist Band DF-400 Miniature VHF/UHF Direction Finding System

FEATURES

- 4-element pseudo-Doppler system
- Miniature body-wearable active antennas
- Unique radial histogram statistical DF
- Active LED display with dimming
- Miniature display can be wrist worn
- VHF/UHF operation
- Usable with any FM receiver

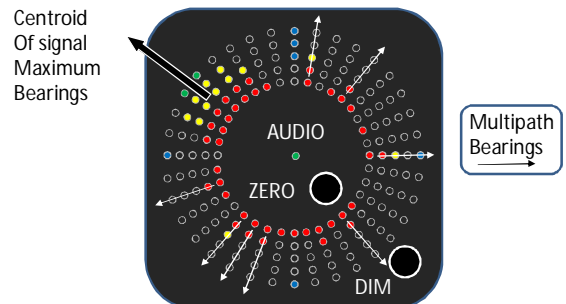
DESCRIPTION

The Wireless Innovations DF-400 is a miniature VHF/UHF DF system that may be body worn or inconspicuously mounted on a platform. The system utilizes a classical 4 element pseudo-Doppler DF antenna array and processor, and operates in conjunction with a user-provided receiver's audio output.

The four antennas are each an active, zero db gain voltage probe antenna which operates from 50-3000 MHz. The high dynamic range active antennas are approximately 3 x 0.5 x 0.1 inches, and built on a flexible printed circuit board to allow embedding in clothing. Each antenna connects to the DF processor via a 0.086 inch diameter coaxial cable.

The pseudo-Doppler processing circuits are packaged into a small 2.5 x 2.5 x 0.5 inch (approximate) case. The four DF antennas connect to the unit, and one cable (antenna output) connects to the user-provided receiver. An audio cable connects the receiver to the DF unit. Power to the DF processor is supplied from an external 5-28 vdc source (not included).

The DF processor features a unique radial histogram LED DF display. Each of 36 radials (corresponding to 10 degree increments) has five LEDs of different colors. The five LEDs in each radial represent a bar graph of the number of DF readings that were taken for that direction radial. The Doppler array is electronically "rotating" 500 revolutions/second; hence the DF processor records 500 bearings/second. Those bearings are summed by radial and scaled to the largest value. Thus the DF



display is a circular bar graph display showing the distribution of DF bearings taken. This is very important in the real world environment, where noise and multipath often mask the target signal. Our experience has shown that the multipath and noise are randomly distributed bearings, while the target signal is steady and unvarying in bearing. Thus the target signal will be the largest bar/group on the display. Where multiple bars comprise a broad bearing toward the target signal, the bar group is easily visually centroided to point accurately to the signal. A convenient ZERO button is provided on the display to reset the statistics as desired. A DIMMER button allows varying display brightness as needed.



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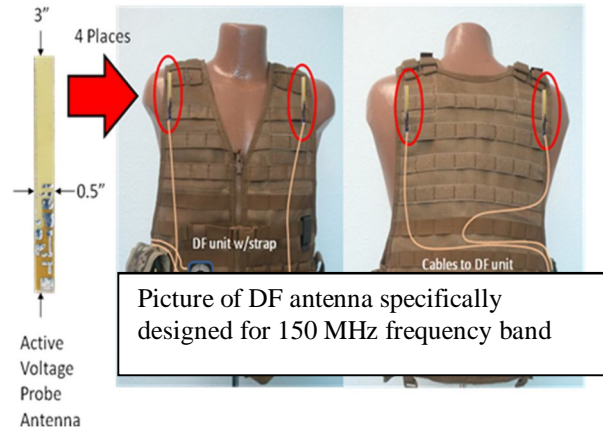
The DF processor has a manual time delay and DF calibrate switch to accommodate receivers with differing time delays. The user simply acquires a known reference signal location and repeatedly pushes the calibrate button to align the display correctly. Calibration is stored.

The DF display also has dual blue LEDs to indicate a reference direction (i.e., ahead), and three orange LEDs at the 90 degree ordinal points.

ANTENNA CONFIGURATION

The configuration of the four antenna elements is critically governed by the laws of physics. For the DF system to operate correctly, the four antennas MUST be arranged at corners of a square. The side of the square MUST be $\frac{1}{4}$

wavelength at the center of the operating frequency band (i.e., 6"/450 MHz, 18"/150 MHz, 54"/50 MHz); accuracy will degrade as the frequency moves away from the $\frac{1}{4}$ wavelength separation frequency. For optimum DF results, it is incumbent on the user to adjust the spacing when setting up and/or installing the DF-400 according to the desired band.



SPECIFICATIONS

Parameter	Specification
DF PARAMETERS	
Frequency range.....	30 to 3000 MHz
DF accuracy.....	+/-5 deg RMS (with 1/4 wavelength antenna spacing)
Sensitivity.....	0 dbi gain DF antennas
Rotation/update rate.....	500 Hz
Audio input.....	0.25 vrms (internal AGC), high impedance load
DISPLAY	
Format.....	Multicolor LED display, 36 radials, 10 degree increment 5 level bar graph per radial displays total hits vs bearing
Controls.....	Zero statistics, dimmer, calibrate, calibrate lock, power
PHYSICAL	
Power input.....	5-28 vdc
Power consumption.....	200 milliwatts nominal
Weight.....	Approx 4 oz with antennas, cables (less radio)
Size.....	each
Connectors.....	3.5mm audio; SMA RF (5)
Operating temperature range.....	-20 to 55°C
Specified performance.....	25 ± 5°C
Non-operating temperature range.....	-40 to +70°C
Operating altitude.....	0 to 12,000 ft (0 to 3657 m)
Operating humidity.....	10 to 90% non-condensing (waterproof seal)