

AAREFF

TRANSMISSION SYSTEMS

250W VHF FM TRANSMITTER SYSTEM WITH 4 WAY STACKED DIPOLE



- i. The various pieces of equipment in this document are only for use permanently at a pre-defined location with a license or authorisation from the radio spectrum regulator of the EU member state.
- ii. The installer must have competent RF engineering skills at their disposal, be EMC aware and understand radio frequency systems. The final installation should be in accordance with the site engineering document at <http://www.aareff.com/ETR132.pdf> . The radio station management must assign a responsible person to the transmission equipment and installation.

1 x STEREO CODER AUDIO LIMITER / 1 WATT FM DRIVER EXCITER 13.8V DC (ALSCB & 1WPLLB)
1 x DISTRIBUTION AMPLIFIER (4WDA19)
2 x 125W FM POWER AMPLIFIER (125WNTAP)
2 x DC LEAD TO DC LEAD (DC CONNECTIONS FROM ALSCB TO 1WPLLB TO DISTRIBUTION AMPLIFIER)
1 x MPX AUDIO LEAD (AUDIO CONNECTION FROM ALSCB TO 1WPLLB)
3 x BNC TO BNC LEAD (RF CONNECTION FROM 1WPLLB TO DISTRIBUTION AMPLIFIER TO 2 x 125WNTAP)
1 x 13.8V DC SWITCH MODE AC POWER SUPPLY (4.0 AMP)
3 x IEC AC CORD
12 x M6 SCREW, NUT AND WASHERS
2 x 19 INCH 3 x 2U CLAMPING BARS
2 x 2 WAY STACKED DIPLOE HIGH POWER ANTENNAS
2 x 50 METERS LMR400 CABLE WITH PLUGS FITTED

Before the transmitter and limiter can be used, it is necessary that the two tuned dipole antennas with the LMR400 50 ohm coaxial cable are installed. Please ensure that all antenna connections are sound, this is important as poor connections and soldered joints will cause severe noise to the transmission and will use excessive RF bandwidth. **IMPORTANT! PLEASE READ THE NEXT PAGE THOUGHLY ABOUT THE ANTENNA SYSTEM.**

Power Supply	90-260 VAC 50/60 Hz
Power Amplifier RF Power Output	2 x 125 Watts (250 Watts Total) +/- 0.5 dB from -20 to +40 Deg C
Freq Stability	Better than +/- 2 KHz from -20 to +40 Deg C, +/- 300 Hz typ.
Freq Range	100 KHz steps from 87.5 to 108 MHz
Freq Adj. Accuracy	+/- 50 Hz
Deviation Sensitivity Stability	+/- 2 % max
Spurious Emissions	Better than -75dB ref to carrier
Harmonic Emissions	Better than -70dB ref to carrier
RF Bandwidth	200 KHz (+/-100 KHz @ -40 dB rtc)
Output Connectors	SO239 (or optional N type)
RF Ruggedness	Any VSWR, any phase, any length of time
Audio Input Sensitivity	0dBu 775 mV rms adjustable
Audio Inputs Connector	Phono/ RCA socket
Audio S/N Ratio	Better than 70 dB
Audio Freq Response	30 Hz to 15 KHz +/- 0.5 dB
Audio Distortion	better than 0.1% at +/-75 KHz dev
Stereo Crosstalk	35 dB
Pre-emphasis	50 uS (75uS USA) or None
Pilot Tone Freq	19 KHz
Pilot Tone Stability	0.2 Hz
Antenna Polarisation	Vertical
Antenna Gain	+6 dB
Antenna Cable Loss	-2 dB 50m LMR400 foam cable

! IMPORTANT ! PLEASE READ INSTRUCTIONS

The antenna is the most important part of the transmission system and must be correctly installed before proceeding further and before any transmission equipment is connected.

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 400 watts of transmitter power, power flux density measurements made at ground level directly under the antenna show less than 1 W/m². Several European countries use a value for the power flux density of 10 W/m² as a basis for considering whether or not an area is safe. The issue of radio frequency radiation limits is a contentious one and work in this field is continuing worldwide. **Under no circumstances** should the antenna be mounted and used at ground level or within a few meters of personnel.

ANTENNA PACKAGE CONTENTS CHECKLIST

2 x Dipole (YELLOW marked cable + 53 cm RG59 cable)
1 x Dipole (RED marked cable + 53 cm RG59 cable)
8 x 65cm radiator rods
8 x Bolt, wing nut and plastic spacer
2 x RF connector 3 way junction box
4 x Mast fixing clamp
20 x Cable ties
2 x 50m Antenna Cable Phased Lengths

TO ERECT THIS ANTENNA YOU WILL NEED TO PROVIDE

1. PVC insulation tape and/or Self Amalgamating Tape
2. Tape Measure with mm
3. 10mm Spanner
4. A secure mounting mast with a diameter of 45-50mm and clear length of at least 8 meters for mounting the dipoles to.

CONSTRUCTION

1. Using the 8 x Bolt, wing nut and plastic spacer mount the two 65cm rods to each of the dipole terminal boxes, make sure they are screwed tight.
2. Mount the 4 dipoles to the mast using the clamps provided. It is **IMPORTANT** for correct operation that the dimensions on the diagram are followed as closely as possible, all dipoles must be directly above each other. A red dipole should be at the bottom, a yellow next up, a red again next up and at the top a yellow dipole. **ALL 'TERMINAL BOXES' MUST BE FACING THE SAME WAY** for the system to work properly and give maximum gain to the horizon.
3. Mount one of the 3 way junction boxes between the red and the yellow dipole at the bottom. Mount the other 3 way junction box between the red and the yellow dipole at the top.
4. Connect the 2 x 50m phased LMR400 antenna cables to the centre of each of the two 3 way junction boxes, **MAKE SURE THE CONNECTORS ARE SCREWED PROPERLY AND TIGHT**. Wrap PVC or self-amalgamating tape tightly around and all over the connectors to make them water resistant.
5. **IMPORTANT! DO NOT CUT BACK, ADD OR CHANGE THE ANY OF THE ANTENNA CABLE LENGTHS.** To get maximum radiation to the horizon it is important that the signal from each amplifier to each dipole arrives at exactly the same time, this can only happen if the cables are exactly the same length.
6. Securely fix the 2 cables using PVC tape or large cable ties to the mast as shown in the diagram. Make sure the cables are not going to flap around in the wind. Once again, do not cut back any excess cable. To make the cabling look tidy, it is okay to coil the cable.
7. Make sure that all fixings are tight and are not going to work loose over time with wind.
8. On completion of the antenna installation you should have 2 x 50m cables ready to plug into each of the large RF power amplifiers.

IMPORTANT!

DO NOT SHORTEN, LENGTHEN OR CHANGE THE LENGTH IN ANYWAY TO THE 50M LENGTHS OF THE SUPPLIED ANTENNA CABLE

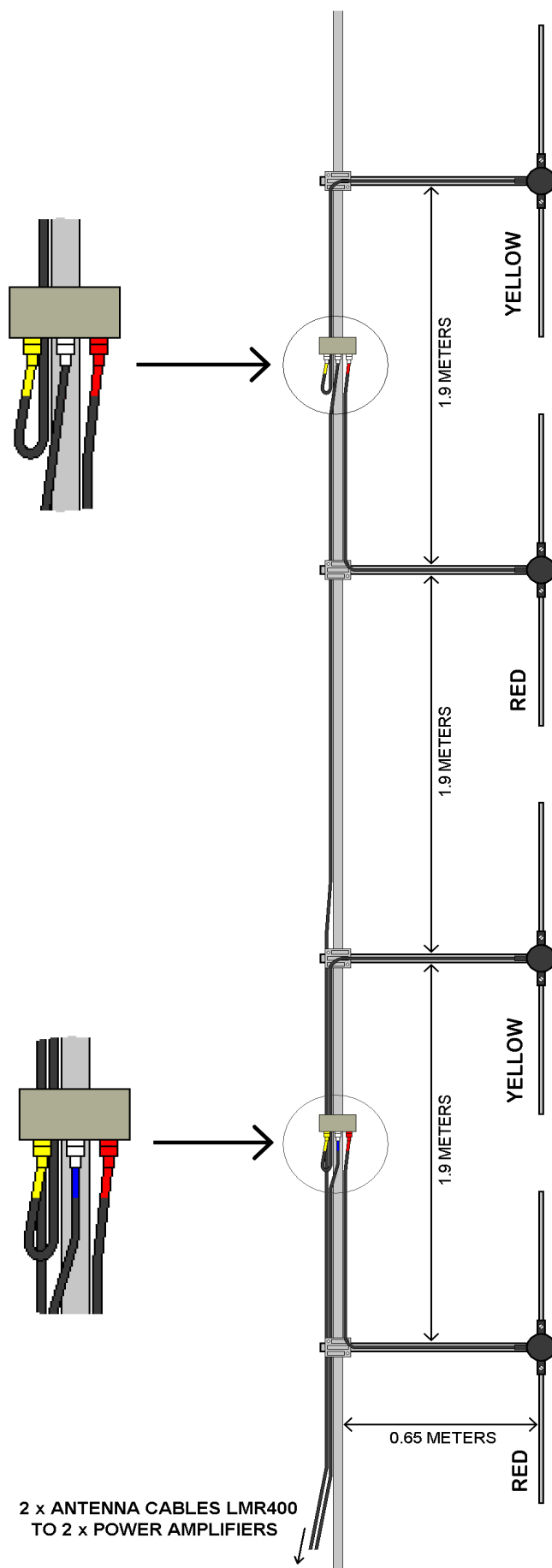
FOR THIS SYSTEM TO WORK CORRECTLY AND GIVE 1600 WATTS 1.6 KW ERP TO THE HORIZON IT IS VERY IMPORTANT THAT:

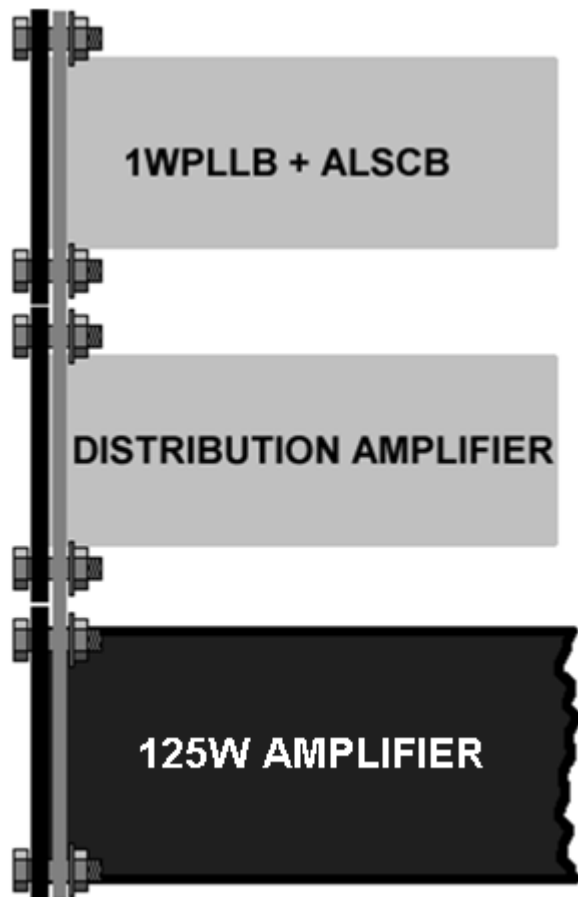
1. THE ANTENNAS ARE MOUNTED STRAIGHT IN A VERTICAL LINE WITH EACH OTHER AS SHOWN IN THE DIAGRAM
2. THE RED DIPOLE IS AT THE BOTTOM, NEXT UP YELLOW, NEXT UP RED AND AT THE TOP THE YELLOW DIPOLE.
3. THE 50M CABLE LENGTHS ARE NOT CHANGED

IF YOU NEED TO EXTEND THE ANTENNA CABLES READ THE FOLLOWING CAREFULLY

THIS WILL WORK PERFECT! It is important that the signals from the FM power amplifiers arrive at each dipole at exactly the same time, this can only happen if the LMR400 cables from each power amplifier to each junction box are the exactly the same length. It does not matter how long the cables are, how many cables you use or how many joins are used to connect the cables together. All that matters is that the total lengths of cable are exactly the same. In practice we have found that a difference or tolerance of up to 2 cm between each cables is acceptable, this gives a 2 to 3 degree tilt error up or down in the direction of the horizon, any more than this and the loss of signal to the horizon will become noticeable.

THIS WILL NOT WORK! If you choose to connect any random lengths to extend the cables or lengths that have not been properly and accurately measured to be identical, then the signals will arrive at the dipoles at different times and this will cause a cancellation effect to the combined signal in the air. In worst case the signal gain to the horizon could disappear completely. In best case some of the signal will be radiated, but it will be very poor and inefficient. The only way to measure the cables accurately is to lay them out side by side on a flat road, side walk or similar. With a person at each end, pull them tight and cut them exactly equal with each other, then fit the plugs. If you fit a plug incorrectly, you need to repeat the process by cutting both again.





Arrange the units as shown in diagram to the left. Use the supplied M6 screws, nuts, washers and drilled bars to clamp the 2U 19 inch driver and 2U 19 inch power amplifier. The power amplifiers are much heavier, so these should be at the bottom. The driver and distribution amplifier are light and will suspend in the air and do not need any support at the back.

Alternatively you can mount the units in a professional 19 inch enclosure and integrate the units with other equipment that you supply.

Arrange the units as shown in the picture above. The picture shows the view of the rear panels.

It is self explanatory from the rear panel where the power supplies plug in, **DO NOT plug in the power supplies at this stage.**

1. Connect the output from each power amp to the two 50m cables coming down from the dipole antennas. If you find that the cables are longer than necessary, **DO NOT** shorten these leads as they are a specific phased length. It is okay to coil and cable restrain them to make the arrangement tidier.

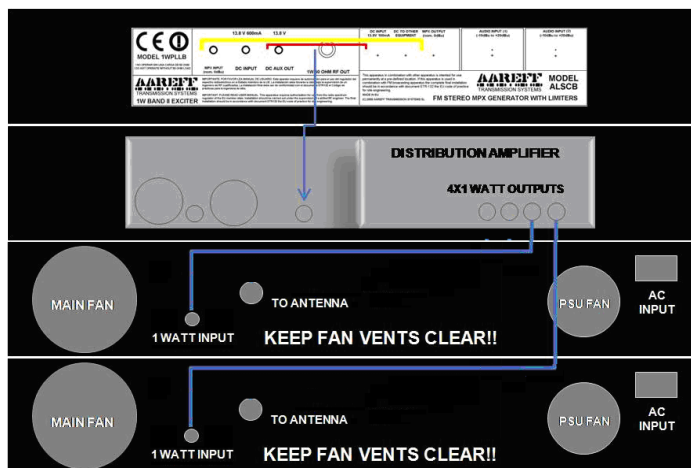
2. Using the two leads supplied terminated with BNC connectors connect the 1W input from each power amp to the 1W driver outputs. You will find that the supplied leads are longer than necessary, **DO NOT** shorten these leads as they are a specific phased length. It is okay to coil and cable restrain them to make the arrangement tidier.

3. There is a 15V DC adapter. Plug the adapter into the ALSCB DC INPUT. Then connect the ALSCB DC TO OTHER EQUIPMENT to 1WPLL DC INPUT using the short red and black DC cable. Then connect the 1WPLL DC AUX OUT to Distribution Amplifier using the short red and black DC cable. Then connect the AC mains power to the adapter.

4. Turn on the mains power to all units. The driver will lock after a few seconds and power amps should indicate power on the front panel meters. The switch on the front panel of the power amplifiers should be set to 'FWD'

5. Provide an audio input to the ALSCB Stereo Generator and Limiters and you are on air.

ALWAYS KEEP THE VENTS AND FANS CLEAR.



EQUIPMENT COMPLIANCE

This system is:

- i. designed and tested to comply with the European Harmonised Standard for Telecommunications ETS 300384 when used as shown in this document. It is generally considered and accepted that harmonized standards reflect state of the art performance and a presumption of conformity.
- ii. designed to be compliant throughout its useful working life of typically 5 to 10 years.
- iii. not for use by the unqualified general market consumer.
- iv. specifically designed and only intended for installation by an engineer with other similar apparatus in a fixed installation at a permanently pre-defined location.

ROHS

All components used in this apparatus are RoHS compliant and do not contain above the specified limits in any of the following restricted substances:

- Lead
- Hexavalent Chromium
- Mercury
- Cadmium
- Polybrominated Biphenyls (PBB's)
- Polybrominated Diphenylethers (PBDE's)

PRODUCT END OF LIFE

This apparatus must NOT be disposed of with other domestic waste.

We are fully committed to maintaining our responsibilities to the environment. Owners of apparatus that has reached the end of its useful life can return it to us for recycling, recondition, reuse or proper disposal. You will be required to pay lowest cost postal service available to ship the apparatus to us. Before shipping please contact us for more important information.

LEGAL ADVICE

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 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 product.