Introduction

The AX-55D direction finding antenna system represents a direction finding solution for frequencies between 50 and 1000 MHz. This frequency range is expandable down to 20 MHz (option AX-55D-20).

The AX-55D antenna is supplied in an easy to assemble modular kit form, making it possible to use the antenna in different configurations, optimised for the frequency range of interest, and tailored to common application scenarios, in both stationary and mobile environments.

Two such common configuration examples are shown below:

Such high modularity and flexibility is not very common with DF antennas, and this is what makes the AX-55D antenna so unique. In fact, the AX-55D represents six antennas in one (three stationary and three mobile ones).

With the AX-55D-20 low-frequency option, yet another configuration is available, which makes it possible to operate in the low-VHF range, down to the high HF bands.
The AX-55D antenna is lightweight and portable. It is designed for fast hand-assembly and disassembly without the need of any specialized tools. All parts of the antenna fit into an inconspicuous carry bag (supplied with the antenna) which can be easily carried by one person. One person can easily assemble and disassemble the entire antenna within minutes.

The AX-55D direction finding antenna system is ideally suited for applications in both military and civilian environments, where simplicity of operation, portability, flexibility and ease of deployment are required.

The complete kit includes an Antenna Control Unit, compatible with WiNRADiO WD-3000 Direction Finding Receiver. Together with this receiver, this system represents a universal, reliable direction finding solution suitable for many demanding applications.
The following tables summarize the various standard configurations of the AX-55D antenna:

1. **VHF stationary (using ‘long’ antenna elements)**

<table>
<thead>
<tr>
<th><strong>Specifications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency range</strong></td>
</tr>
<tr>
<td>50 MHz – 250 MHz</td>
</tr>
<tr>
<td><strong>DF accuracy</strong></td>
</tr>
<tr>
<td>5 deg RMS typ.</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
</tr>
<tr>
<td>VHF direction finding in a stationary environment.</td>
</tr>
</tbody>
</table>

2. **VHF/UHF stationary (using ‘medium’ antenna elements)**

<table>
<thead>
<tr>
<th><strong>Specifications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency range</strong></td>
</tr>
<tr>
<td>200 MHz – 500 MHz</td>
</tr>
<tr>
<td><strong>DF accuracy</strong></td>
</tr>
<tr>
<td>5 deg RMS typ.</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
</tr>
<tr>
<td>High VHF and low UHF direction finding in stationary environments.</td>
</tr>
</tbody>
</table>
3. **UHF stationary (using ‘short’ antenna elements)**

<table>
<thead>
<tr>
<th>Specifications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency range</strong></td>
<td>500 MHz – 1000MHz</td>
</tr>
<tr>
<td><strong>DF accuracy</strong></td>
<td>5 deg RMS typ.</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>UHF frequencies in stationary environment.</td>
</tr>
</tbody>
</table>

4. **VHF mobile (using ‘long’ antenna elements)**

<table>
<thead>
<tr>
<th>Specifications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency range</strong></td>
<td>50MHz – 250MHz</td>
</tr>
<tr>
<td><strong>DF accuracy</strong></td>
<td>5 deg RMS typ.</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>VHF direction finding in mobile applications.</td>
</tr>
</tbody>
</table>
5. **VHF/UHF mobile (using ‘medium’ antenna elements)**

<table>
<thead>
<tr>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
</tr>
<tr>
<td>DF accuracy</td>
</tr>
<tr>
<td>Usage</td>
</tr>
</tbody>
</table>

6. **UHF mobile (using ‘short’ antenna elements)**

<table>
<thead>
<tr>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
</tr>
<tr>
<td>DF accuracy</td>
</tr>
<tr>
<td>Usage</td>
</tr>
</tbody>
</table>

7. **HF/VHF stationary (using option AX-55D-20)**

<table>
<thead>
<tr>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
</tr>
<tr>
<td>DF accuracy</td>
</tr>
<tr>
<td>Usage</td>
</tr>
</tbody>
</table>

*Note: Specifications are subject to change without notice.*
General View
(VHF stationary configuration)

AX-55D antenna with long elements (active and passive)
(50MHz-250MHz range)
General View
(VHF/UHF stationary configuration)

AX-55D antenna with medium elements
(200MHz-500MHz range)
General View
(UHF stationary configuration)

AX-55D antenna with short elements
(300MHz-1000MHz range)
General View
(HF/VHF option)

AX-55D antenna with AX-55D-20 option
(20MHz-60MHz range)
AX-55D
Main Parts Identification

Extension assembly

Antenna base element long

Antenna base element medium

Antenna base element short

Passive antenna base element

Support bar

Ground plane, end panel

Ground plane, centre panel

Magnet mount

Control unit

Magnetic base

Serial cable

Guy rope peg

Antenna cables (N-type) - 0.5m long

Antenna cable (BNC) - 5m long
Assembly and Installation Instructions
(using ‘long’ antenna elements)

1. If using as a stationary unit, open tripod legs until locking pins are fully seated.

2. Loosen locking collar on tripod legs and extend each leg to desired height, and tighten locking collar. Ensure all legs are separated and that the tripod is stable and level. Adjust leg lengths accordingly.

3. Place extension assembly on top of tripod by aligning the ¼ turn fasteners with the mating parts. The larger of the two ends of the extension assembly sits on top of the tripod. Lock ¼ turn fasteners by rotating in a clockwise motion to secure.
4. Place ground plane centre panel on top of the extension assembly by aligning the ¼ turn fasteners with the mating parts. Lock ¼ turn fasteners in clockwise motion to secure.

5. Place one support bar underneath ground plane centre panel and align with mating ¼ turn fasteners. Lock fasteners in clockwise motion to secure. Repeat for second support bar.

6. Place one end panel over support bar, and align with ¼ turn fasteners and lock in place. Repeat for second panel.
7. Secure the control unit to the extension assembly by using the thumbscrew located in the guy rope bracket.

8. Attach the Antenna cable (BNC) to the centre connector on the control unit.
9. Attach the four fixed antenna cables to the control unit, ensuring that each one matches with the corresponding connector. (Connector cables and mating connectors on control unit are labelled N, E, W, S).
10. Attach serial cable to the control unit for connection to a PC system (such as the WiNRADiO WD-3000 Direction Finding System).

11. Connect the antenna base elements to the N-type connectors on the ground plane. Ensure that connectors are securely tightened.
12. Connect the passive antenna base elements to the underside of the ground plane. These antenna elements are secured using two thumbscrews, which have mating fasteners in the bracket under the ground plane.

13. Ensure all connections are secure, and that antenna is level.

14. The ground plane can be raised to the desired height so that the passive antenna elements are clear of the tripod. This is done by loosening the locking collar on the extension assembly, lifting the ground plane to the desired height, and retightening the locking collar.

15. Before using the direction finding system, it is important that the antenna is properly oriented, in order to ensure correct readings of the signal bearing. For this purpose the antenna has a marking indicating the orientation of the "mechanical North". This "mechanical North" needs to be aligned to point to the geographical North.
16. The accuracy of such alignment will determine the bearing measurement accuracy. To position the antenna, use a compass. The two diagonal antenna elements intersecting with the mechanical North can be used to advantage, to align an imaginary connecting line with the geographical North direction as shown by the compass.

17. If it is not convenient to physically rotate the antenna to point exactly to North, the difference between the ideal direction and the actual direction can be entered as "offset" in the DF software. For example, if the "mechanical North" is 5 degrees to the left (i.e. to the West) of geographical North, the offset will be +5. In mobile applications, if the DF system is used in a moving vehicle, the orientation of the vehicle will be obviously changing, and it is usually
convenient to orient the antenna in the forward direction of the vehicle, which the displayed bearing will then be relative to.

18. The antenna can be stabilized by use of the guy ropes provided. Pegs have been provided for attachment of guy ropes into the ground.

19. For mobile antenna unit assembly, follow steps 5 and 6 to assemble the ground plane.

20. Fasten the magnet mounts to the magnetic bases with the flat surface facing upwards. Screw them into the holes located on the bottom of the ground plane.

21. Secure the control unit to ground plane by using the thumbscrew located in the middle of the ground plane.

22. Connect the cables to the control unit as per steps 8-10.

23. Attach the antenna base elements to the N-type connectors on the ground plane. Ensure that connectors are secured tightly. The antenna can now be mounted on vehicle roof.
24. Disassembly is the reverse of these procedures.

25. When not in use store in carry bag provided.
Assembly and Installation Instructions
(using ‘medium’ or ‘short’ antenna elements)

26. Assemble tripod, extension assembly and ground plane. Then fasten control unit as per steps 1-7.

27. There are two sets of mounting holes in the ground plane for the medium and short antenna elements. It is important that the correct elements are mounted in the mating holes.

28. The antenna elements are attached by inserting the N-type antenna cables into the mounting hole with the matching label (e.g., N, E, S, W). With the cable in place, fasten the antenna element by using the N-type connector. Repeat for the remaining antennas.

29. Connect the cables to the control unit as per steps 8-10, using the fixed antenna cables instead of the N-type antenna cables.

30. Raise ground plane to desired height and align to north by following steps 14-17.

31. The antenna can now be stabilized by using the guy ropes provided.

32. For mobile applications assemble the ground plane and attach the antenna elements as described above.

33. Secure magnetic mounts to the ground plane and mount of vehicle roof.
AX-55D-20 Option
Main Parts Identification

Control unit attachment plate

Antenna cable (N-type) - 6m long

Tripod

Antenna extension element
34. Prepare each tripod as per instructions 1-2.

35. Attach long antenna cables to the tripods by mounting the N-type connector in the hole provided in the tripods. Please note that for the north tripod, the control unit attachment plate will have to be placed on the N-type connector, with the thumbscrew pointing down, before it is mounted in the tripod.
36. Attach one antenna base element to each tripod, then attach one antenna extension element to each base element. Ensure that the locking pin on the base antenna is fully retracted, then slide antenna extension elements into the antenna base elements. Push locking pins in place. (Note that the antenna extension elements can only be installed in one direction).

37. Attach cables to control unit as per instructions 8-10. Do not over tighten connectors.

38. Mount control unit to control unit attachment plate by using the thumbscrew provided.
39. Be sure to take note of the label on the antenna cables (e.g. N, E, W, S), and arrange the antennas so that they correspond to the points of a compass. Refer to instruction 15 for how to compensate for where it is not possible to align them to face North.

40. Position each Option tripod 1.8-2.4 metres (6-8 ft) apart.

41. If using WD-3000 system, attach serial and antenna cable from the control unit to the WD-3000 system.

42. The antenna is ready for use.