WD-6200

High-performance MF/HF phase-coherent interferometer DF System

- Frequency range 500 kHz to 40 MHz
- High accuracy medium aperture antenna
- Rapid and simple deployment
- Low visibility antennas
- High sensitivity
- Effective against short duration signals
- Provides area of target location using SSL
- Typical accuracy better than 2 degrees SD
- Common reference providing phase-coherency
- Utilises direct-sampling DDC based receivers
- Low power consumption
- Expandable to correlative interferometer
- Portable receiver system

The WiNRADiO WD-6200 Direction Finding System employs a sophisticated phase-coherent multi-channel interferometer-based method, combined with statistical signal processing, to deliver a cost-effective yet robust and accurate HF DF solution for government, military, and law enforcement applications.

The system is small, lightweight and ruggedized, suited for deployment in stationary and portable situations.

The system offers unparalleled flexibility given its SDR architecture, high accuracy and sensitivity performance, making it capable of filling not only the role of a direction finding system but also that of a highly capable HF COMINT intercept receiving system.

Each WD-6200 system comprises of three main parts: antenna array, phase-coherent receivers and processing computer.

The sense antennas utilised are specially designed high-gain active antenna monopoles. The antenna array size can simply be varied according to the desired frequency range of the system, whereby the antennas are positioned in a “L”-shape configuration, which each leg being typically 5 meters in length for optimum coverage from 3 MHz to 30 MHz, and typically 10 meters for best coverage between 1 MHz to 15 MHz.

The receivers are a phase-coherent variant of the well-proven WR-G33DDC SDR, fitted into a rugged portable enclosure.

An integrated tablet computer is used for interfacing with the system, and for processing and analysing the received signals.

In addition to accurate azimuth measurements, the WD-6200 system is also capable of measuring the elevation of an incoming signal. Providing the height of the reflecting ionospheric layer is known, it allows for an estimation of the target’s location, without having to revert to a traditional multi-sensor approach for the necessary triangulation.

The entire antenna array can be assembled by two people in less than 30 minutes, while the receivers and the processing computer system can be operated either stationary or setup inside a suitable vehicle.

Combining modular hardware design with innovative software, the WiNRADiO WD-6200 HF Direction Finding System exhibits flexibility and performance which usually is not available in conventional technology systems.

This is the first time an interferometer based MF/HF direction finding system with such advanced specifications and its combination of unique features has been made available in such an easy-to-use and cost effective package.

This has been made possible by combining the highly advanced range of COTS software-defined receivers and antennas developed by WiNRADiO for usage by government, military, security services, surveillance tasks and other demanding industrial applications.

Hardware

The WiNRADiO WD-6200 DF system breaks new ground with its state-of-the-art components, by utilizing the phase-coherent WR-G34DDC HF receiver together with specially designed high-gain active antenna monopoles.

The receiver system is mounted within a portable enclosure and can be powered either from AC mains or from automotive DC with optional converters, allowing for stationary as well as transportable deployment.

In order to operate the system efficiently, it is recommended that dual monitors are utilized, allowing DF operations to be performed on one monitor, without compromising the normal receiver control function.

Software

At the heart of the WD-6200 system is its sophisticated digital signal processing software. In addition to the standard WR-G3xDDC style graphical user interface, the system software also handles all of the complex mathematical functions and associated processes.

The system is entirely software-defined, which means that additional features and modes can easily be added by means of simple software changes.

The azimuth and elevation displays are established against the North reference, and show clearly the effect of reflections and other effects which degrade the bearing quality. A dynamically adjustable buffer allows the user to average the bearing samples over time. Histogram and waterfall displays also assist the operator.

There is also an integrated digital recorder, making it possible to instantly record and playback the received signal, both at the IF and audio levels.

Example showing azimuth and elevation of sky wave on HF band

Options

The system can be extended to include the following hardware and software options:

Crossed loop antenna for operation in Watson Watt mode for space limited deployments.

Client/Server option software to allow remote control of both receiver and DF functions.

The Triangulation/Mapping option requires multiple DF stations, which must be linked by a suitable TCP/IP networking infrastructure. The bearing data from the DF stations will be used for triangulation, with the resulting position displayed on a map overlay. Map source data is subject to separate licensing arrangements with the respective map provider.

Specifications

Receiver type	Direct-sampling, digitally down-converting software-defined receiver
DF frequency range	500 kHz to 40 MHz
DF process	3-element classical coherent interferometer
Number of receive channels	Three, utilising one receiver permanently connected to reference antenna, and one receiver which is commutated between N and E antenna elements
Sensor elements	AX-81SM/DF active monopoles with ground plane
Antenna aperture	½ wavelength at highest frequency
DF azimuth accuracy	Instrumental accuracy, < 0.5 degree following system calibration. Ground wave accuracy in typical deployment, < 2 degree SD
DF elevation accuracy	Instrumental accuracy, < 2 degree following system calibration
DF sensitivity	Typically signals greater than 3db above noise floor will show azimuth accuracy in accordance with above.
Signal duration	Typically a signal duration < 500ms duration will show azimuth accuracy in accordance with above
DF modes	AM/SSB/CW/FM/Data
DF bandwidth	Within DDC2, variable from 1 Hz to 64 kHz
Monitoring	Full receiver control available during DF operation
Interface	USB 2.0 high speed
Computer	Dual core I5 or better with Windows 10
Physical size	Antenna element: 1.2 m with 5 m ground radial system. Receiver unit: portable enclosure 475 (W) x 375 (H) x 180 (D) mm 18.7 (W) x 14.8 (H) x 7 (D) in.
Power supply	115/230 V AC or automotive DC with optional converters, 80 W max.
Operating temp.	-10 °C to 50 °C

Specifications are subject to change without notice due to continuous product development.

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