

A WORD ABOUT TUNING NARROW BAND ANTENNAS WITH GRAPHING ANTENNA ANALYZERS.

Analyzers like the Rig Expert series sample only so many points when constructing a graph. 80 points in the case of the RigExpert series, when not being controlled by a PC. If you are sweeping say +/- 4MHz, a sample is taken every 100KHz. On an antenna with a 2.62:1 SWR bandwidth (-3dB points) of 16KHz, the dip may not be seen or will be quite shallow. Once you find the dip, center it, narrow the Range and resweep.

Typically, on 40M as an example. I do the final tuning with a sweep range of 40KHz. This will give a true indication of SWR.

TUNING SMALL LOOPS IN GENERAL

Antennas are function of their environment. They “see” objects near to them. So in order to avoid detuning the loop by being close to it:

Make a small adjustment and step away from the loop– ideally staying at right angles to the plane of the loop where it has nulls. Take a reading, make a change if required and again step back to take a reading.

Once you have the SWR centered on your operating frequency, you may wish to make small adjustments in the coupling loop height to achieve even lower SWR. Use the same procedure as above– step away from the loop while making your adjustment.

The unique hybrid matching network makes height adjustments of the coupling loop less necessary than would be the case with a classic coupling loop.

SPECIFICATIONS

Coverage 5.3MHz– 29.4MHz
Polarity Low Angle: Vertical
Polarity High Angle: Horizontal
Loop Diameter 45”
Design Z: 50 Ohms
Power Handling: 15W SSB/CW 10W DIGITAL
Weight: 3 lb
Shipping Size 16 X 16 X 3”
Materials: 6061-T6 Aluminum, CPVC,
Hardware: Stainless Steel
Connector: Female gold/teflon BNC

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**SMALL RX/TX HF LOOP
MODEL W4OP
60-10M STL**

PARTS LIST

PART NO.	QTY	DESCRIPTION
SUBL1001	1	MAIN RADIATOR ASSEMBLY
SUBL1002	1	COUPLING LOOP ASSEMBLY
L1003	1	COUPLING LOOP THUMB SCREW
SUBL1004	1	3 PIECE SUPPORT MAST
L1005	1	TABLE/RAIL CLAMP
L1006	4	STABILIZER FOOT 1” x 8”
L1007	4	RED STABILIZER FOOT THUMB SCREW
L1008	1	HOOK&LOOP TIE WRAP 6”
SUBL1009	1	MAIN TUNING UNIT
L1010	1	TUNING KNOB
L1011	1	OWNER’S MANUAL



FIG. 1

ASSEMBLY

1. UNPACK THE SUBASSEMBLIES AND LOCATE THE TUNING BOX AND THREE PIECE SUPPORT MAST.
2. THE LOEST MAST SECTION HAS A FEMALE 1/4-20 THREAD. FIRMLY SCREW THIS SECTION INTO THE TUNING BOX.
3. ASSEMBLE THE REMAINING TWO MAST SECTIONS ONTO THE LOWER PIECE IN ANY ORDER.
4. LOCATE THE HYBRID TUNING LOOP AND INSTALL IT ONTO THE UPPER TUBE. LOWER IT SO THAT THE TOP OF THE LOOP IS BELOW THE TOP OF THE UPPER TUBE AND LOCK IT IN PLACE BY TIGHTENING THE BLACK THUMB-SCREW.
5. CAREFULLY EXPAND AND RESHAPE THE RADIATOR INTO A 4' DIAMETER CIRCLE. GRASP THE CABLE WITH BOTH HANDS ABOUT 10" APART AND STRIGHTEN A BIT- MOVE UP AND DOWN THE CABLE GRADUALLY INCREASING THE RADIUS.
6. LOCATE THE 4 BLACK STABILIZING FEET, OR THE BLACK TABLE CLAMP. IF USING THE STABILIZER FEET, ATTACH THEM TO THE TUNING BOX WITH THE 4 RED THUMBSCREWS. LEAVE THE FEET A LITTLE LOOSE AT THIS TIME.
6. PLACE THE ENCLOSURE ON A LARGE FLAT SURFACE- FLOOR ETC. LAY THE MAIN RADIATOR ON THE FLOOR AND SCREW THE PL-259'S INTO THE SO-239'S BY JUST SEVERAL TURNS . **DO NOT TIGHTEN THE PL-259'S.** THE RIGHT SIDE HAS TWO SO-239'S. THE FRONT FOR 60-12M AND THE REAR FOR 10M.
7. LIFT THE RADIATOR UPRIGHT AND PLUG IT INTO THE TOP OF THE UPPER TUBE. TIGHTEN THE PL-259'S AS TIGHTLY AS POSSIBLE. AS YOU TIGHTEN, MOVE THE AXIS OF THE CONNECTOR A BIT TO MAKE SURE IT IS ALIGNED WITH THE SOCKET AND CONTINUE TIGHTENING.
8. THE STABILIZER FEET CAN BE ARRANGED AS NEEDED. IT IS OFTEN EASIER TO GRASP THE RED THUMBSCREW AND ROTATE THE FEET. IF NOT USING THE STABILIZER FEET, ATTACH THE CLAMP NOW TO A TABLE OR RAILING TO SECURE THE ANTENNA.
IF USING THE CAMERA TRIPOD OPTION- SEE ITS INSTRUCTIONS.
9. THE TOGGLE SWITCH ON THE LEFT SIDE IS PLACED IN THE UP POSITION FOR ALL BANDS EXCEPT 60M AND IN THE DOWN POSITION FOR 60M ONLY.
11. A LOOP & HOOK TIE WRAP IS PROVIDED TO SECURE YOUR FEEDLINE TO THE SUPPORT TUBE. DEPLOY IT AT THE BASE OF THE SUPPORT TUBE

TUNING

1. DEPLOY THE LOOP AS HIGH AS POSSIBLE OFF OF THE GROUND TO REDUCE GROUND LOSSES.
2. THE TUNING SCALE IS DESIGNED TO GET YOU INTO THE BALLPARK. THE CAPACITOR HAS A 6:1 REDUCTION DRIVE- THUS IT TAKES 3 TURNS TO GO FROM MAXIMUM CAPACITY TO MINIMUM CAPACITY. AS AN EXAMPLE: **40M/1** MEANS THAT THE 40M MARK IS ON THE 1ST REVOLUTION. THE **20M/2** MARK IS ON THE 2ND REVOLUTION AND **12M/3** IS ON THE THIRD REVOLUTION.

2A. BEGIN BY TURNING THE TUNING KNOB FULLY CCW. WHEN THE TUNING CAP IS FULLY MESHED YOU WILL FEEL AN INCREASE IN DRAG. CONTINUE TURNING CCW UNTIL THE FINGERHOLE IS ALIGNED WITH THE **CAL LINE**.

3. INITIAL TUNING MAY BE DONE BY TUNING THE VARIABLE CAPACITOR FOR MAXIMUM RECEIVER NOISE. FINAL TUNING IS BEST DONE WITH AN SWR METER OR ANTENNA ANALYZER. THE GRAPHING ANALYZERS MAKE QUICK WORK OF TUNING. ONE UNIQUE FEATURE OF THIS ANTENNA IS THE CAPABILITY OF PRECISION ADJUSTMENT OF THE COUPLING LOOP WITH RESPECT TO THE MAIN LOOP. THIS FEATURE ALLOWS FOR ADJUSTING THE SWR TO CLOSE TO 1:1 REGARDLESS OF THE MOUNTING LOCATION- I.E. PROXIMITY TO GROUND, BUILDINGS ETC.

4. TO TAKE ADVANTAGE OF THIS FEATURE, TUNE THE VARIABLE CAPACITOR TO YOUR OPERATING FREQUENCY. MEASURE THE SWR. RAISE OR LOWER THE COUPLING LOOP BY 1/4" AND REMEASURE THE SWR. SLIGHT RETUNING OF THE VARIABLE CAP WILL KEEP THE LOOP ON YOUR FREQUENCY. MAINTAIN THE COUPLING LOOP PARALLEL TO THE MAIN LOOP.

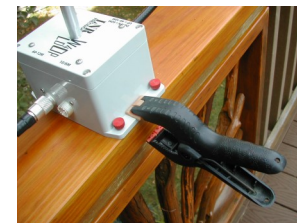
4A. IF YOU LEAVE THE COUPLING LOOP ABOUT 1/2" ABOVE THE MAIN RADIATOR, YOU SHOULD BE ABLE TO ACHIEVE SWR ON ANY BAND UNDER 1.5:1.

4. REMEMBER, THE NARROWER THE FREQUENCY COVERAGE FOR A GIVEN LOOP CIRCUMFERENCE, THE **MORE EFFICIENT** THE ANTENNA. ONE MANUFACTURER TOUTS HIS LOOP COVERING ALL OF 40M WITHOUT RETUNING. ANALYSIS OF THAT ANTENNA REVEALED IT IS OVER 10DB BELOW THE W4OP LOOP ON 40M.

5. 10M IS COVERED BY SCREWING THE RIGHT SIDE OF THE RADIATOR INTO THE REAR CONNECTOR. ON THE 10 AND 12M BANDS THE ANTENNA IS NOT A SMALL TRANSMITTING LOOP BUT RATHER A CAPACITY LOADED CIRCULAR DIPOLE. RADIATION IS AT RIGHT ANGLES TO THE PLANE OF THE LOOP - JUST THE OPPOSITE OF THE SMALL TX/RX LOOP.



DETAIL SHOWING THE FEET DEPLOYMENT AND COAX CONNECTORS FOR THE TWO BAND SEGMENTS.



DETAIL SHOWING THE TABLE/RAIL CLAMP