



## **TZ-RD-1740 17/40m Rotary Dipole Instruction Manual**

The TZ-RD-1740 is a loaded dipole antenna for the 40m band and a full size rotary dipole for the 17m band. The antenna uses an aluminium radiating section and two loading coils to permit performance on two frequency bands. All hardware supplied is stainless steel to cope with aggressive environmental conditions except for the mounting U bolts which are galvanised steel but optionally supplied at slightly extra cost as stainless steel.

The antenna uses medium efficiency loading coils located at such a position to permit the coils to present a high impedance at 18.1MHz but to act as loading coils on 7.1MHz. By locating the coils at a large distance from the feedpoint the input impedance of the antenna is kept high increasing the operational bandwidth of the antenna between the 2:1 VSWR points. Additionally, the current flowing through the inductors is reduced compared to loading coils placed at the feed point thus reducing overall resistive losses. The current distribution of the antenna is kept almost sinusoidal up until the loading coils where it is linear to the tips of the antenna. Only a small inductance is required but at sufficient distance from the feed point to ensure the input impedance of the antenna

is not too low. The loading coils are protected by covers to prevent bird damage and are sealed to prevent moisture ingress.

Heavy wall tubing is used to provide superior strength and durability.

The antenna has a large bandwidth capable of being tuned for a maximum VSWR of less than 2.0:1 across 200 kHz of the 40m band and the whole of the 17m band. When mounted at 15m or greater the antenna will perform significantly better than a vertical for DX contacts.

The antenna may be mounted on a separate tower or mast to other HF antennas or mounted on the same tower or support as your 10/15/20m tri-bander or other antenna as long as a vertical separation of 2m or greater is used. If smaller spacing is used the VSWR and radiation pattern of the TZ-RD-1740 or other antennas on the support may be degraded

When mounted at heights of 15m or greater, in the clear, the antenna is extremely efficient and offers excellent low angle radiation for DX communications.

### **Supplied Equipment**

The following equipment and/or facilities are supplied with the TZ-RD-1740 antenna:

<b>Radiating element:</b>	Radiating section – Various sleeved aluminium sections.
<b>Traps</b>	(2) Two loading coils within the centre elements.
<b>Adjustment hose clamps</b>	(4) Six stainless steel hose clamps, 32mm, and 15mm.
<b>Stainless Steel Screws</b>	(16) Self Tapping 3 mm Stainless Steel Screws.
<b>Aluminium Pop Rivet</b>	(16) Aluminium Pop Rivets (may be used instead of the S/S screws)
<b>Mounting bracket</b>	Aluminium mounting bracket attached to a support pipe or tube.
<b>Mounting hardware</b>	(2) 50mm galvanised steel U bolts.
<b>Instruction Manual</b>	This document.

### **Optional Equipment**

<b>Balun</b>	(1) HF 1:1 Balun, TZ-1840 or equivalent. A balun is recommended to prevent feed line radiation which may impair the radiation pattern, VSWR or cause TVI.
<b>Stainless Steel U Bolts</b>	(2) Stainless Steel 50mm U bolts are supplied instead of the two (2) 50mm galvanised U bolts for mounting the vertical on a pipe.



## Guidance for all installation types

To assist with corrosion protection for the RF connectors and radiating element connection, a layer of plastic insulation tape followed by a layer of self-amalgamating tape (bhutal rubber) tape may be used. The electrical tape assists in making removal of the self-amalgamating tape easier when maintenance is required. Use drip loops to form a single coil of cable that assists with corrosion

protection and provides stress relief for the RF coaxial feeder. Do not over tighten the radiating element connection terminal nuts. Use only enough torque to cause the spring washers to “flatten”. Further torque may crack the internal lock tight adhesive making later removal of the balun difficult. Simply “nip up” the nuts just past finger tight.

## Tools Required for Assembly and Tuning.

The following tools are required to assemble the TZ-RD-1740 antenna:

- a. Flat blade screwdriver,
- b. No. 2 Phillips Head Screwdriver
- c. 13mm open ended spanner,
- d. Pop rivet gun (if the supplied pop rivets are used instead of the S/S screws, and
- e. VSWR Meter or antenna analyser.

## Warning Electrocutation Hazard

When installing this antenna be sure not to come into contact with overhead electrical power lines which may not be insulated. Contact with uninsulated overhead powerlines whilst installing or operating this antenna may lead to *serious injury* or *death*. DO NOT INSTALL this antenna in a location where mechanical failure of the support or antenna may allow the antenna or support structure to fall onto or come into contact with overhead electrical power lines.

## Check the supplied parts.

Locate all the components and check that all hardware has been supplied with your antenna. If any item is missing please contact RippleTech

Electronics for a replacement item, [info@rippletech.com.au](mailto:info@rippletech.com.au) or contact your local agent or supplier.

## Assembling the antenna.

Once all the components have been identified, layout the antenna on the ground. Assemble the inner sections of the antenna first.

Insert one of the 32mm tube sections into each side of the centre support section. Ensure that the M6 screws that clamp the element in place are loose at this point so that the element slides in easily. Insert the sections into the centre insulating block into the 32mm tube and insert the M6 x 10mm retaining screw with flat and spring washer, do not tighten

yet. Insert the other 32mm section into the insulating blocks. The sections should slide into the insulating block holes and over the centre insulator.

Insert two (2) phillips head M6 screws into the top of each insulating block and the centre insulator. Use a flat washer and spring washer under each screw (qty 4 each). For the centre insulator screws be sure to attach the balun fly leads (pig tails) prior to tightening the screws.



Refer to Figure 1 – Centre Mount Assembly Detail. Once all screws have been inserted with at least one turn, tighten each screw in turn.

The pigtailed used for the TZ-RD-1740 should be 15cm (6 inches) long and terminated in “eye” type terminal lugs. Pigtailed are not supplied with the

antenna or balun but are available separately from RippleTech Electronics or can easily be made up at home using automotive terminal lugs and 2.5mm<sup>2</sup> electrical wire. Refer to Figure 1 – Centre Mount Assembly Detail for detail of the balun connection point.

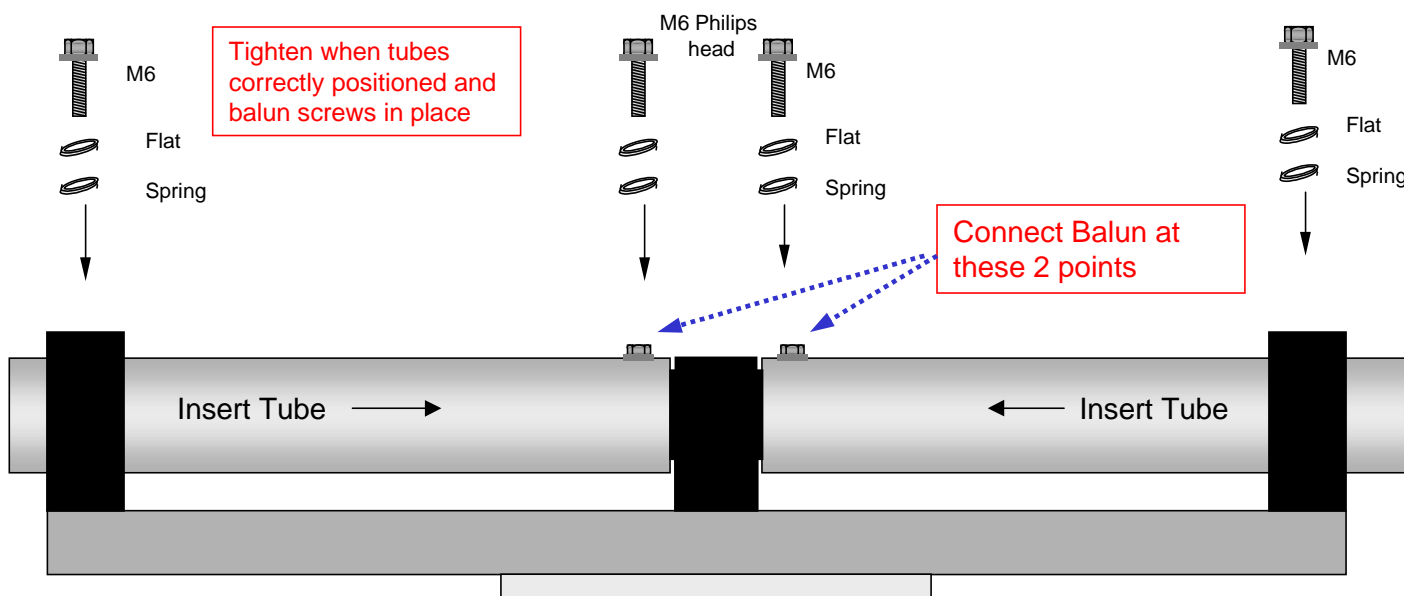


Figure 1 – Centre Mount Assembly Detail

Locate and insert each telescoping tube for each side of the element. Line up the pre-drilled holes and insert either the supplied S/S self tapping screws or use the supplied pop rivets to secure the elements together. If using the pop rivet method, the holes may need to be drilled out slightly so that the pop rivets can fit. Pop rivets are the preferred method if you antenna is going to be used in a permanent installation.

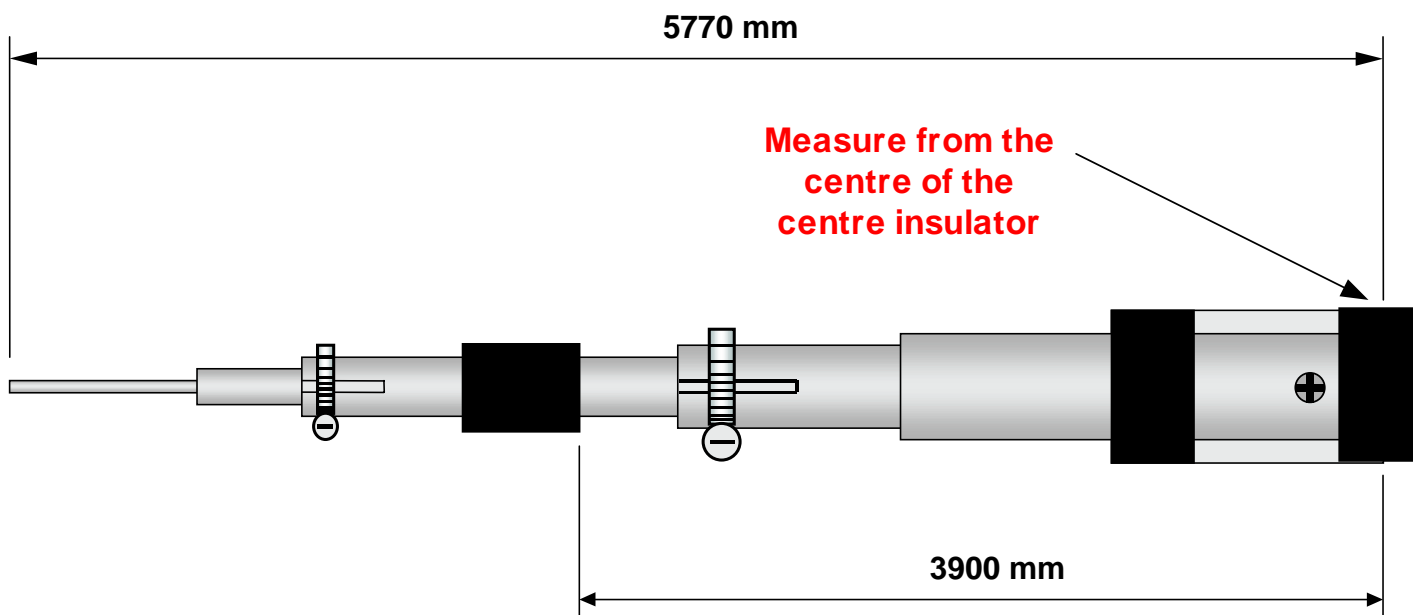
First insert the 28.8mm diameter tubes and then the 25.4 mm diameter tubes. Once **all** tubes have been lined up, then either pop rivet or screw the elements together. Two (2) fasteners are required for each join.

Locate the 25mm hose clamp (this is the largest one supplied). Place the hose clamp over the end of the 25mm tube section and slightly tighten so that the clamp does not move. Locate the loading coil

element section and insert this radiating element section and secure in place. This tube should be inserted approximately 6 to 7.5 cm into the larger section. Tighten the hose clamp. Repeat for both sides of the antenna. The total length from the centre of the element to the inner edge of the loading coil should be 3.9m.

Locate the 15mm hose clamp. Place the hose clamp over the tube section and slightly tighten so that the clamp only just does not move. Locate the final element section and insert. Repeat for both sides of the antenna.

Carefully measure the length of each side of the antenna and adjust until the total length from the outermost insulating block to the tip of the antenna is 5.77m. Refer to Figure 2 – Dimensions for Tuning for guidance. Check that each hose clamps have been securely tightened.



**Figure 2 – Dimensions for Tuning**

Connect the balun pigtails to the connection points and the balun. When the antenna is mounted to the mast, use cables ties to attach the balun to the mast. Ensure that the weight of the balun and feeder is not supported by the balun pigtails, i.e provide slack for the balun pigtails.

Since the balun is DC short, there should be a DC short between the two element halves via the balun. With the balun disconnected there should be a DC open between the two element halves. Normally, a good match can be achieved by altering the radiating element length.

If difficulties are encountered use an antenna analyser to measure the input impedance of the antenna. This is best achieved using a 1/2 wavelength feeder cable or RG-58 or RG-8 (RG213). Refer to Table 1 - 1/2 and Full Wavelength Feeder Cable Lengths (Velocity Factor 0.66), which details the length of cable required for the intended use of your antenna.

Using a 1/2 wavelength (or full wavelength) of cable ensures that the antenna analyser readout is correct for both magnitude and phase of the input impedance, i.e. the real and imaginary components are correct.

Perform a final check of the lengths of the elements shown in Figure 2 – Dimensions for Tuning. Note that the dimensions stated in this document are for an installation height of 10m or greater. If the antenna is mounted less than ten (10)m high then the dimensions shown will have to be reduced. This antenna is not designed to be installed at heights less than 10m.

Insert the two U bolts into the mounting bracket and temporarily adjust to suit the diameter of your supporting mast. A diameter of 50mm (2") is recommended for this antenna.

Your TZ-RD-1740 is now ready for installation on your tower

Frequency (MHz)	1/2 wavelength (RG-58) (m)	Full wavelength (RG-58) (m)	2 wavelengths (RG-58) (m)
7.100	13.85 m	27.7m	
18.130	5.42 m	10.84 m	21.70 m

**Table 1 - 1/2 and Full Wavelength Feeder Cable Lengths (Velocity Factor 0.66)**



## Mounting Your TZ-RD-1740 with an existing beam

In most installations the TZ-RD-1740 will be mounted on a tower with an existing tri-bander for the traditional HF bands. There are two installation methods that are recommended to ensure minimum interaction between the TZ-RD-1740 and any existing or future antennas.

### *Method 1 – Vertical Separation*

If you desire to have the TZ-RD-1740 face in the same direction as your existing antennas, it is recommended that the TZ-RD-1740 be mounted with at least 3m vertical clearance. Reasonable results can be achieved with only 2m vertical separation but there will be some interaction between the antennas. This will be noticeable as a change in the VSWR responses of either antenna, which in some instances can actually reduce VSWR readings. However, in such instances it is likely that the gain, bandwidth and/or F/B ratio of

the beam antenna will be degraded. Greater than 3m vertical separation will result in negligible interaction between the antennas.

### *Method 2 – Angular Separation*

An alternative method to the vertical separation method is to mount the TZ-RD-1740 at right angles to the main beam, that is with the TZ-RD-1740 parallel to the boom of any existing beam antenna. When mounted parallel to the boom of a beam antenna the TZ-RD-1740 may be mounted only 1m above the boom without adversely affecting the performance of the beam antenna. There will however, be a degradation in the VSWR curves of the TZ-RD-1740 if the boom of the antenna is long, (approx 4m or longer). If the TZ-RD-1740 is separated at 2m or greater the VSWR of the TZ-RD-1740 should be unchanged from the figures specified within this document.

## Tuning Your TZ-RD-1740 Rotary Dipole

Since the WARC bands are relatively narrow the TZ-RD-1740 should normally be tuned for operation on the particular 40m band segment of interest. It is unlikely that the 17m VSWR will be greater than 2.0:1 when the 40m resonance is within the region 7.0 – 7.25 MHz. Refer to the dimensions given in Figure 2 – Dimensions for Tuning.

The electrical length of this antenna varies with the height above ground. The higher the antenna, the longer the elements are required to be. At heights greater than 15m the effective length of the element will remain relatively unchanged. The length given in Figure 2 – Dimensions for Tuning is suitable for mounting the antenna in the clear at least 15m above ground.

To tune the antenna for a VSWR dip at your preferred frequency, use the adjustment tabs on the centre mount. To lower the resonant frequency, lengthen the element. To raise the resonant shorten the element. The element lengths should be symmetrical, i.e same distance out on each side.

Should your installation present an unacceptable VSWR or the VSWR dip is not within the bands. The following procedure should be followed.

### *Step 1*

Mount the TZ-RD-1740 on a tall step ladder in a clear space so that the antenna is clear of any nearby metallic objects. The antenna should be at around 3m above the ground. Use an antenna analyser or VSWR meter to measure the resonant frequency at each band.

### *Step 2*

Adjust the length of the inner element at the hose clamp to achieve a VSWR dip in the 17m band. Adjust the end element section length at the outer hose clamp for a dip in the 40m band.

### *Step 3*

Adjust the length of the element to obtain a VSWR dip approximately 150 kHz below the required frequency. *Do not adjust the antenna to resonate at the frequency required when the antenna is only 3m above ground. This will result in a VSWR dip out of band when the antenna is mounted at full height.*

### *Step 4*

If unacceptable VSWR persists, ensure that the antenna is mounted well in the clear. Locate the



antenna as far as possible from other antennas or metallic objects. Raise or lower the antenna to alter the input impedance of the antenna.

Note the dimensions for future reference of your particular installation preferences.

## Specifications

<b>Type</b>	Loaded 40m/17m Rotary Dipole.
<b>Frequency Range</b>	Adjustable 7.00 – 7.300 and 17.5 – 19.5 MHz .
<b>Bandwidth</b>	17m: 2000 kHz, 40m: 200 kHz, (2.0 : 1 VSWR limit).
<b>Input Impedance</b>	Nominally 50 ohm.
<b>Radiation polarisation</b>	Horizontal mounting
<b>Gain</b>	17m – 0 dBd, 40m –1.0 dBd
<b>Directivity</b>	Up to 2.14 dBi.
<b>Power Handling</b>	1000 Watts PEP
<b>Total Weight</b>	6.0 kg.
<b>Electrical Length</b>	17m – 100%, 40m – 60%
<b>Overall Length</b>	13.0 m
<b>Element Sizes</b>	32mm – 10mm Dia
<b>Wind Survival</b>	120 km/h