Assembly Instructions for the 1.5 Watt Amplifier Kit

1.) All of the small parts are attached to a sheet of paper indicating both their value and id.
2.) Leave the parts affixed to the paper until you are ready to solder them to the circuit board.
3.) Orient the circuit board with the diagram.
4.) Use a narrow chisel tip 25-30 watt soldering iron for assembly.
5.) All the small parts are taped in position on the diagram.
6.) Begin assembly with the surface mount components (non-leaded components).
7.) Starting at the input side of the diagram, locate the position of C1 (.001uf) and remove it from the paper . Then extract it from the protective plastic strip. Be careful not to drop it.

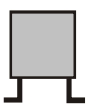
8.) Lightly tin the solder pad where the component is being placed.

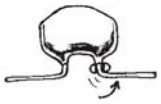
9.) Use a pair of tweezers to hold the component in position.
10.) Place the component in position. Heat the pad and draw the solder so it flows onto the end of the surface mount component.

11.) Do not apply heat directly to the end of the component for more than 5 seconds.
12.) Go to the other side of the component which in many cases will be the ground plane of the circuit board.
13.) Apply heat with the soldering iron, wait a moment and then apply a small amount of solder and draw the solder so it flows onto the other end of the surace mount component.

14.) Soldering surface mount components takes a bit of dexterity and skill. The resulting joint should look like this:

15.) Continue to solder the surface mount capacitors and resistors in order (i.e. C1, C2, C3, etc.) to the circuit board.
16.) Begin to solder the leaded components to the board, do not solder the transistors in at this time.
17.) Keep the leads short and form them like this:

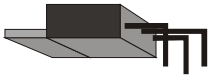




18.) Grasp one lead of the component with needle nose pliers as close to the body of the component as possible. Then bend the wire lead at a right angle as shown above. Some components such as resistors and rf chokes will require two bends, as above. Always bend against the tip of the pliers. The internal connection can be compromised if pliers are not used as a strain relief when bending.

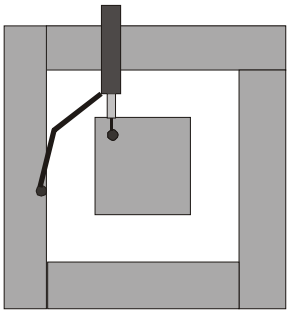
19. After the lead is properly bent, trim the portion which will be soldered to the circuit board to a length of 1/8 of an inch. It should only contact the surface of the pad it being soldered to and not stick out beyond the pad.
20. When you solder the coils to the circuit board make sure that the coil is no more than 1/8 to 1/4 of an inch above the surface of the circuit board. Also, there should be one wire diameter of separation between the turns of the coil.
21. Locate the positions of leaded components and begin soldering them onto the circuit board. First pool a bit of solder onto one of the pads where one of the leads goes. Then, firmly grasping one lead of the component with a pair of needle nose pliers, hold the component in position and heat the puddle of solder with your soldering iron and draw the pool of solder around the lead while heating both the lead and pad. It should flow in a smooth and even manner. Let the joint cool and then remove the pliers, the component should remain standing. Proceed to the other lead. Lay the tip of the soldering iron against both the lead and pad, let everything heat up for a moment, then apply a bit of solder. It should flow up and around the lead. Let the heat of the lead and pad melt the solder, not the tip of the soldering iron. If necessary, touch up the first lead. Proceed to the next component.
22. One lead of the small inductor is inserted and soldered into the hole at the juncture of the capacitor and resistor while the other lead is soldered directly to the circuit trace shown on the diagram, where one lead of the MAV11 is soldered. Do not install the inductor if your exciter has an output level of 50 milliwatts
23. Note the correct orientation of the MAV11 IC. Gently form the 4 leads of this component and solder into postion. Do not install the MAV11 if your exciter has an output level of 50 milliwatts

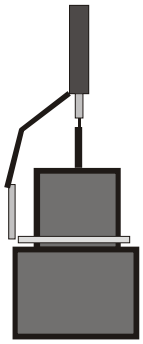
24. After soldering the remainder of components, it is time to insert and solder the transistors. Note that Q1 has a flat side, it is oriented facing the edge of board. It should not be more than 1/4 of an inch above the board. Using your needle nose pliers, gently bend the center lead out a bit so it matches up with hole pattern in the circuit board. Insert Q1 and solder.
25. Q2 is next. Note the hole pattern. Place the needle nose pliers across all three leads and bend the two outsided leads straight down. The bend will be at point on each lead where the thicker portion ends and the thinner portion of the lead begins. After bending the two outside leads, move the tip of the pliers slightly away from the other two leads, 1/10 of an inch, and grasp the center lead. Bend it down. The leads should match the hole pattern and spacing on the circuit board.



26. Locate the heatsink, 4-40 nut and 1/4 inch 4-40 machine screw. Postion the heat sink on top of the circuit board so the mouting hole lines up with the one the cicuit board. The heat sink should be centered squarely. Spread a thin coating of heat compound on the back of Q2. Postion Q2 so the mounting hole is lined up with those of the heat sink and circuit board and the leads are correctly aligned with their respective holes. Place Q2 flush against the heat sink and circuit board and be certain the leads enter the holes properly. Once in postion, insert the 4-40 machine screw from the top and thread on the nut from the bottom side of the circuit board. Tighten and stop when you see the heat compound begin to spread out from around the edge of transistor. Check for proper alignment, then solder the three leads of Q2.
27. The next step is to connect the voltage and ground wires to the board.
28. Use #18 stranded insulated wire for these connections
29. Measure the length needed to connect from the voltage pad of the circuit board to where the red banana socket is mounted on the panel.
30. Cut the red wire to length and strip about 1/4” of the insulation from the ends.
31. Route the wire so it runs parallel to the edge of the board, not across it.
32. Solder one end to the voltage pad and the other end to the tab on the red banana socket.
33. Repeat the process with the black wire.
34. Solder one end to the banana jack and the other end to the circuit board ground area.
35. The RF output pad is connected to the So239 socket with a length of RG213 coaxial cable.
36. Carefully strip about 3/4 inch of the outer insulation from each end of the coax.

38. Unbraid the outer conductor from each end and twist into a tight wrap, then carefully strip about 1/4 inch from the end of the inner conductor - do not nick the inner conductor. Lightly tin both the inner conductors and braid shield wires.
39. Puddle a bit of solder on the output pad of the circuit board, grasp the inner conductor of one end of the coax with a pair of needle nose pliers and solder it to the pad. Then grasp the braided shield wire with the pliers and solder it to the ground area next to the pad. Be sure that braid wire does not contact the output pad.
40.) Grasp the inner conductor of the other end of the coax with a pair of needle nose pliers and solder it to the center pin of the SO239 connector, some extra heat will be required. Then grasp the braid with the pliers and solder to the solder lug on the SO239 connector.





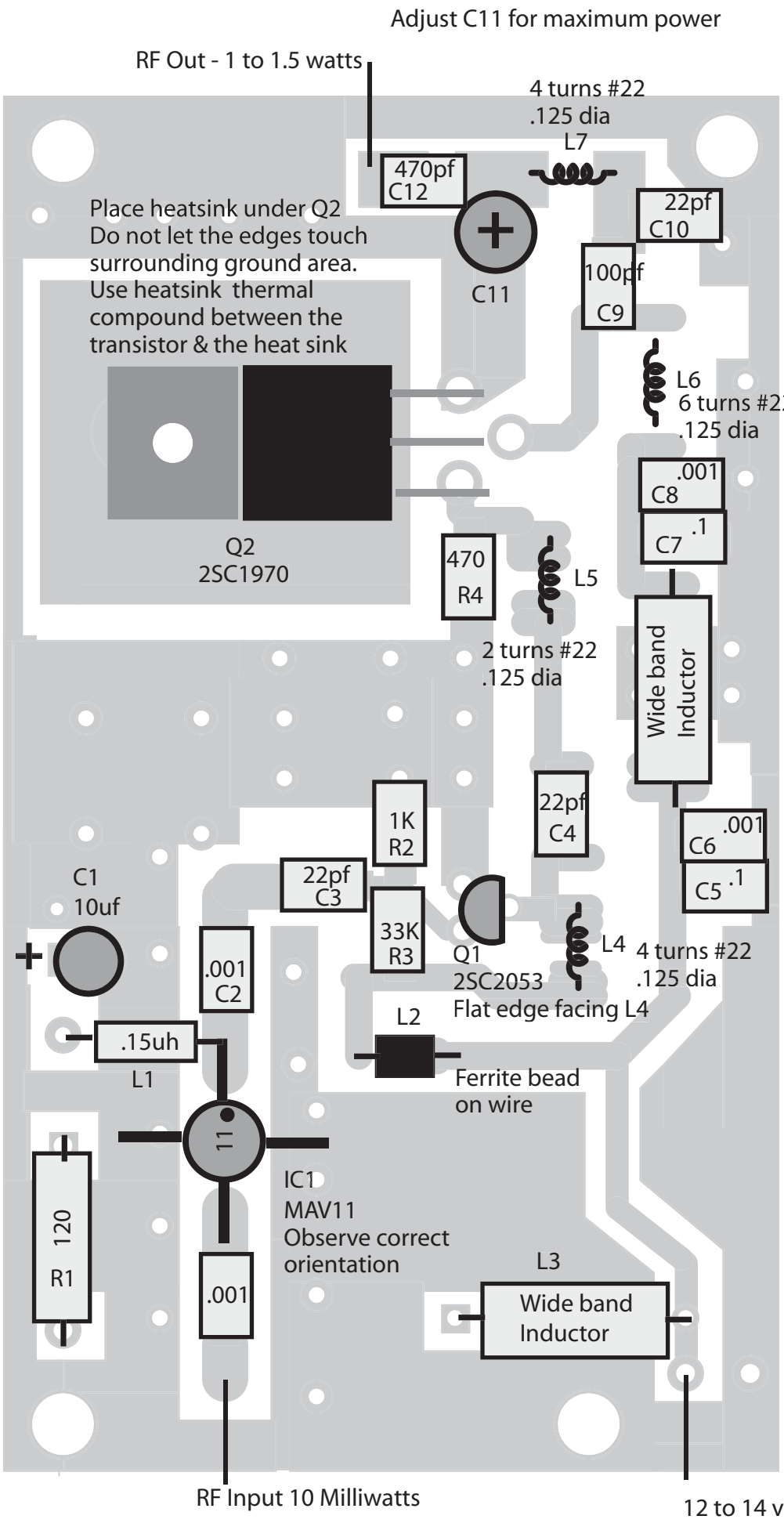
41. The last remaining connection is to the input pad of the amplifier.
42. The input will be coming from either a 10 milliwatt or 50 milliwatt exciter. If you have a 10 milliwatt signal, connect it to the spot indicated on the diagram - the input side of the MAV11 amplifier. If you have a 50 milliwatt signal, connect it to the location indicated on the diagram.
43. Use a short piece of RG174 coax to connect from the output of the exciter to the input pad of the 1 watt amplifier, same procedure as before.
44. If you are using an external exciter to drive the 1 watt amplifier, you will connect the input pad and ground to either a BNC or SO239 connector with a short piece of RG174 coax.
45. Double check all the connections, use a continuity test to make sure there are no shorts on the input and output traces of the amplifier.
46. Connect a dummy load of sufficient capacity to the output connector of an RF power meter. Use a short coax jumper to make the connection. A simple 2 watt load can be constructed by soldering 4 1/2 watt, 210 ohm carbon film or carbon resistors from the center pin of an SO239 connector to 4 solder lugs attached with 4-40 machine screws and bolts to the corner mounting holes of the SO239 connector.
47. Connect the output of the amplifier to the input of the RF power meter.
48. Connect the exciter to the input of the1 watt amplifier.
49. Once everything is connected properly it is time to test the amplifier.
50. Connect your power supply, 12-14 volts DC - observe correct polarity.
51. Turn on the power supply, be certain the unit is connected to the power meter & dummy load.
52. With 13.8 volts DC applied the amplifier should put out about 1 watt, adjust the trimmer capacitor for maximum power.
53. If there is no output or the output transistor (2SC1970) becomes excessively hot, turn everything off and check all the connections - bad solder joints or a component improperly placed are the usual culprits.
54. If everything is ok, then proceed to turn everything off and complete finally assembly and configuration of your transmitter.

1 Watt No Tune Amplifer

C1 - 10uf electrolytic		1
C2, C12, C6, C8 - .001uf 1206 SMT		4
C3-C4, C10 - 22pf 1206 SMT		3
C5, C7 - .1uf 1206 SMT		2
C9 - 100pf 1206 SMT		1
C11 - 5-30pf variable trimmer		1
C12 - 470pf 1206 SMT		1
IC1 - MAV11		1
L1 - .15uh choke		1
L2 - Ferrite Bead on wire		1
L3, L8 Wide band RF Choke		2
L4, L7 - 4 turns #22 .125 dia. bus wire		2
L5 - 2 turns #22 .125 dia. bus wire		1
L6 - 6 turns #22 .125 dia. bus wire		1
Q1 - 2SC2053		1
Q2 - 2SC1970		1
R1 - 120 ohm 1/4 Watt		1
R2 - 1K ohm 1206 SMT		1
R3 - 33K ohm 1206 SMT		1
R4 - 470 ohm 1206 SMT		1
Heatsink for 2SC1970		1
RF Connector	SO239	1
Banana Plugs	1 red, 1 black	
Banana Sockets	1 red, 1 black	
Coax	8” RG174	2
Hookup wire	8” twisted pair #24	1
Heat sink compound packet		1
Circuit Board		1
Bolts	#4 1/2”	4
Bolts	#4 1/4”	5
Lug terminal		1
Nuts	4-40	9
Stand off spacers	¼”	4

1.5 Watt Broadband No-tune Amplifier

FRB 2004



Note: If you have a 50 milliwatt signal, omit & bypass IC1 & connect it to the input pad to C2. Do not use L1, C1, R1 & L3.