Kelemen Trap Dipoles

Kelemen-Antennas are wire antennas with traps made of Teflon insulated Coax.

Trap Antennas – What Does that Mean?

By inserting traps into both halves of a dipole further resonances can be obtained. Trap antennas are mostly somewhat shorter than full size dipoles and offer multi band operation where limited space doesn't allow larger antennas.
With trap antennas, however, you have to consider the weight of the traps, as they are mostly rather heavy and increase the mechanical load considerably causing the antenna to sag.
Trap antennas, however, are no broad-band antennas. The SWR rises quickly when working off the resonant frequency and an antenna tuner may possibly be required.
The location of a trap antenna is more critical than that of a mono-band dipole. Just as any dipole, the antenna should be placed as high and unobstructed as possible to avoid shifting of the resonant frequencies. Install it well away from buildings and similar structures. For the design of Kelemen-dipoles a reference height of 10 metres above ground has been assumed.
Their coaxial traps are much lighter than conventional traps making it easier to keep the antenna at a more effective average height.
Kelemen-Antennas are most suitable for portable operations because of their low weight. In most cases they can be simply supported by a single glass fibre pole.
The special traps of Kelemen-Antennas have a high Q and therefore low losses.
If you do not have enough space for a full-size dipole, you can use a shortened dipole with loading coils made of Teflon cable. However, shortening reduces the usable bandwidth and an antenna tuner may be required.
Like all Kelemen-Antennas the shortened versions are lightweight, as well as fully temperature-resistant and weatherproof.
Kelemen-Antennas are being manufactured from high-quality materials. All cases are milled from weather-proof Polycarbonate. Nuts, bolts and clamps are all made of stainless steel. Baluns are cased in bolted transparent cases of weather-proof Polycarbonate. In spite of the higher manufacturing costs they are not potted in sealing compounds to enable you to fix the balun yourself in the rare case of a failure. Furthermore it saves about half its weight. As condensation cannot totally be avoided, the bottom of the balun has a drain hole providing ventilation at the same time. All baluns come with a lug for easy mounting.
Included in delivery: complete antenna ready for operation, including balun with SO-239 socket and egg insulators.
As required, we offer models from 200 Watts to 2000 Watts.
Power ratings refer to PEP in SSB and actual Morse-keying (not permanent key down) in CW. All these ratings call for an antenna impedance of 50 ohms (more about that below).

Wire Antennas in Inverted-Vee Configuration

If for lack of space an antenna cannot be installed horizontally, the inverted-vee configuration is a useful alternative. Instead of the typical directional pattern of a dipole the radiation is almost omnidirectional, and only one single central support is required. Preferably, the apex angle should be between 90 and 130 degrees and not less than 75 degrees. Keep the ends of the dipole well above ground by extending them with some non-conductive line.

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Tuning

Your Kelemen-Antenna was factory-tuned to the low end of the specified band(s). As all antennas are influenced by their environment you may have to fine tune your antenna accordingly.

The following steps are recommended:

- To shift the resonance to a higher frequency on all bands increase the size of the loops to the strain relief on both sides. A few centimetres may well make some difference. Shortening the leads will rarely be necessary. To lower the resonant frequency on all bands make these loops smaller.

- To increase the resonant frequency on the lowest band fold back some wire at the egg insulator and secure it with tie wraps. Shortening of the wire will rarely be required. To decrease the resonant frequency do the opposite, there will be sufficient extra length of wire.

- By changing the shape of the traps you can adjust the resonance on single bands. This is particularly interesting for multi-band antennas for 3 or more bands.

- Slight squeezing of the traps (slightly oval) will increase the resonant frequency on the corresponding band and - to a decreasing degree - on the subsequent lower bands.

By careful combination of these three methods you can tune your antenna in its actual place to your favourite frequencies on each band.

Please note that all wire antennas are influenced by the prevailing weather conditions. In winter antennas tend to resonate somewhat lower than in summer. Similarly the antenna will be resonant a few khz lower during rain. Ice loading on cable and traps may also cause deviations.

Operation

As already pointed out, the traps of Kelemen-antennas have a high Q with very low loss. This advantage is partly compensated by a slightly smaller bandwidth in comparison with conventional traps. Therefore an antenna tuner may be required for operation far off the resonant frequencies. This may result in very high voltages in the traps and - in extreme cases - even arcing in the sealing compounds.
For this reason you should not apply the maximal specified power especially when feeding the 2 kw-antenna through a tuner.
There will be no problem running the usual 100 Watt transceivers into a 400 Watt antenna, even if using a tuner.

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Safety Instructions – please note!

- **Do not exceed the tensile strength of the wire!**

The PVC-coated stranded wire of the antenna is made of DIN 46431/40500 graded copper with a breaking load of 210-280 N/sq.mm. This load is far beyond the irreversible stretching limit damaging the wire. To be reasonably safe the load should not exceed the values in the following table:

Type of antenna	cross section	**maximal load**
400W, 80m-10m	1,5mm²	**4….6 'Kilos'**
400W, 160m	2,5mm²	**8…10 'Kilos'**
2000W, 160m-10m	2,5mm²	**8...10 'Kilos'**

please do not force high mechanical tension on the antenna, a slight sag of the antenna will not disturb the function and efficency of the antenna, but will avoid the antenna to tear on high winds.

- **If trees are used to support the antenna, provisions must be made to take up the movement of the trees and avoid breaking of the wire. This can be done by a pulley up in the tree and a halyard with a weight down as shown in the picture above. Alternatively you can take up the movement with an elastic (rubber) guy line or a spring. Don't forget to install a safety catch in case of a failure of the line or spring!**

- **Before mounting the antenna make sure that the stainless steel clamps at the egg insulators and the balun have been securely tightened!**

- **Because of the high voltages at both ends of the antenna touching the wire will cause electric shocks and burns. Try to keep a distance of 1 - 2 meters between the ends of the antenna and the supporting structures to avoid deteriorating influences by stray coupling!**

- **Keep adequate safety distances to power lines and masts and do not forget to provide lightning protection!**

General Hints for Wire Antennas:

- To be able to tune the antenna in its actual site it is helpful if you can easily hoist and lower the antenna.
- The effectiveness of the antenna depends as much on its height as on its unobstructed location.
- The VSWR is influenced by the way the feed line is led down from the balun. Keep it as perpendicular to the antenna wire as possible.
- Antennas running parallel to power lines are prone to receive a substantially higher level of QRM and may easily cause TVI.

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