



TZ-80-1 80m ¼ Sloper Installation Manual

The TZ-80-1 is a high performance antenna for both DXing and local rag-chewing in the 80m band. The antenna can be user tuned to operate in the 80m CW section, phone band or the DX phone window –around 3.775 to 3.800 MHz. Compared to traditional DX antennas, such as verticals, the TZ-80-1 is broadband and in certain installations

can be tuned with a VSWR of less than 2.0: 1 over the frequency range 3.500 to 3.800 MHz. The radiation pattern of the antenna includes both horizontal and vertical components as well as low and high angle radiation. The TZ-80-1 is designed to be used with an existing tower, nominally 13.7m (45 feet) tall.

Supplied Equipment

The following equipment and/or facilities are supplied with the TZ-80-1 antenna:

Radiating element:	21m (70 ft) grey PVC coated 2.5m ² electrical wire complete with eyelet and Triple heatshrink mechanical strengthening.
Balun	1:1 linear ferrite core balun designed for operation 1.8 – 45 MHz
Mounting bracket	Aluminium mounting bracket attached to balun
Mounting hardware	(1) One 30mm stainless steel U bolt.
Thimble	(1) One nylon thimble to be used as an end termination
Cable Ties	(4) Four 100mm black UV stable cable ties, (wire termination).
Instruction Manual	This document.

Required but not Supplied

To operate efficiently the TZ-80-1 must be mounted on a tower or other support structure that is at least 10m tall. The support structure must be metal (conductive) or a separate down conductor must also be run to the ground. Note, as supplied the TZ-80-1 is designed for tower mounting. The base of the tower must be grounded. For optimum low angle radiation at least 4 ground radials should

be attached to the ground point. The longer and greater the number of radials the better will be the low angle performance of the antenna and the greater will be the radiating efficiency.

The following equipment and/or facilities are *not* supplied with the TZ-80-1 antenna but must be provided by the operator for the antenna to operate correctly:

Ground Space	When mounted on a 14m tower the bottom mounting point for the radiating element is required to be approximately 14m away from the base of the tower.
Ground Rod	2m or greater length copper clad steel earthing rod (available from electrical distributors)
Ground Radials	up to 64 insulated or bare copper conductors, preferably 20m long or greater.

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 nut. 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.



Using the TZ-80-1 on a 14m or greater height tower.

The TZ-80-1 may be mounted on a 14m or taller tower or support structure. Installation on an Australian “nally” tower or American Rohn 50 is perfect for this antenna. For other taller towers the feed point should be mounted at approximately 14 – 15m (45 – 50 ft) mark.

As supplied, the radiating element has been trimmed to be slightly longer than that which would normally be required for resonance in the CW portion of the 80m band. The length of the element is 21m (69 ft).

Determine the required frequency of operation of the antenna. For CW and rag-chewing select a resonance frequency of 3.600. For SSB rag-chewing with the occasional foray into the DX window choose a resonance point of 3.700 MHz. For SSB DX operation in the DX window, use a resonance frequency of 3.800 MHz.

Use the chart below to determine the appropriate length of the radiating element. **DO NOT CUT** the element to the exact length shown in Table 1 – Typical Radiating Element Lengths. The table is a guide only and each installation will be slightly different due to the various tower types, height and

antennas in use. Use the supplied thimble to form an end point, folding the radiating element wire back around, twisting it back along the radiating element wire. Refer to Figure 1 - Wrapping Excess Cable Method, for guidance regarding a suitable fold back and wrap technique. You may trim the wire so that there is approximately 0.5m folded back since 2.0m (6 ft) of wire must be removed from the radiating element length for SSB DX band use.

If the radiating element is cut too short, the wire may be stripped back, spliced, soldered and covered with heat shrink to extend the element length.

Alternatively the wire ends may be soldered or crimped with an eyelet and a stainless steel or brass bolt used to join the wire together.

The end of the radiating element should terminate above the ground. This may be close to the ground, say 0.5 – 1.0m (1.5 – 3 ft) or alternatively the element may be terminated at the top of the property boundary fence, or suitable wooden pole 1.75 – 2.0m (5 – 6 ft) tall. Note the lower end of the radiating element is left unterminated, do not connect it to ground or any metallic object.

Typical Activity	Resonant Frequency (MHz)	Typical Upper Frequency (MHz)	Typical lower Frequency (MHz)	Length
CW Dxing & Rag-chewing	3.550 MHz	3.650 MHz	3.500 MHz	20.25 m, (66' 6" ft/in)
Phone Ragchewing	3.600 MHz	3.700 MHz	3.500 MHz	20.0 m, (65' 7" ft/in)
Phone DX/Chat Compromise	3.700 MHz	3.800 MHz	3.600 MHz	19.4 m, (64' 4" ft/in)
Phone DXing	3.800 MHz	3.650 MHz	3.850 MHz	19.1 m, (62' 6" ft/in)

Table 1 – Typical Radiating Element Lengths

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.

Note for good performance, the VSWR of the 80m sloper does not need to be better than 3.0:1. 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.

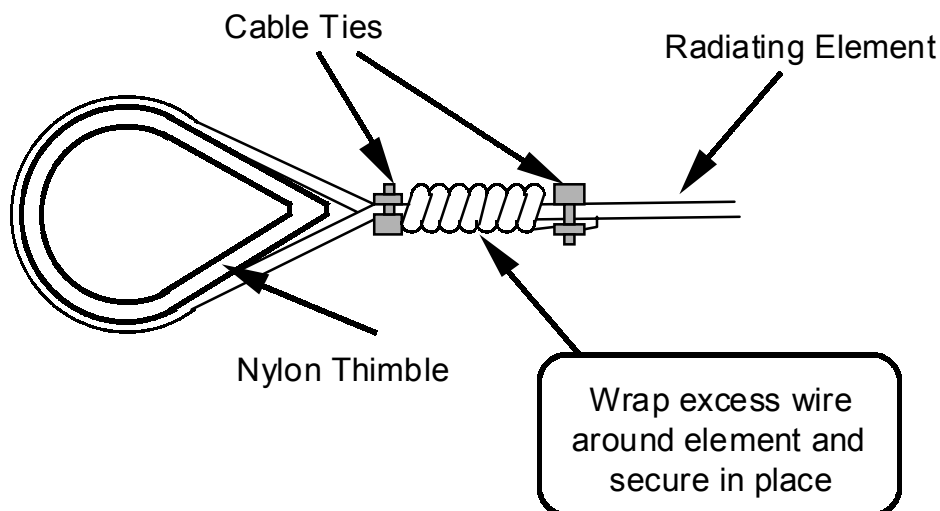


Figure 1 - Wrapping Excess Cable Method

The base point for the radiating element should be approximately the same distance from the base of the tower as the height at the mounting point. Thus, the radiating element is mounted at 45° to the tower.

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

Normally, a good match can be achieved by altering the radiating element length. Since this can be

achieved at ground level this task is relatively simple.

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 3 - VSWR adjustment Options, which details the length of cable required for the intended use of your sloper. Using a ½ 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.

Frequency (MHz)	Cable Length (m)	Cable Length (ft & inches)	
3.50	28.00	91	10
3.55	27.61	90	7
3.60	27.23	89	4
3.65	26.85	88	1
3.70	26.49	86	11
3.75	26.14	85	9
3.80	25.79	84	7
3.85	25.46	83	6
3.90	25.13	82	5
3.95	24.81	81	5
4.00	24.50	80	5

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

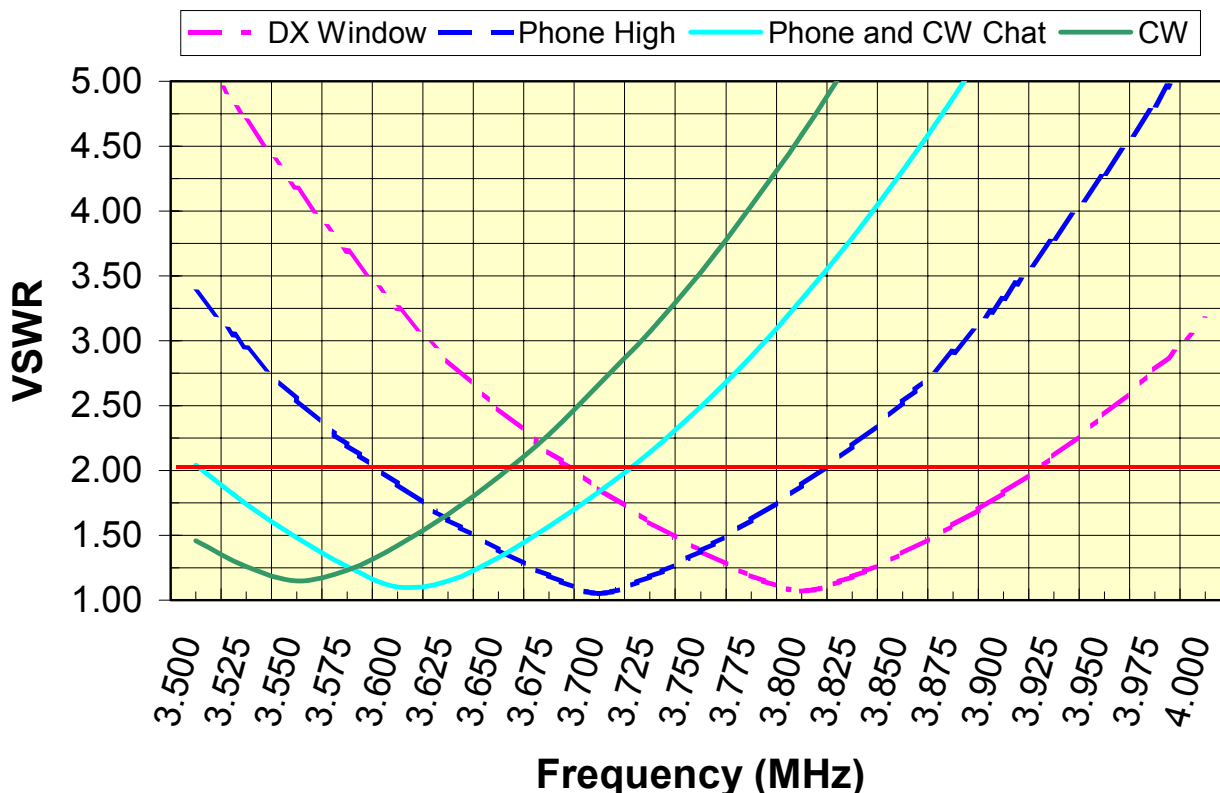


Figure 2 – Typical TZ-80-1 VSWR Plot

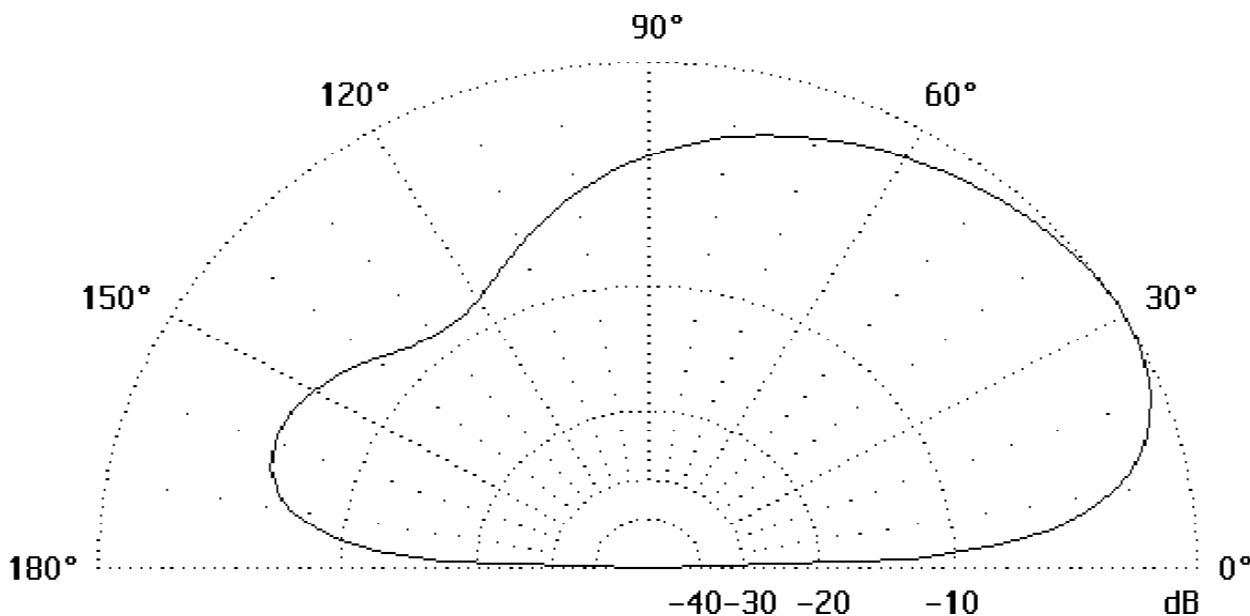


Figure 3 – Typical TZ-80-1 SLOPER Radiation Pattern

By adding 32 1/4 wavelength radials to the base of the tower the low angle radiation performance of the antenna can be improved by about 1.0 dB. The

front to back ratio of the antenna will also diminish. For DX contacts, it is still advisable to locate the radiating element towards the DX.

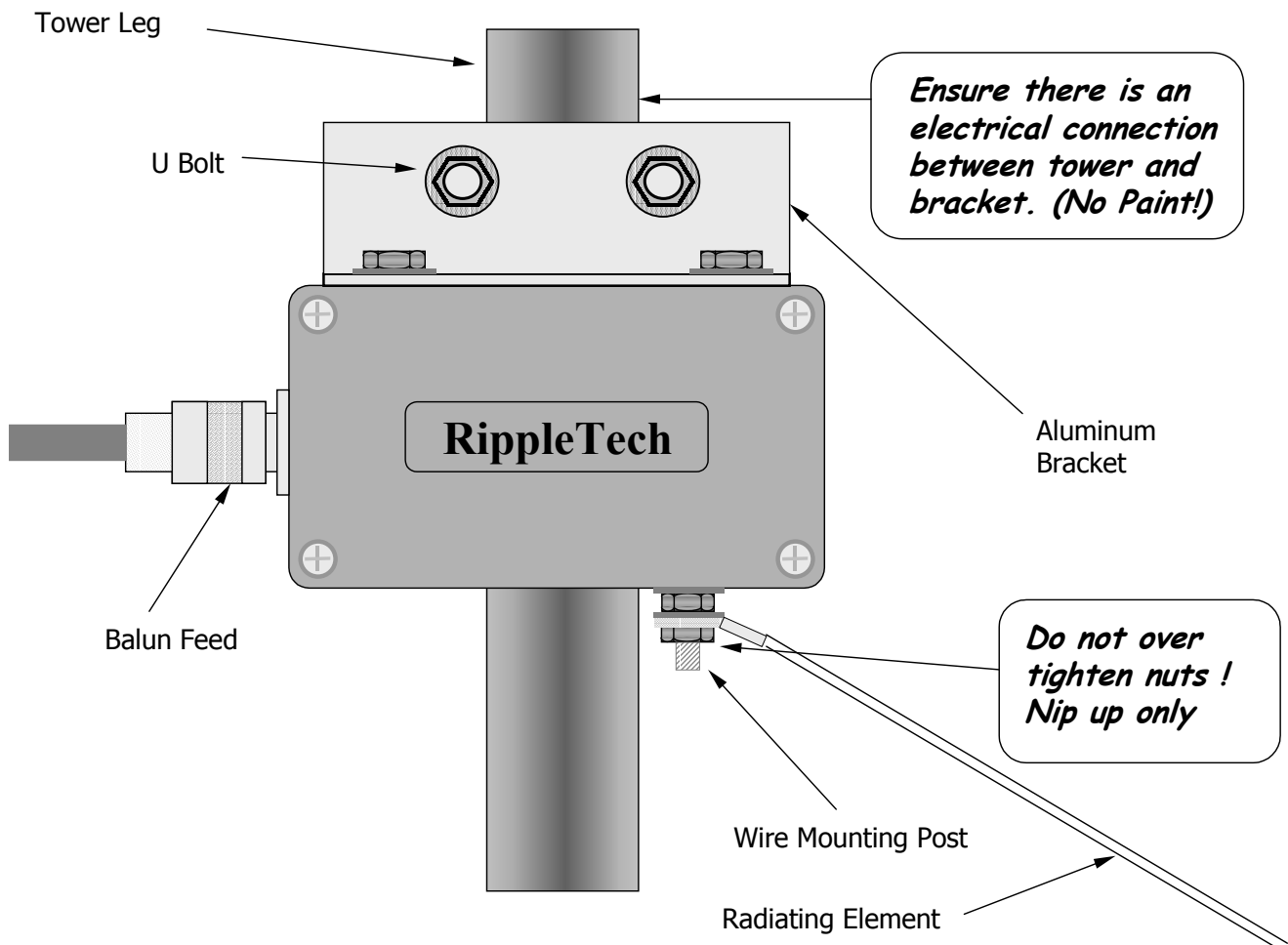


Figure 4 – Tower Mounting Details

Installation on a Short Tower

The TZ-80-1 may be mounted on a shorter tower or support structure, however the performance of the antenna will be reduced with respect to acceptable VSWR, bandwidth and gain. The configuration of the antenna will need to be altered, refer to Figure 5 - Short Tower Installation Configuration for details. To achieve resonance and an acceptable VSWR for this configuration, it is highly desirable to use an antenna analyser or other measurement equipment (such as a noise bridge) that can determine both the input reactance and resistance at the feed point. Adjustment can be made using a simple VSWR meter, however due to the wide variance of installation configurations and types this method may be extremely time consuming.

The base point for the radiating element should be approximately the same distance from the base of the tower as the height of the tower. Thus, the

radiating element is mounted at 45 degrees to the tower. The radiating element should be cut so that it can be terminated approximately 50 to 75 cm above the ground.

Use the remaining radiating element wire, or other wire (not supplied), to form either an inverted Tee or loop attached to the radiating element. This forms a capacitive element (akin to capacity hats) to electrically lengthen the radiating element, whilst still obtaining a 45 degree angle at the feed point.

Raise or lower the loop or tee to achieve resonance at the desired frequency. Raising the loop decreases capacitance (raises the resonant frequency) whilst lowering the loop increases capacitance (lowers the resonant frequency). Alternatively, the size of the loop or length of the “tee” can be adjusted. Increasing the size of the loop or the length of the “Tee” will increase



capacitance to ground and lower the resonant frequency of the antenna.

The shape of the wire loop is not relevant. Any shape including, circular, square, triangular, diamond, etc will suffice. For a tower height of 9-10m a loop area of about 1m² is the preferred starting point. Adjustment of the feed angle may be required to achieve a good VSWR, an antenna analyser will be most efficient to achieving a

satisfactory match quickly. To assist with antenna analyser measurements a feed line length of exactly ½ wavelength will provide an accurate value of the impedance of the antenna, both reactive and resistive, at the feed point. For 80m operation using RG-58 or RG8, with a velocity factor of 0.66, the relevant feeder lengths are given in Table 3 - VSWR adjustment Options.

Change Required	Option One	Option Two
To increase impedance	Mount feed point higher on tower	Lower beam antenna mounting point
To decrease Real (R) component	Mount feed point higher on tower	Raise beam antenna mounting point
To Lower Resonance point	Lengthen radiating element.	Increase Loop size or lower loop
To Raise Resonance Part	Lengthen radiating element.	Decrease Loop size or raise loop.

Table 3 - VSWR adjustment Options

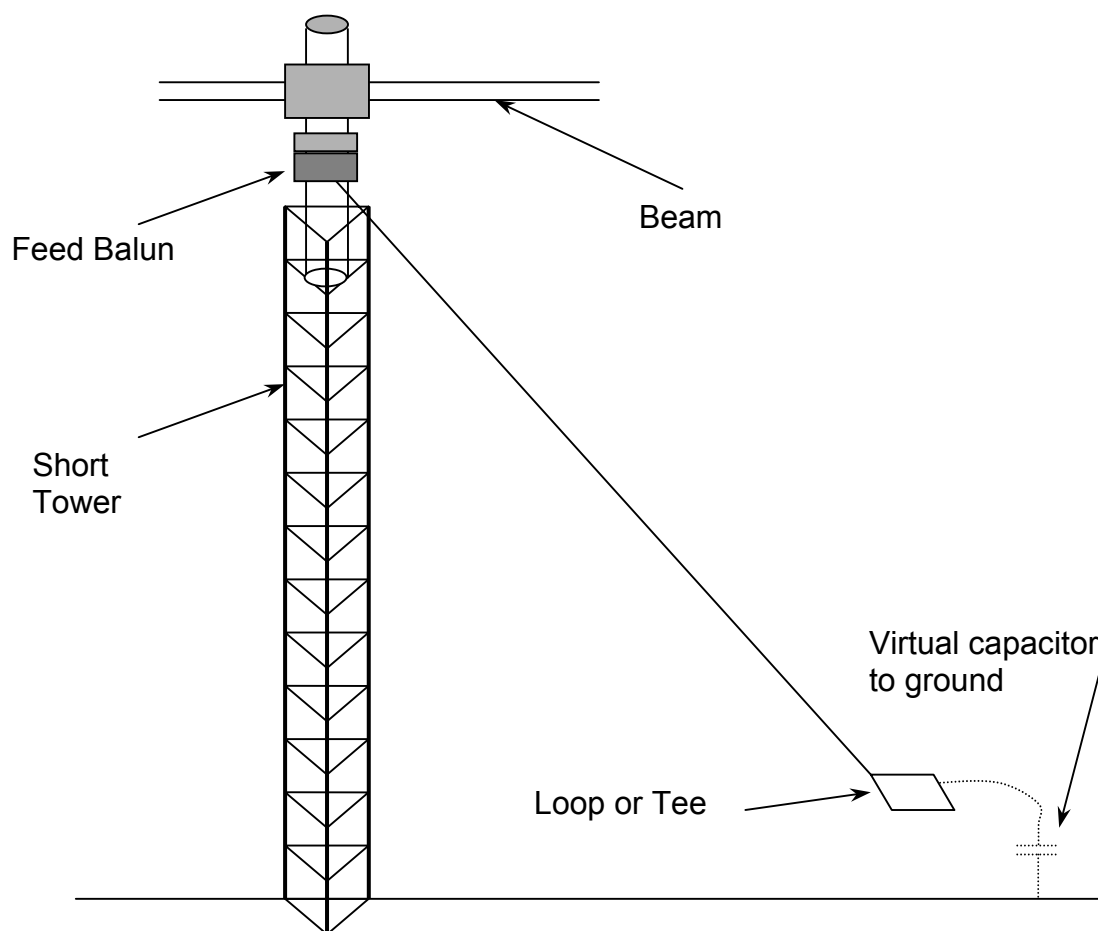


Figure 5 - Short Tower Installation Configuration



Using the 80m Sloper on other bands

The 80m sloper can be put to good use on the 30m (10.1 – 10.15 MHz) band since the antenna is approximately $\frac{3}{4}$ of a wavelength long on these frequencies. On suitable installations the antenna may present a VSWR of approximately 3.0:1 on 30m. An ATU may be used to provide a suitable match to your amplifier or transceiver. On air performance shows that the antenna will perform as well as a wire dipole mounted at approximately the same height as the feed point. Radiation is best in the direction of the radiating element.

The antenna may be used on other bands, however the feed impedance is not ideal and much higher losses are encountered in the feed line due to the high VSWR. The antenna presents a very high

impedance on 40m since it is essentially an end fed $\frac{1}{2}$ wavelength antenna, and will not perform well on this band.

A reasonable level of performance can be achieved on the 17m band, however in general the antenna will be several dB down on a simple dipole mounted at the same height.

A shortened 160m sloper is available from RippleTech Electronics for use on a 14m (45 ft) or greater tower. A mod kit to convert your 80m sloper to a dual band 160m/80m sloper will be available from RippleTech in the near future. Please contact your dealer or RippleTech Electronics directly for further information.

Specifications

Type	$\frac{1}{4}$ wave half sloper antenna.
Frequency Range	Adjustable 3.5 to 4.0 MHz .
Bandwidth	200 kHz (2.0 : 1 VSWR limit) Refer to Figure 2.
Input Impedance	Nominally 50 ohm.
Radiation polarisation	Both Horizontal and Vertical components
Gain	2.0 dBi at 3.8 MHz
Directivity	Up to 3 dB at low radiation angles omni-directional at high angles.
Front to Back	Up to 6 dB at low radiation angles.
Power Handling	1000 Watts PEP
Radiation Pattern	Near Omni-directional, See Figure 3.
Antenna Colour	Light Grey