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Wireless**



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HF Active Vee Antenna

Operating Manual

version 1.0

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1 Introduction

Thank you for buying a Cross Country Wireless HF Vee Active Antenna.

It was originally designed as part of a contract to replace existing passive antennas for a professional HF signals monitoring organisation.

It is a wideband active antenna with excellent performance designed and built with high quality materials to last for years.

2 Theory of operation

The Active Vee Antenna uses a short balanced upright vee dipole to sense the electric component of the electromagnetic field. The pattern and polarity of the antenna is nearly omnidirectional with sensitivity to vertically polarised signals as well as horizontally polarised signals. Mounted close to ground at around 5m agl the antenna is ideal for NVIS use on 3 to 10 MHz.

The short elements used in the Active Vee Antenna have a very high impedance with a capacitance of 12 pF over a wide bandwidth.

In the head unit a balanced amplifier using high linearity low noise transistors is used with a matching balun to match the high impedance of the antenna elements. Diode limiters and high voltage ceramic capacitors provide protection from local high RF fields and static electricity from falling rain and snow.

The balanced amplifier feeds an isolation transformer matched to the 100 ohm balanced load of the ethernet cable connecting the head and base units.

At the base unit another isolation transformer is used to match the 100 ohm balanced load of the ethernet cable.

Any RF signal or noise induced in the ethernet cable as a common mode signal is rejected by both transformers.

A diode limiter provides protection from excess RF voltages to receivers connected to the BNC connector.

DC power is fed from the base unit to the head unit via a current sensing circuit indicating the remote connection of the head unit with the illumination of a red LED. Balanced filter networks at each end isolate common mode RF signals and noise from the head unit amplifier.

The amplifier gain has been equalised so that with the standard 20m ethernet cable supplied with the antenna the overall gain with 12 pF capacitance antenna elements is flat +/- 1 dB between 3 and 30 MHz.

The frequency response at the lower end is limited to 50 kHz by the transformers and coupling capacitors.

The amplifier is flat within -6dB up to 150 MHz but the elements change their electrical characteristics at higher frequencies so the working upper limit is around 108 MHz.

3 Package contents

2 Whip elements

2 Whip tips

1 Allen key

1 Active Vee Antenna head unit with bracket and 50mm U bolt

1 Active Antenna base unit

1 2.5mm DC power connector

20m Ethernet cable with two nitrile rubber sleeves



4 Assembly

Head unit

Install the whip elements in the antenna mounts using the allen key. Make sure that the elements are securely fastened.

The head unit can be mounted onto a pole using the bracket and U bolt assembly.

Remove the box lid with a Phillips or flat bladed screwdriver.

Loosen the cable gland to allow the RJ-45 connector to go through the gland. Carefully connect the RJ-45 connector to the socket.

Slide the nitrile rubber sleeve into the cable gland and tighten the gland so that the sleeve is securely gripped by the cable gland. There is no need to over-tighten the gland to make a secure watertight seal.

Base unit

Remove the box lid with a Phillips or flat bladed screwdriver.

Loosen the cable gland to allow the RJ-45 connector to go through the gland. Carefully connect the RJ-45 connector to the socket.

Slide the nitrile rubber sleeve into the cable gland and tighten the gland so that the sleeve is securely gripped by the cable gland. There is no need to over-tighten the gland to make a secure watertight seal.

Connect a 12 to 15 V supply to the 2.5mm DC power connector. The centre pin is positive polarity.

The green LED should illuminate when power is applied. If the head unit is connected to the far end of the cable the red LED will also illuminate.





5 LEDs



The base unit has two LEDs. The green LED is for DC power indication. The red LED confirms that DC current is flowing to the head unit.

The head unit has a single green LED to confirm DC power during installation.

6 Ethernet cable

The ethernet cable supplied with the Active Antenna uses standard RJ-45 connectors.

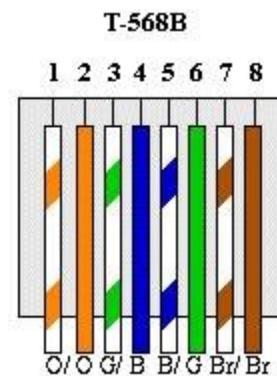


The nitrile rubber sleeve used to seal the cable in the cable gland is :

Smooth nitrile fuel tubing hose Type A DIN 73379 5.4mm ID 9.4mm OD

The cable wiring is straight through to the T-568B colour code below.

Following tests with different types of cable we don't recommend the use of shielded cable as the extra capacitance caused extra losses at higher frequencies.



7 Suggestions for installation

The Active Antenna uses a balanced short upright vee dipole as a sensor for the electric portion of the electromagnetic field.

Keep any nearby metal work as far away as possible.

If the antenna is mounted off the side of a tower keep the distance from the tower to the antenna elements the same to ensure symmetry.

Mount the antenna as far away as possible from RF noise sources i.e. switch mode power supplies, computers, phone chargers, electric fences.

The mounting height isn't too critical. If you have a choice of locations go for the quietest location for RF noise rather than the strongest signal.

If mounting in a tree don't let any leaves or branches touch the antenna elements. When they get wet they will unbalance the short dipole and may reduce the antenna performance.

Due to the small size of the antenna look at possible locations as far away from local RF noise sources as possible.

