RippleTech Electronics
www.rippletech.com.au
Sales@rippletech.com.au

TZ-WD-4080 Low Band Wire Dipole Instruction Manual

The TZ-WD-4080 is a trapped dipole antenna for the 40m and 80m amateur bands. The antenna has two (2) wire elements for the 40m band and two (2) wire elements for the 80m band and can be configured in a dipole formation or an inverted Vee formation although the lengths of the elements may need to be altered to achieve an acceptable VSWR for each type of installation. All hardware supplied is stainless steel to cope with aggressive environmental conditions except for the mounting eye bolt on the balun which is galvanised steel.

The antenna uses high efficiency coaxial traps which are sealed against the ingress of moisture and surrounded with a PVC cover to protect the traps from rodent and bird attack, a common occurrence in many locations.

The antenna has a bandwidth capable of being tuned for a maximum VSWR of less than 2.0:1 across 200 kHz of the 40m band and up to 150 kHz of the 80m band, provided the antenna is mounted at a substantial height. When mounted in sub-optimum locations or at low heights the bandwidth is reduced and the minimum VSWR may be 1.5:1 or greater at resonance.

When mounted in an inverted Vee configuration the antenna is situation for excellent short hop communications and local ground wave QSOs. For users in Australia, good signals will be provided throughout the continent.

When mounted as a dipole at low heights, 12m (36ft or less) the antenna performance is similar to that of an inverted Vee configuration.

When mounted in a dipole configuration at medium to high heights, the antenna will perform very well for DX, or international communications. Excellent DX signals can be enjoyed when the antenna is mounted at heights of 70ft or more. The higher the antenna is mounted, the better the performance of the antenna for DX communications. At heights of 15m (45ft) or more good DX signals will be evident on the 40m band. At this height the antenna will generally outperform a ¼ wave vertical on 40m.

At heights of 20m (66ft) or more DX signals will be evident on the 80m band, although for excellent DX performance on 80m, installation heights of 30m or greater are required. Generally, for best DX performance mount the antenna as high as possible.

Supplied Equipment

The following equipment and/or facilities are supplied with the TZ-V-3w antenna:

Radiating element:	Radiating section – 2 by 9.75m lengths of 2.5mm^2 electrical wire. (40m)
	Radiating section – 2 by 6.5m lengths of 2.5mm^2 electrical wire. (80m)
Traps	(2) Two traps – 40m resonant.
Balun	(1) 1:1 high Power HF Balun, optimized for 3.5 - 7 MHz performance.
End Eyelets	(2) Two nylon thimbles to use as end insulators.
Instruction Manual	This document.

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.

RippleTech Electronics
www.rippletech.com.au
Sales@rippletech.com.au

Tools Required for Assembly and Tuning.

The following tools are required to assemble the TZ-WD-4080 antenna:

a. 10mm open ended spanner,

b. Wire Cutters,

c. Heat gun, and

d. VSWR Meter or antenna analyser.

Warning Electrocution 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 or contact your local agent or supplier.

Assembling the antenna.

Lay the antenna on the ground. Measure the length of the antenna and adjust to the lengths given in Table 1 – Radiating Element Lengths. These values should be used as guidance only. The higher the antenna is installed the longer the elements needs to be. The 40m elements are the longest elements and are pre-cut and attached to the balun. When installed in an inverted vee configuration the length of the antenna will need to be slightly shorter.

Locate the two (2) 40m traps. Attach the ends of the 40m radiating sections (9.75m lengths – the longer ones) to one end of the trap. Place the eyelet, then spring washer, flat washer and nut on the M6 bolt and tighten so that the spring washer flattens. Nip up but do not overtighten. Repeat for both traps.

Locate the 80m radiating sections and repeat the above procedure at the other end of the trap. The free ends (end without installed eyelet) of the 80m radiating section is unterminated to permit tuning to your preferred operating frequency on the 80m band.

Wrap the wire ends over the end thimbles and temporarily secure in place. Raise the antenna to height and check the VSWR prior to trimming the antenna. Once the VSWR is dipped at the desired point, by wrapping more wire in a coil at the end of the antenna, then and only then, cut the antenna to length, leaving around 10 – 15 cm excess as a safety excess which can be wound around the element wire without any performance degradation.

Typical Activity	Resonant Frequency (MHz)	Typical Upper Frequency (MHz)	Typical lower Frequency (MHz)	Length (Per side)
CW	3.525 MHz	3.600 MHz	3.450 MHz	6.25 m, (20’ 5” ft/in)
CW & Phone Rag-chewing	3.560 MHz	3.500 MHz	3.625 MHz	6.10 m, (19’ 11” ft/in)
Phone Ragchewing	3.600 MHz	3.675 MHz	3.550 MHz	5.90 m, (19’ 3” ft/in)
Phone DXing	3.750 MHz	3.815 MHz	3.675 MHz	5.10 m, (16’ 8” ft/in)

Table 1 – Radiating Element Lengths

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 ½ wavelength feeder cable or RG-58 or RG-8 (RG213). Refer to Table 2 - Feeder Cable Lengths (Velocity Factor 0.66) Table 2 - Feeder Cable Lengths (Velocity Factor 0.66), which details the length of cable required for the intended use of your antenna. Using a ½ 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.

Once the correct length of wire for your installation has been determined you may then trim the radiating element to the correct length, to achieve the best VSWR. Use the supplied cable ties to neatly hold the radiating element in place around the thimble.

Alternatively, the wire may simply be left in position, secured in place by cable ties, so that the antenna may be tuned for another frequency in the future, or if the tower antenna configuration is altered, the 80m sloper can be re-tuned. Refer to Figure 1 - Wrapping Excess Cable Method, for guidance on the wrapping method most appropriate. Use the supplied heatshrink to cover the cable ties and wrapped cable to secure everything in place and create a strong, secure and neat installation.

Note for good performance, the VSWR of the 80m dipole does not need to be better than 2.0:1. A suitable ATU can be used to provide an acceptable match for your transceiver or amplifier and the radiation pattern and efficiency of the antenna will not be noticeably degraded. However, with time and persistence a good wide-band VSWR, less than 1.5:1 can be achieved.

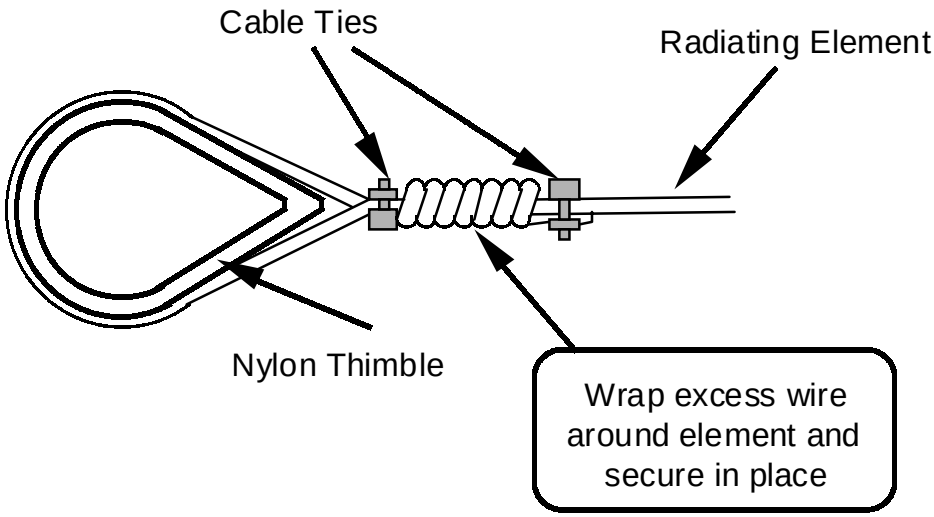

Figure 1 - Wrapping Excess Cable Method

Alter the configuration of the radiating element to achieve the best VSWR. This may involve raising or lowering the feed point, the length of the radiating element, or a combination of both.

Normally, a good match can be achieved by altering the radiating element length. However, if a good match cannot be achieved, altering the height of the antenna or configuring the antenna as an inverted Vee may assist.

If difficulties are encountered use an antenna analyser to measure the input impedance of the antenna. Use the analyser to read the input impedance and alter your installation to achieve a higher or lower input impedance (as necessary) to obtain a closest match to 50 ohms.

Should the antenna resonance on 40m be too high in frequency for your particular installation, fly leads may be connected to the inner M6 bolts of the 40m traps. These fly leads can be trimmed to lower the resonant frequency on the 40m band without affecting the 80m band. Use cable ties to make a loop over the 40m trap and attach to the 80m radiating element. Use insulated wire and ensure no electrical connection to the 80m radiating section is made. DO NOT ADD THE WIRE FLY LEAD TO THE 80M SIDE OF THE TRAP (outer side) AS THIS WILL HAVE NO EFFECT.

RippleTech Electronics
www.rippletech.com.au
Sales@rippletech.com.au

Frequency (MHz) 80m	Frequency (MHz) 40m	Cable Length (m)	Cable Length (ft & inches)	
For ½ wavelength section on 80m and full wavelength on 40m				
3.50	7.00	28.10	92	2.5
	7.05	27.90	91	6
3.55	7.10	27.70	90	11
	7.15	27.51	90	3
3.60	7.20	27.32	89	8
	7.25	27.13	89	0
3.65	7.30	26.94	88	5
3.70		26.58	87	2
3.75		26.22	86	0
3.80		25.88	84	11

Table 2 - Feeder Cable Lengths (Velocity Factor 0.66)

Specifications

Type	Trapped Wire Dipole.
Frequency Range	7.100 MHz (40m) and adjustable 3.500 to 3.800 MHz (80m)
Bandwidth	40m – 200 kHz, 80m 125 kHz (2.0 : 1 VSWR limit).
Input Impedance	Nominally 50 ohm.
Radiation polarisation	Horizontal mounting
Gain	0 dBd (40m), -0.5dBd (80m)
Directivity	Up to 2.14 dBi.
Power Handling	1000 Watts PEP
Total Weight	3.5 kg.
Overall Length	32.5 m

IMPORTANT NOTICE – INSTALLATION AND USE LIMITATIONS

Your antenna will ***only*** achieve the stated performance when installed in the clear, a good distance from large trees, buildings, roofs and metal structures. For optimum performance the antenna must be mounted at least 13m (40ft) from the ground or above other objects, a garage or house roof etc. However, the radiation efficiency will be the same for even the poorest of installation locations, only the VSWR will degrade.

For instance, when your antenna is mounted as a dipole at 8m (30ft) the input impedance may degrade to be approximately 27-30ohms representing a VSWR of about 1.8:1 at resonance. However, any high quality Antenna Tuning Unit (ATU) may be used to improve the VSWR match for the transceiver and coupling efficiency is likely to be 95% or better. The cable losses attributable to the higher VSWR on the transmission line will be less than 0.5 dB for 40/80m when the transmission line length is less than about 30m.

You may use the antenna on other bands with an ATU however this will result in higher voltages at the antenna traps than when the antenna is operated on its resonant frequencies. Care must be exercised when using an amplifier on non-resonant frequencies so that the voltage limitations of the traps are not exceeded, a power output of no more than 250W CW or 500 W PEP is advised. No responsibility is accepted for non-resonant frequency operation above 100W PEP