Press release

For immediate publication

[Short version]

Direction-finding in seconds, stable results – Narda develops automatic DF antenna

Pfullingen, Germany, November 29, 2018 – The engineers at Narda Safety Test Solutions have successfully developed an automatic direction-finding antenna (ADFA) that delivers incomparably stable results extremely quickly. Highly insensitive to reflections, it precisely and reliably determines the direction of a detected signal. When coupled with the powerful SignalShark real-time receiver, the long list of advantages to Narda's ADFA 1 make it into the ideal system for automatic direction-finding of signals in the frequency range from 200 MHz to 2.7 GHz. As well as for cellular network providers and the military, it is primarily aimed at PMR and BOS radio operators with applications that involve safety and security, such as the police, fire and ambulance services, frontier defense, and intelligence services.

At the heart of the ADFA 1 is an array of nine antenna elements around an omnidirectional reference antenna optimally arranged to achieve stable measurement results. The reference antenna allows test engineers to observe the spectrum at the same time as direction-finding. The principle of automatic direction-finding for a single-channel receiver is based on the measurement of the phase difference between antenna elements. The nine antenna elements are measured against the central reference element. The greater the distance between them and the greater the recorded phase difference, the more reliable the bearings.

As well as stationary applications, the ADFA 1 can be attached to the roof of a vehicle using a magnetic mount. When connected to the SignalShark, a bearing cycle takes just 1.2 milliseconds and achieves an accuracy of up to 1° RMS (typical). Along with the simple display of the determined direction, the receiver can also overlay a so-called heat map on a stored map. The powerful localization software on the SignalShark can thus show the most likely location of the interferer directly on the screen during mobile operation. All in real time, without the need for an external computer. A hand-held antenna can be used with the SignalShark to determine the exact location of a signal source over the final few meters, so that the test engineer can enter a previously localized building in order to determine the floor and the exact room where the source is located.

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[Long version]

Direction-finding in seconds, stable results – Narda develops automatic DF antenna

Pfullingen, Germany, November 29, 2018 – The engineers at Narda Safety Test Solutions have successfully developed an automatic direction-finding antenna (ADFA) that, when used with the powerful SignalShark real-time receiver, is capable of delivering incomparably stable bearing results extremely quickly. Insensitive to reflections, which are ever present in urban environments, it reliably and accurately determines the location of a detected signal. A complete bearing cycle takes just 1.2 milliseconds. This high measurement speed contributes towards the unprecedented stability of the bearing results. A long list of further advantages makes the ADFA 1 the ideal solution for automatic direction-finding of signals in the frequency range between 200 MHz and 2.7 GHz. As well as for cellular network providers and the military, it is primarily aimed at the users of PMR (professional mobile radio or trunked radio) and BOS (security and safety authorities and organizations) that have applications that involve safety and security, such as the police, fire and ambulance services, frontier defense, and intelligence services.

The sources of its reliability

At the heart of the ADFA 1 is an array of nine antenna elements around a central omnidirectional reference antenna optimally arranged to achieve such robust measurement results. The nine antenna elements are measured against the central reference element, which can receive signals from all directions and which allows test engineers to observe the broadband spectrum at the same time as determining the direction of the signal being traced. This feature is particularly useful when the test engineer is tracking a suspect who is broadcasting in a particular channel and who then suddenly changes to a different channel. If the spectrum is not monitored, the signal will have disappeared, so ending the search. However, with the information from the reference antenna, the test engineer can see where the signal has gone and resume observation and tracing of the interference signal.

Another detail that ensures the reliability and precision of the results is the ability of the new Narda STS ADFA 1 automatic DF antenna to determine the elevation angle of the signal bearing, thereby utilizing an additional factor to increase the reliability of the measurement results. This is particularly useful in an urban setting where localization to an individual floor level may be needed.

Automatic direction-finding with single-channel receivers

The principle of automatic direction-finding is based on the measurement of the phase difference of a signal between several antenna elements. Multi-channel systems are

naturally ideal for such measurements, but the disadvantage here is that the cost of such receivers is totally off the scale. Direction-finding can also be successful using a single-channel system, however, particularly when intelligent antenna elements are used, as in the ADFA 1. An ingenious array of antennas, phase shifters, and complex algorithms makes it possible for the ADFA 1 to reliably and extremely precisely determine the signal direction fully automatically using only a single-channel receiver. The phase difference between the antenna elements is measured for this. The greater the distance between them and the greater the recorded phase difference, the more precise and reliable the bearings. Weighing just 5.6 kg and with a diameter of 480 mm, the ADFA 1 is the ideal symbiosis of precision and compactness. In this context, size does matter, so there is no compromise here.

The ADFA 1 in practical use

In practice, the ADFA 1 is attached to the roof of a normal vehicle with the aid of a magnetic mount. There is absolutely no need to drill holes in the vehicle bodywork or make any other modifications. The high immunity of the antenna to influences from the mounting surface means that correction tables for the specific vehicle type are no longer needed. This independence means that the ADFA 1 can be used flexibly and universally. For other applications, the ADFA 1 can also be mounted on a tripod and used to trace interference from a semi-fixed location as is commonly required in military applications.

The secret of the stable bearing results lies in the combination of the large aperture of the ADFA 1, the use of a reference element, and the clever processing of the bearing results by the SignalShark software. Finally, the high measurement speed also plays a part. The chances of obtaining a perfect bearing result, of getting a line of sight result when driving past a row of buildings naturally increase with the speed of the measurement. The greater the number of measurements that indicate a certain direction or location, the more stable the result will be. In the end, that is nothing more than statistics.

An additional hand-held antenna can be used with the SignalShark to determine the exact location of a signal source over the final few meters. This allows the test engineer to enter a previously localized building on foot in order to determine the floor and the exact room where the source is located.

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Image 1: In practical use, the ADFA 1 is attached to the vehicle roof with the aid of a magnetic mount and connected to the SignalShark inside the vehicle by means of a cable passed through a partly-opened window. It can take a bearing in less than 1.2 milliseconds. If the test engineer needs to enter a building that has been localized in order to check out the last few meters to the signal source, a hand-held antenna can be used to complete direction-finding.

Narda is a leading supplier of measuring equipment in the RF Test & Measurement, EMF Safety and EMC sectors. The RF Test & Measurement sector covers analyzers and instruments for measuring and identifying radio sources. The EMF Safety product spectrum includes wideband and frequencyselective measuring devices, and monitors for wide area coverage or which can be worn on the body for personal safety. Under the PMM brand, Narda offers instruments for determining the electromagnetic compatibility (EMC) of devices. The range of services includes servicing, calibration, and training programs. The company operates a management system complying with ISO 9001/2008 and ISO/IEC 17025.

Narda has development and production facilities at three locations: Hauppauge, Long Island / USA, Pfullingen / Germany and Cisano / Italy and has its own representative in Beijing / China. A worldwide network of representatives guarantees closeness to customers.

Narda is part of **L3 Technologies**, New York.

For more information, contact:

Texterei Jungmann
Thomas Jungmann
Bahnhofstr. 42
D-88239 Wangen im Allgäu
Tel.: +49 - 7522 / 9899-850
E-Mail: info@texterei-jungmann.de
http://texterei-jungmann.de

Narda Safety Test Solutions GmbH
Sandwiesenstr. 7
D-72793 Pfullingen
Tel.: +49 - 7121 / 97 32 - 0
Fax: +49 - 7121 / 97 32 - 790
E-Mail: info.narda-de@L3T.com
www.narda-sts.com

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