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TROUBLESHOOTING CUSHCRAFT TRAPPED YAGIS AND DIPOLES

ADJUSTING THE ANTENNA

The suggested element lengths will be correct for most installations. The local environment may shift the point of best VSWR. In this situation you may improve VSWR for a specific frequency by making equal length adjustments on each side of the center of the driven element.

To adjust the highest frequency band adjust the tubing length between the center of the element and the first trap on the element.

To adjust a center frequency band adjust the spacing between the trap for that band and the next higher frequency trap.

To adjust the lowest frequency band adjust the length of tubing beyond the lowest frequency trap.

If you have a yagi adjust the driven element only. Leave the reflector and director elements set to the suggested lengths.

TROUBLES IN THE ANTENNA

If you fail to get a good VSWR on one band there are three possible problems. One is that a trap is bad or mis-tuned. Another is that nearby metal or other antennas have de-tuned the antenna. The third is that a length of tubing section has changed possibly due to loose clamps.

First verify that all element lengths are correct and if you have a yagi make sure that the element spacing is correct. If the reflector and director spacings are swapped it will have a serious effect on the impedance of the antenna. Rotate the antenna and check VSWR at different azimuth headings. Any variation in VSWR is an indication that nearby guy wires or other antennas are having an effect on the tuning of the antenna.

A trap is a high Q parallel resonant circuit. If the next lower frequency does not work then a coil may be open. Do not try to take a trap apart since this will void the warranty. The balance between inductance and capacitance is critical and requires special equipment to assure proper adjustment. Refer to the trap troubleshooting section for checking individual traps.

VSWR CHANGES WITH WEATHER

Ice or heavy snow that sticks to the elements and traps will cause the resonant frequency to shift lower since the radiator will appear to be fatter. If your antenna is close to the ground the effect of more conductive soil during wet weather will shift the resonant frequency lower due to capacative loading. Any cracked or torn plastic caps will allow moisture to ingress thus affecting the resonant frequency of the traps. Putting any type of a sealant on the hot end of the traps will likely de-tune them and create voltage breakdown problems since the outer end of a trap is a high voltage point.

VSWR CHANGES WITH POWER

If VSWR varies with power level on one or more band the problem may be in the VSWR bridge (or harmonic content of your PA). There can be a non linear variation of diode action at different power settings. This is common with inexpensive bridges. It is possible to overload a diode in the forward power mode. The diode is now on a different slope of the curve in relation to the reflected power diode which is not overloaded. The end result is that your VSWR will apparently increase when you go from low to high power. Example: 1.1:1 at 50 watts, 1.4:1 at 800 watts. Observe VSWR as you slowly increase power. If VSWR slowly increases you may be overloading your bridge. If you see a large jump in VSWR at a specific power level, not related to a slow increase in power, you have voltage breakdown troubles with your antenna system. CAUSES: Poor or intermittent connection in coax or connection in a trap: High voltage breakdown in a trap can be detected by sniffing the end cap to determine if it has burned. VSWR too high on one or more bands: Mistake in assembly or a defective trap. See trap troubleshooting. Look for a trap in backwards. Look into tubing at each end of trap, the end where the selftapping screw threads are visible, is the end that should be closest to the boom.

TRAP TROUBLESHOOTING

The traps are a very robust unit that should not require any attention. Amateur power levels should not be capable of damaging the coils or causing arcing under peak power conditions. Therefore trap problems will usually be traced to mechanical faults that are easily corrected.

The first step you should take when you suspect a problem is to locate the antenna so

that you can work on it easily. For safety's sake it is a good idea to have both of your feet on the ground. *(The traps should be marked before removal so that proper re-assembly is assured.)*

Check each trap to insure that the cover is tightly secured. The cover is the 1-5/8" tubing between the two large black end caps. Any movement of this cover will cause an intermittent VSWR condition on the antenna. You may easily test for a loose cover while the antenna is still assembled. Grasp the cover in one hand and the trap tubing in the other hand, apply a moderate amount of pressure first in a clockwise and then in a counterclockwise direction about the axis of the element. If the cover slips even a small amount it will require tightening. Remove the black cap from the trap on the side towards the boom of the antenna. A hex head screw will then be visible underneath. Tighten the screw with an appropriate screwdriver or nut driver. Be careful not to apply so much force as to strip out the sheet metal screw. If the hole is already stripped, or gets stripped accidently it is an easy matter to be fixed by substituting a #10 3/8" or 1/2" self tapping screw into the enlarged hole.

If all your traps pass the mechanical test and seem to be installed properly, then a frequency check is in order. *(The traps should be marked before removal so that proper re-assembly is assured.)* Place a trap on an insulated surface (such as a large cardboard box) and couple a dip oscillator to it as shown. Make sure to couple it to the end of the trap that was closest to the boom, the end of the trap that has the self tapping screw threads visible inside the tubing. Insert the tip of the dip oscillator coil slightly into the tubing. When a dip is found pull the oscillator coil out of the end of the trap slightly and re-dip the oscillator. Continue to pull the dip oscillator coil out of the tubing and re-dip until you have the smallest perceptible dip. It should be noted that the dip meter frequency is lower than the operational frequency of the trap. This is caused because the trap will load the dip oscillator and lower its frequency.

TRAP	OPER FREQ	DIP OSC FREQ
TA	28.60	27.50
TB	21.50	20.39
TC	21.30	20.20
TD	28.00	27.00
TE	28.80	27.60
TL	24.90	24.15
TM	18.11	17.29
TN	21.30	20.20
TK	14.18	12.65

You should use the listed oscillator frequencies as a guide. Temperature and humidity can have a +/-100KHz effect on traps. If the readings are within 200KHz of the listed amounts do not worry, the effect upon the assembled antenna will be minimal. Shorted turns or other serious defects will cause wide shifts from the norm. One or two megahertz is a definite indication of a defective trap. If you find such a trap, do not attempt to repair it yourself as this would void the warranty. All coils are sealed and are difficult to repair properly. When all traps are checked and corrected, re-install them in the proper order, *(as you previously marked them)* and your antenna is now ready for action.