FM BROADCASTING BAND II 2 WAY + 2.6 dBi STACKED CIRCULAR ANTENNA

CE

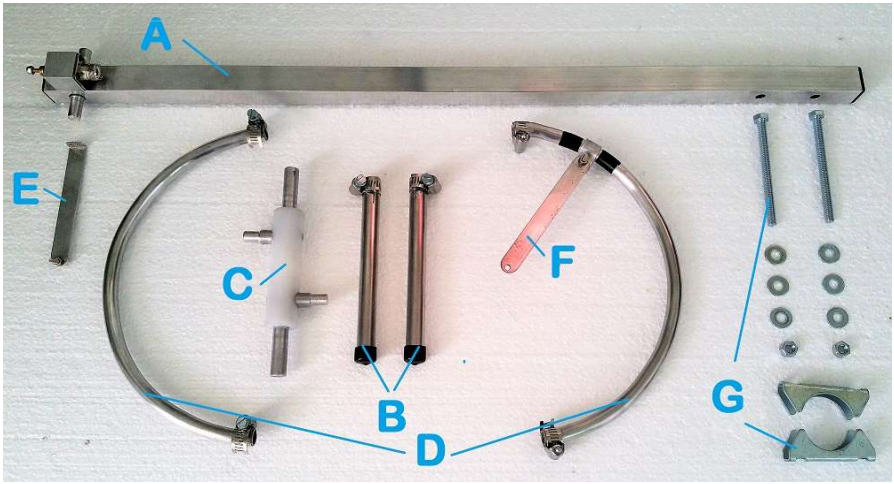
Please read this manual carefully. To avoid harmful interference to other users of the electromagnetic spectrum, do not power up the antenna until it is properly installed.

UNPACKING AND CHECKING

The package (sometimes more than one package if delivered by the postal system) should contain the following:

1. Two Circular Dipole Packs which each contain:

   A. Boom
   B. Two Vertical Dipole Sections and Two Tube Clips
   C. Teflon Support Insulator and Horizontal and Vertical Dipole Pegs
   D. Two Horizontal Dipole Sections and Two Tube Clips
   E. Feed Point Section 1
   F. Feed Point Section 2 clamped to One Horizontal Dipole Section
   G. Mounting Clamp



2. One antenna spitter boxes
3. Combo cable LMR400 (2.30 mt BLUE plug) and RG11 (0.63 mt) GREEN plug, total length 2.93 mt

Verify that the parts are in good condition and have not been damaged during transport. In case of loss or damage please contact us at info@aareff.com

INTENDED USE

This antenna is intended for use with an FM broadcasting transmitter up to 800 watts at a permanently pre-defined location with a license or authorisation from the radio spectrum regulator of your country.

USER SAFETY RESPONSIBILITY

You are responsible for selecting the correct antenna for your application, installing it properly and ensuring the system maintenance.

INSTALLATION NEAR TO POWER LINES

Following is a list of precautions to follow when installing the antenna if placement of antenna and cables is anywhere near power lines

- Erect antenna as far away as possible from the power line.
- Avoid crossing antenna cables under electrical power lines
- Do not attach antennas to towers, poles or similar structures carrying electrical power lines.
- If you are not experienced in installation of antennas, have experienced persons assist you

- During installation, tie off antenna with rope so if it falls it can be diverted away from power lines.
- Avoid fastening antennas, especially self-supporting types, to old chimneys or to any chimney not designed to take such stress. Forces created by a strong wind may be sufficient to topple both chimney and antenna.
- Make sure antennas have been properly grounded and provided with other necessary lightning protection

RF RADIATION TO PERSONNEL

Under no circumstances should the antenna be mounted and used at ground level or within a few meters of personnel.

Ideally this antenna should be mounted 20 meters high and clear of any surrounding objects to get maximum range and more importantly to reduce risk of radio frequency radiation to personnel. When mounted at 20 meters in height off ground and using 800 watts of transmitter power, power flux density measurements made at ground level directly under the antenna show less than 2 W/m^2. Several European countries use a value for the power flux density of 10 W/m^2 as a basis for considering whether an area is safe. The issue of radio frequency radiation limits is a contentious one and work in this field is continuing worldwide.

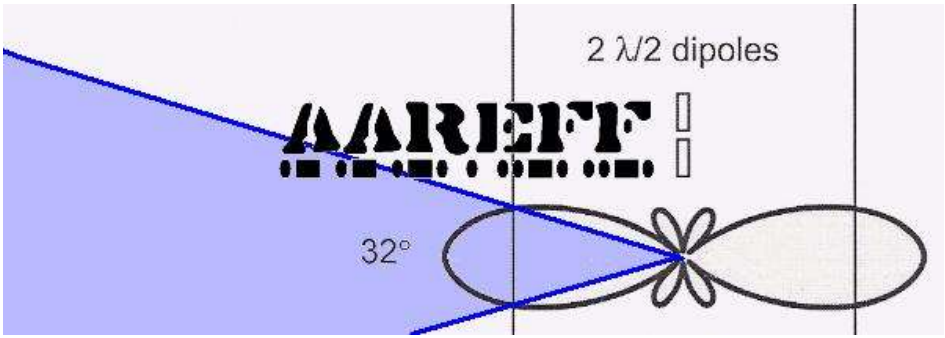
ELECTROMAGNETIC COMPATIBILITY

When writing this manual, there was no EU directive or FCC rule regarding the EMC compatibility of Band II VHF broadcast antennas, however in our view there are some potential EMC compatibility issues that need to be addressed when installing this antenna system. On completion of the antenna installation check;

- All the cables entering the connectors are tight and properly crimped or soldered
- All the connectors are screwed in tight and sound.
- PVC insulation tape and/or self amalgamating tape are wrapped around all the connectors to stop water entering the connector and the inside of the body of the cable.

If any cables are loose or there are bad connections this can cause some non-linear resistance, diode action or some small arcing. When this happens, it creates EMC disturbance (arcing and crackling sound) across a wide frequency spectrum.

SPECIFICATION



The diagram above is the E-Plane radiation pattern. To obtain this pattern of 3.4dB over a single circular polarized dipole (-3dBd / -0.8dBi) the design uses two separate circular polarized dipoles. Each dipole is tuned to give 50 ohms at transmitter frequency. The two 50 ohm circular polarized dipoles are combined using a set of two ¼ wavelength 75 ohm cables, this configuration is known as the Wilkinson combiner. At the point where they are all combined the impedance is also 50 ohms (SWR less than 1.4)

Frequency Range: 87.5 to 108 MHz (factory tuned to the exact frequency on ording)

RF Connectors: Teflon/PTFE SO239/UHF (or optional N type)

Impedance: 50 ohm (+/-1.4 SWR) unbalanced input

Antenna Polarization: Circular / Mixed

Antenna Gain (Isotropic): + 2.6 dBi

Antenna Gain (Rel. Dipole): +0.4 dBd

E-Plane Radiation Angle: 32 Degrees (see diagram above)

H-Plane Radiation Angle: 360 Degrees Omni-Directional (depending on the tower or mounting pole used this figure may be modified by 0.5dB)

RF Power Rating: 800 Watts

Weight of Each Dipole: 1 Kg

Weight of Total Package: 3.5 Kg

Wind Speed Handling / Survival: 90 MPH Minimum

INSTALLATION

Before installing make sure you have read section **INSTALLATION NEAR TO POWER LINES** and section **RADIO FREQUENCY RADIATION TO PERSONNEL**

TOOLS AND OTHER ITEMS NEEDED

- PVC insulation tape and/or Self Amalgamating Tape
- 13mm Spanner or Socket and Wrench
- 7mm Spanner or Socket and Wrench
- 5.5mm Spanner or Socket and Wrench
- Flat Screwdriver
- Mounting mast or pole with a diameter of 38 mm or less
- Antenna 50 ohm feeder cable, normally this is LMR400

ASSEMBLING THE CIRCULAR DIPOLES

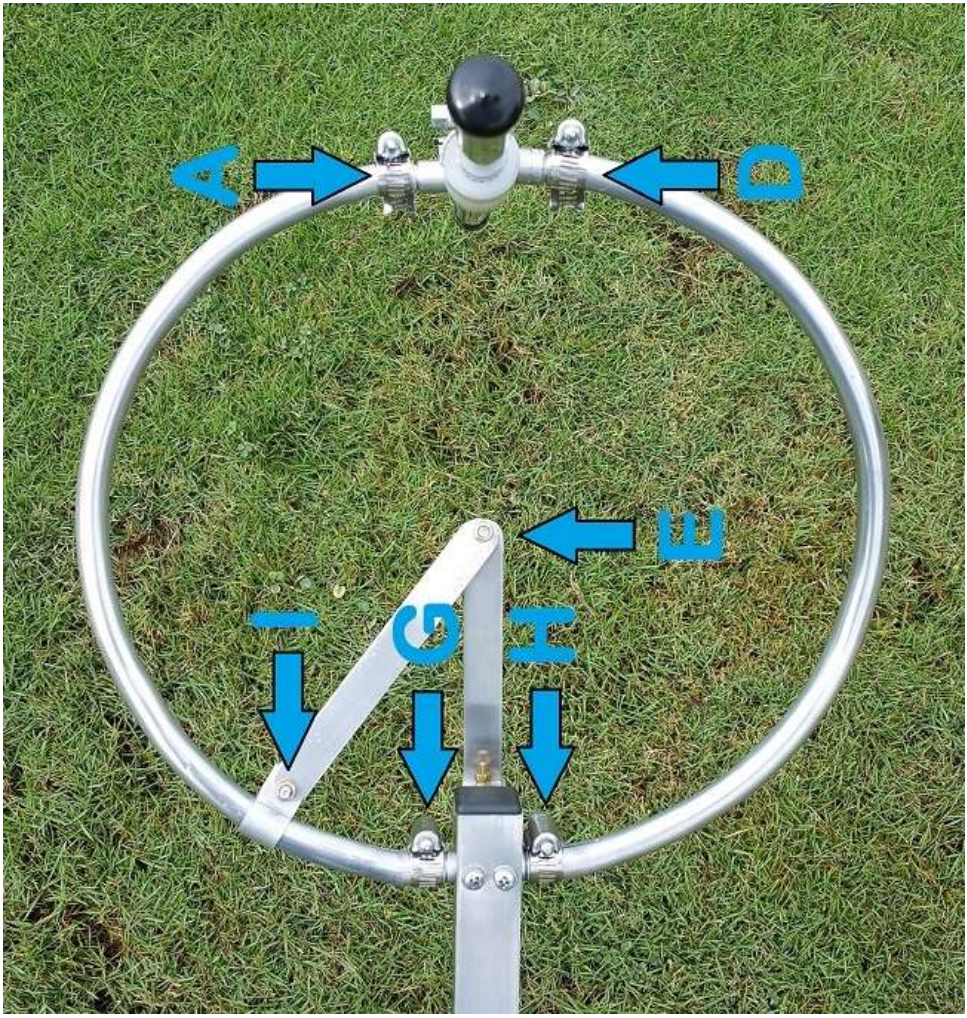
Using the parts in section **UNPACKING AND CHECKING** of this user manual to assemble the antenna as shown in the image of the next page.

Points G and H

The horizontal dipole sections should be pushed in to the boom section at points G and H. Make sure they are pushed in all the way so the tube sides touch the shoulder of the peg. Tighten the tube clips, but not fully, the tubes should still move a little at this stage.

Points B and C

The vertical dipole sections should be fitted to the Teflon insulator and the tube clips full tightend at points B and C. These should be tight and vertical dipole sections should not be loose or wobbling.



Points A and D

The tefelon insulator with the vertical dipole sections should now be connected to horizontal dipole sections and points A and D. Tighten the tube clips, but not fully, the tubes should still move at this stage.

Point F
Connect feed point section 1 to the brass socket section on the boom. There are 2 x M4 brass nuts to hold this in place. Tighten but not fully yet, allow a little movement.

Point E
Connect feed point section 1 to feed point section 2 using the M3 nut and screw. Again tighten but not fully yet, allow a little movement.

Okay the antenna is now assembled in loose form, if it's very loose and floppy, tighten all the screws a little more, but it still needs to move a little.

Move the sections so that the horizonatal sections are exactly horizontal and the vertical sections are at exactly 90 degrees to the horizontal sections which should be perfectly vertical. When you have done this and it all looks to be orientated correctly with vertical and horizontal sections at 90 degrees to each other, then start to tighten up the tube clips very tight so that horizontal dipole sections cannot move.

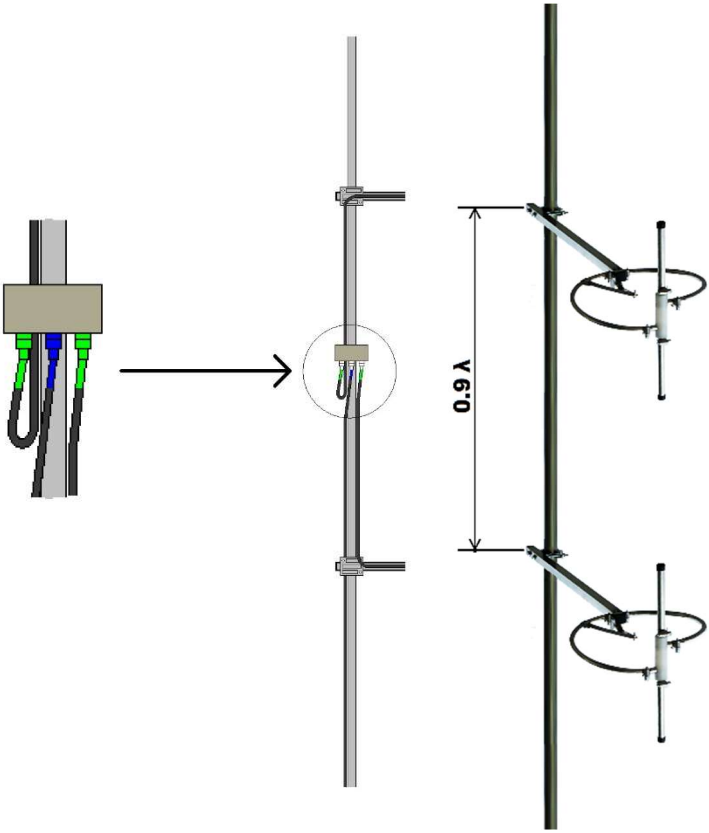
At point F there are 2 brass nuts, the first one should tighten the feed point section so that it doesn't move. The second brass nut should tighten on to the first brass nut to make sure that does not move and stays locked in place, this is a lock nut. The M3 nuts are screws at point E and I should be very tight, these feed point sections may carry 800W, so good tight connections are needed.

0.9 λ DIPOLE SPACING

For maximum gain to the horizon the spacing between the dipoles needs to be 0.9 wavelength. The table below shows this Dimension vs Frequency.

MHz	Metres	Inches	MHz	Metres	Inches
87	3.10	122	98	2.76	109
88	3.07	121	99	2.73	107
89	3.03	119	100	2.70	106
90	3.00	118	101	2.67	105
91	2.97	117	102	2.65	104
92	2.93	115	103	2.62	103
93	2.90	114	104	2.60	102
94	2.87	113	105	2.57	101
95	2.84	112	106	2.55	100
96	2.81	111	107	2.52	99
97	2.78	109	108	2.50	98

TOWER / MAST INSTALLATION



1. Mount the dipoles to the mast using the clamps provided. It is IMPORTANT. that the spacing between the dipoles is 0.9 wavelength. All dipoles must be directly above each other and all the RF input connectors should be on the bottom side of the arm / boom to give a little shelter from the rain and water.

2. Mount the splitter box to the tower or mast between the top antenna and the bottom antenna.

3. Take the two 2.93 mt combo cable lengths. Take the blue sides and make sure the gold pins on the plugs have not got any dirt on them from the floor. Connect the two blue ends to the two antennas. Make sure the plugs fully enter the sockets correctly on the antennas

4. Use two cables ties on each of the two booms to hold the LMR400 cable in place.

5. Take the green ends of the two 2.93 mt combo cable lengths. Connect the the two green marked plugs to the outer sockets of the splitter box. There will be excess cable, simply coil this neatly and tape or tie it to the mast (**DO NOT CUT IT BACK AND REFIT THE PLUG**). The cables marked with BLUE and GREEN are critical phased lengths and must never be altered in length

6. Connect the the main feeder cable from your transmitter to the center connector on the splitter box

7. Wrap PVC or self amalgamating tape tightly around and all over the plugs on the splitter boxes to waterproof them.

8. Securely fix the cables using PVC tape or large cable ties to the tower or mast. Make sure the cables are not going to flap around in the wind.

9. Make sure that all fixings are tight and are not going to work loose over time with wind

CONNECTING THE ANTENNA

An incorrect antenna installation can cause RF burns and levels of RF exposure above the recommended limits for personnel

Under NO CIRCUMSTANCES should the antenna be mounted and used at ground level or within a few meters of personnel.

Ensure that all antenna connections to the transmitter or power amplifer are sound, this is important as poor connections and soldered joints can cause RF burns to personnel, severe noise to the transmission and excessive RF bandwidth.

MAINTENANCE

Because antennas are passive devices maintenance requirements are low, however don't accept low as being none existant, some periodiodic inspections are required.

ANTENNA INSPECTION LIST

- Check antenna is still rigid and tight on tower, mast or pole and vertical tubes are still exactly vertical as opossed to twisted and slanted.

- The PVC tape insulation or self amalgamating tape still covers all the connectors properly and the connectors remain tight.

- The antenna feeder cable (normally LMR400) continiues to be held rigid to the boom, tower, mast or pole.

Always following a heavy storm or extreme weather condtion an inspection should be done and as shown in the table below.

WEEK	ENVIRONMENTS		
	Heavy Duty Tower	Light Duty Tower	Building Roof
13			✔
26		✔	✔
39			✔
52	✔	✔	✔

LEGAL ADVICE

We sell this equipment to professionals and organizations in good faith it will be used correctly and legally. Most countries in the world require licensing for this antenna to be used with a transmitter. It is the customer's responsibility to check relevant laws, directives, regulations and licensing requirements before putting this product into service with an antenna system. You, the customer or user agree to defend, indemnify and hold harmless Aareff Systems Limited, its employees and agents, from and against any claims, actions or demands, including without limitation legal and accounting fees, alleging or resulting from improper or unlawful use of this equipment.

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