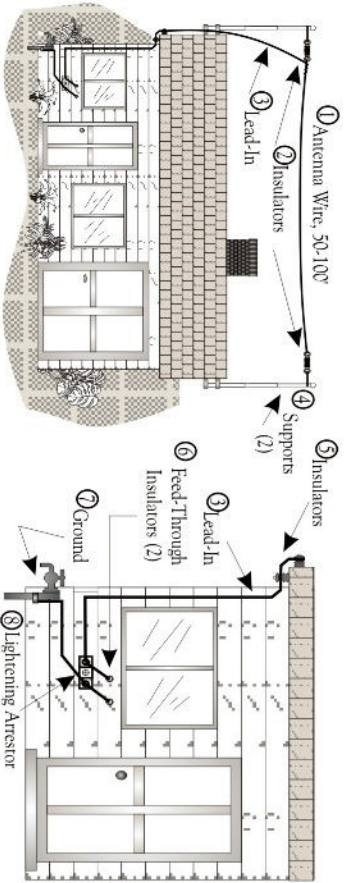


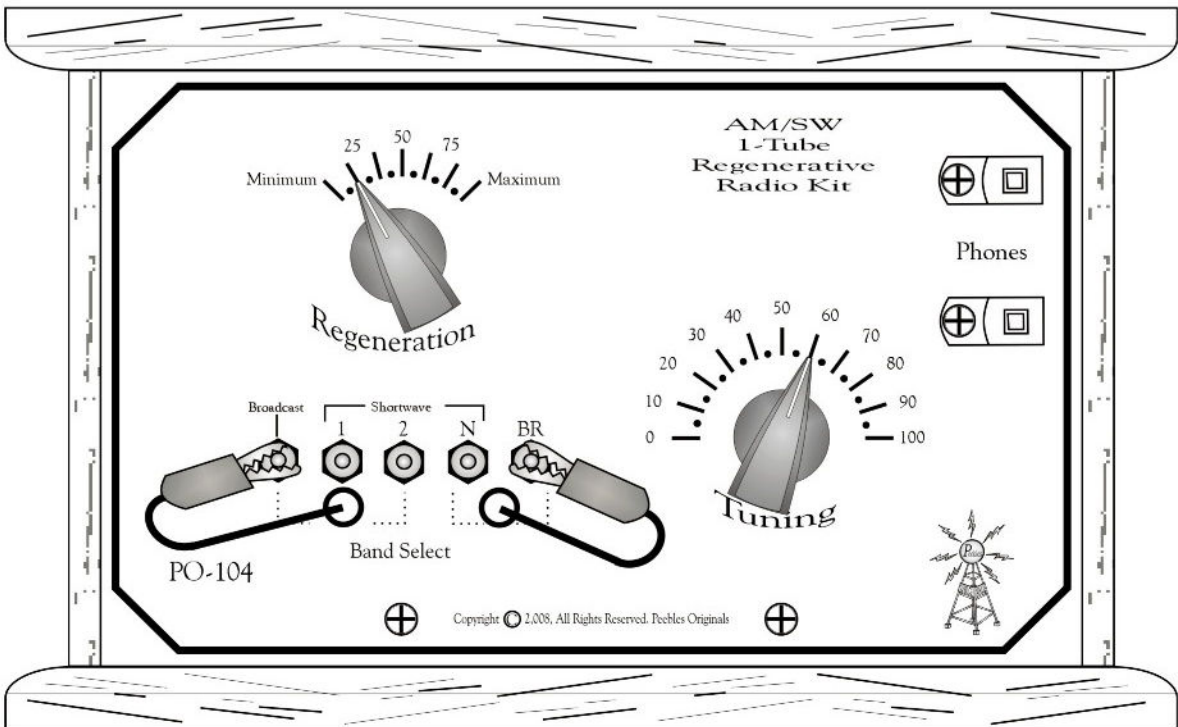
Antennas and Grounds

A substantial antenna and ground are an absolute must, for the ultimate pleasure of crystal radio experimentation. See the diagrams below, for the following explanations:

- 1) Antenna Wire, 50'-100': 14 gauge/stranded wire is the most practical, here. The wire can be insulated or uninsulated and if 14ga. isn't handy or practical, then use what you have that would be a close substitute.
- 2) Insulators: Any style that is fit for an antenna application may be used, here. Make certain that the antenna wire and 6-8" pieces that tie to the Supports are mechanically sound. These connections should be tightly wrapped around each-other and securely soldered.
- 3) Lead-In Wire: This should be of the insulated variety, or could be 52-72ohm coaxial cable. Make certain the shielding is securely grounded. See #7 on grounding. If a single wire is used, then it should be of as heavy gauge as possible and very well insulated. See #5 on insulators.
- 4) Supports: I have used 15' antenna mast, as shown, for my antenna. (Illustration looks like the front of my house!) The supports could be a tree, another building or any object that is as high as possible. Your supports should be as high as absolutely possible, if you live in a "fringe area", and not so important in areas that have a large amount of powerful stations, nearby. A very, very important factor here, is to keep your antenna and lead-ins clear of utility lines of all types.
- 5) Insulators: Your lead-in wire should be insulated from all objects, even-though the lead-in, itself is insulated, the wire should still be run-through insulators. Radio Frequencies have a habit of finding a path to ground, easily. When working with very weak signals as we do, in radio experimentation, we need all the signal, we can obtain, to the set.
- 6) Feed-Through Insulators: Should be used to run the wires through the wall, into radio room.
- 7) Ground: This should be a solid path to "earth". This can be accomplished via water-pipes or other direct paths to "earth" ground. Do-not use Gas pipes, here.
- 8) Lightning Arrestor: This is a very sensible, safety precaution and should be used.



Antenna/Ground Details



PO-104, AM/SW 1- Tube Regenerative Radio Kit
Assembly Instruction and Operating Manual

PO-104, 1-Tube Regenerative AM/SW Radio Kit, Assembly and Operating Instructions:

Introduction:

Thank you for purchasing another fine product of: "Pebbles Originals". The PO-104, Is very typical, in design of many originally produced sets of the era. In it's simplicity, the set's regeneration is accomplished with vario-coupling via rotating shaft, from front panel. The set covers: broadcast-band through 8.5 Mhz (approx.) In three bands. By placing a 470pf capacitor in series with the "365" variable capacitor, for the short-wave bands, the tuning range becomes more narrow producing more ease in tuning. The power supply for this receiver is simply: ("A") 1-1/2V-DC ("C" or "D" cell) and ("B") 45V-DC (5/9V transistor batteries in-series). A nice, neat package for the power supply, use: PO-105 A-B Battery Supply Kit. The other almost, MUST for this receiver is the PO-103 Antenna Tuner/A.M. Trap Kit, will highly aid in short-wave listening. This hobby is one of the most enjoyable activities I've had for the last 45 years. Have fun and gather a few tools and supplies listed below.

Tools and Supplies Needed:

- * Soldering Iron, Low Heat.
- * Rosin Core Solder.
- * Phillips Screwdriver, #2.
- * Wire Strippers.
- * Small Needlenose Pliers.
- * Small Wire cutters (Side Cutters).
- * Nut driver, Optional-use needlenose Pliers.
- * Paper Glue.
- * Paper Card-Stock Material, 1/2" wide.
- * Fine Sandpaper, 100 grit or, so.
- * Clear acrylic coating, Spray or Brush-on, Fast Drying.
- * Sharp Scissors.
- * Sharp Knife
- * Hot Glue Gun
- * Aluminum Foil (5" x 8", Min.)

Coil Winding Instructions:

- 1 See Figure #1 and cut the "Salt Box" to the dimensions shown, make certain that the hole for the control shaft is through the form, centered on both front and rear sides of the form. The hole for the actuator rod should be a slight smaller than 1/4" so the shaft will rotate snugly. Start and end each winding with 2-very small holes that the wire can pass in and out, keeping the wire tight. Leave about 4" of wire at the beginning and ending of each winding of L-1 & 2 and about 8" for L-3. Follow the instructions of Figure #1 and carefully wind all the coils. When the coils are wound, then coat the entirety of the windings with a clear acrylic or laquer coating. Locate the rubber grommet and slice it in-half with a sharp knife. See Figure #1 & #2 and assemble L-3 to L1 & 2 as shown, with dowel actuator rod secured with the two grommet halves.. Make certain that L-3 rotates freely and evenly, inside L-1/2. Use a little Hot-Glue on the inside of L-3 to secure the cardboard form to the actuator rod. The "0" and "20" winding of L-3 passes through two small holes towards the bottom of L-1 & 2. It is very important that these two wires be connected to the circuit as shown (do-not reverse them) and that, they be left loose-enough for the free rotation of L-3. Scrape and "tin" the tap at L-2b/"10", scrape and "tin" the end of a piece of 4"L. Coil-wire and solder to the tap. This completes the coil assembly and proceed to the next step, below.

Assembly and Wiring Instructions:

- 2 See Figure #2 & 3, locate: Chassis panel, 2-chassis rails,4-fahnstock clips, 6-#6 x 1/2 sheet-metal screws and 4-#6 solder lugs. Mount the front and rear chassis rails to the bottom-side of the chassis panel, with the 5/8" side mounted to the underside of the chassis panel. Take note the hardware and the positioning thereof, completing this assembly. Mount the V-1 tube socket with 2/4-40 x 3/4" machine screws, 2-3/8" Spacers and 2/4-40 nuts. If your tube socket has a metal tube protruding from the bottom/middle, then use pliers or side-cutters, pull-it out and discard. Position the socket's terminals as shown in the illustration, spreading them outward. Make certain to position the socket as shown, screws down-through holes, through the spacers, through the chassis and secured with nuts from the bottom-side of the chassis. Mount the variable capacitor to the chassis assembly with 2/6-32 x 1/4" screws and a #6 solder-lug and a #6 lock-washer are in-between the capacitor and chassis (see figure #3). Do-not over-tighten these two screws, as you may damage the capacitor. Find 2/6-32 x 3/8" machine screws, 4/#6 solder-lugs and 2/6-32 hex-nuts. See Figure # 2 and mount these 4 solder-lugs at points above and to the side of the tube socket.

Assembly and Wiring Instructions:

- 2 Position as shown and secure with nuts, from the bottom-side of the chassis. Locate the coil-mounting block, 4/sheet-metal screws, rubber grommet and coil assembly. Mount the block inside the coil assembly as shown in Figure #1 & 2, with 2/sheet-metal screws. Mount the coil assembly to the chassis with 2/sheet-metal screws, from the under-side of the chassis. Note Figure #2 and mount the coil assembly precisely as shown, making certain that the mounting screws are in the middle of the mounting block, position the coil about 1/16" to the edge of the chassis. You may need to loosen the mounting screws of the coil assembly and Variable capacitor, later for alignment of dial panel assembly. See Figure #2 & 3, locate Front/dial panel, 2/fahnstock clips, 8/solder-lugs, 5/6-32 x 1/2" machine screws, 2/knobs, 2/#6 x 1/2" sheet-metal screws and 7/6-32 hex-nuts. Locate and cut-out dial panel and foil template. Paste the foil template to a piece of aluminum foil and cut-out the areas shown. Trim the foil to the border of the template, making certain not to trim the foil in the slot at the bottom-side, indicated. Paste the entire template/foil piece to the backside of the dial panel, making certain to center. Cut-out the 4 indicated holes of the dial panel and paste to the front-side of the dial plate, being certain it is centered. Mount all the hardware to the panel as shown. The front panel assembly is attached to the front of the chassis assembly with two #6 sheet-metal screws, flush with the bottom of the chassis. Note the solder lug between the chassis and the and the front panel assembly. This solder lug should make good electrical contact with the bare foil in the slot at the bottom of the foil template. Make certain the shaft of the variable capacitor and the actuator-rod, center properly and turn freely. You may have to loosen the screws of each and re-adjust for alignment. Install the two knobs, aligning them to the proper indicators. Wire the circuit as shown, being careful to install each component in it's proper place. Carefully recheck your work and move-on to the final step, below.

Note: See the back-page of the front of the Manual for "Antenna and Ground" details.

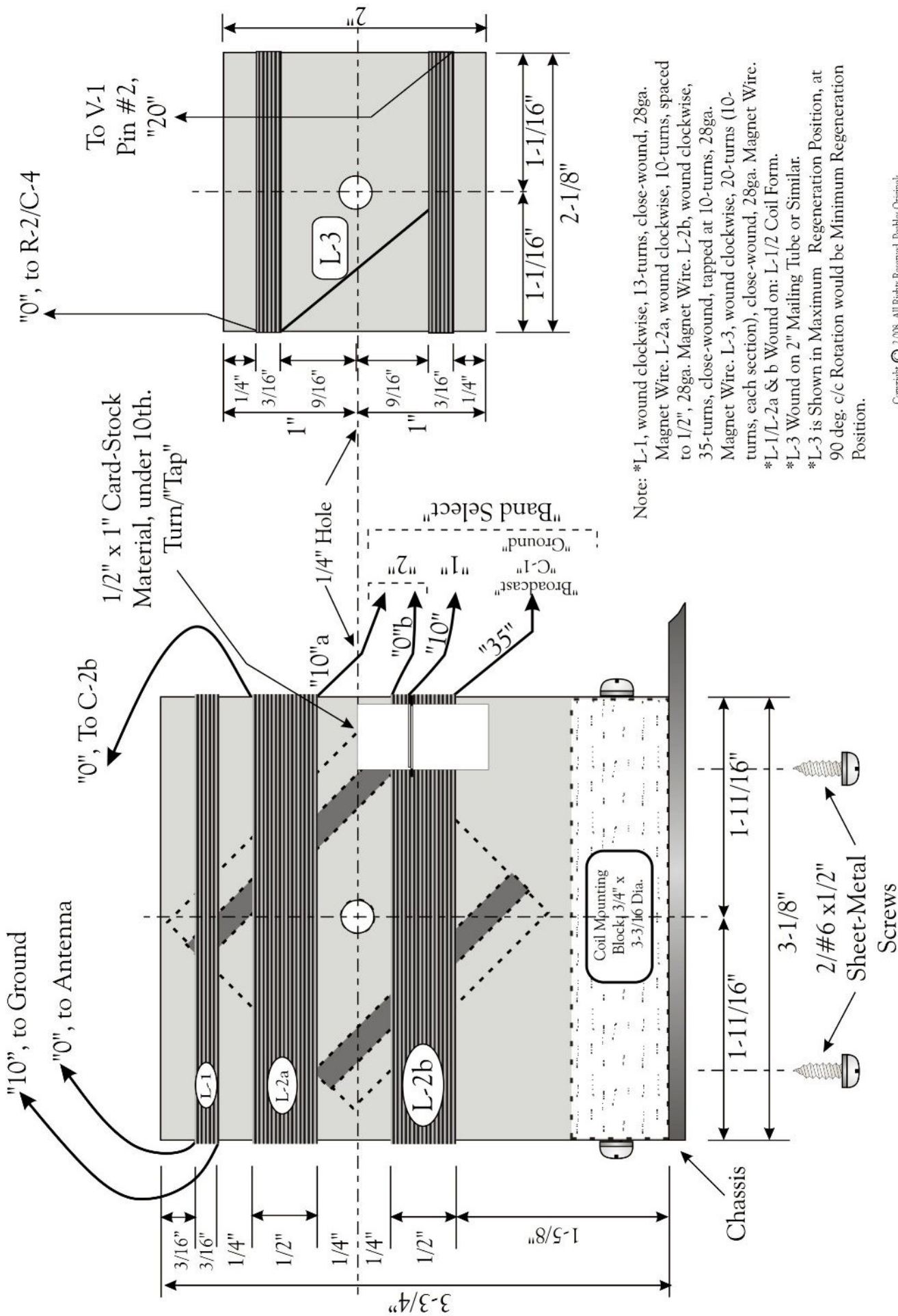
Testing, Using and Troubleshooting Instructions:

- 3 Clip J-1 to "Broadcast" terminal and J-2 to "BR" (broad) terminal. Connect your antenna and ground to their proper terminals. Please read the back of manual for antenna and ground information, if you are not familiar with this subject. Connect your headphones or amplifier to the "phones" terminals. The receiver has a high impedance output, but does-not depend on "phones" for the tube's plate-load, so you may use "crystal" or "ceramic" earphones and other high impedance devices, but not "stereo"-type phones.

The power for this unit is 1-1/2V-DC and 45V-DC and the most convenient way is to use: PO-105, A-B Battery Supply Kit. At any-rate be certain to NOT connect this supply to the wrong terminals of the receiver or you will damage the tube. Connect your battery supply to the receiver, except for the A+ and plug-in the tube. Put-on your headphones and connect the A+, you should hear a little "pop" in the phones. Rotate the regeneration control to mid-point and slowly rotate the tuning knob. You should hear a series of whistles in your phones and stop at one of the whistles and back-off the regeneration control, until you hear a station. Re-adjust the tuning control for maximum volume and advance the regeneration control for maximum, just below the point of "squeal". The technique of tuning takes a little practice and the rule of thumb, here is to always listen for the rushing sound, just below the point of oscillation (squeal) and this is the maximum regeneration level. To gain the maximum short-wave listening pleasure, I would highly recommend the PO-103 Antenna Tuner/A.M. Trap Kit. The short-wave bands are found by connecting J-1 to terminal #1 or #2 and J-2 to "N" (narrow, "BR" works but harder to tune) and rotating the tuning control very slowly. Short-wave requires a large amount of patience and the tuning technique is the same as with the broadcast band. The exception to the previous statement is CW (Morse code) and SSB (single side-band), you want to turn the regeneration, slightly into oscillation and carefully re-tune, to clarity.

Difficulty: Check for coils being wound properly, correct wiring and parts placement, proper voltages to proper terminals or possibly the tube. You can check the tube's filament by using an ohmmeter on a low scale, across terminals #1 & #7. Caution: Connecting the batteries improperly can destroy the tube!

Have fun, and hopefully you will continue this great hobby for a long-time to come. Mike



Note: *L-1, wound clockwise, 13-turns, close-wound, 28ga. Magnet Wire. L-2a, wound clockwise, 10-turns, spaced to 1/2", 28ga. Magnet Wire. L-2b, wound clockwise, 35-turns, close-wound, tapped at 10-turns, 28ga. Magnet Wire. L-3, wound clockwise, 20-turns (10-turns, each section), close-wound, 28ga. Magnet Wire. *L-1/L-2a & b Wound on: L-1/2 Coil Form. *L-3 Wound on 2" Mailing Tube or Similar. *L-3 is Shown in Maximum Regeneration Position, at 90 deg. c/c Rotation would be Minimum Regeneration Position.

Figure #1: Coil Assembly and Details.

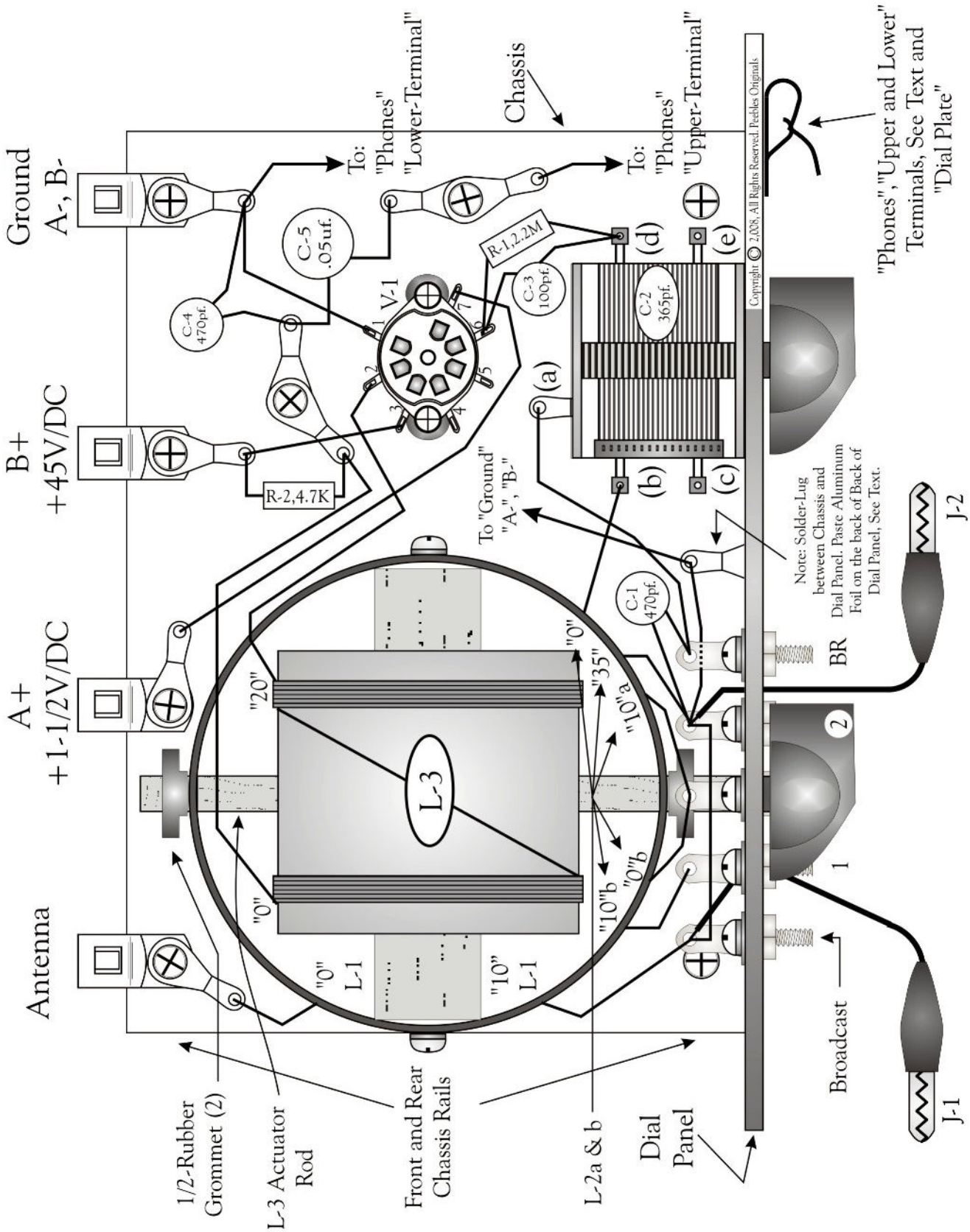
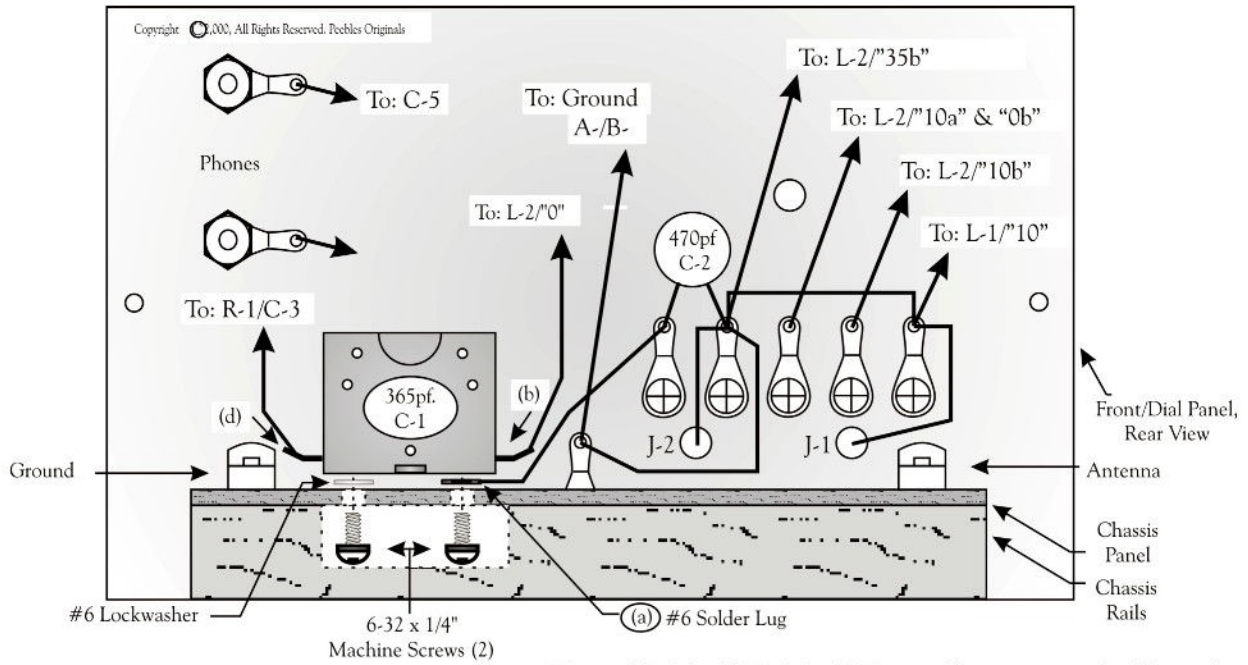


Figure #2, Parts Layout and Wiring.



Note: (b), (c), (d) & (e) of C-1 are all common to the "Stator" Plates of the Variable Capacitor. All are connected together, electrically on Capacitor. Tube Socket, A+/B+ Terminals & Coil Assembly omitted for clarity.

Figure #3, Wiring & Parts Placement, Rear View.

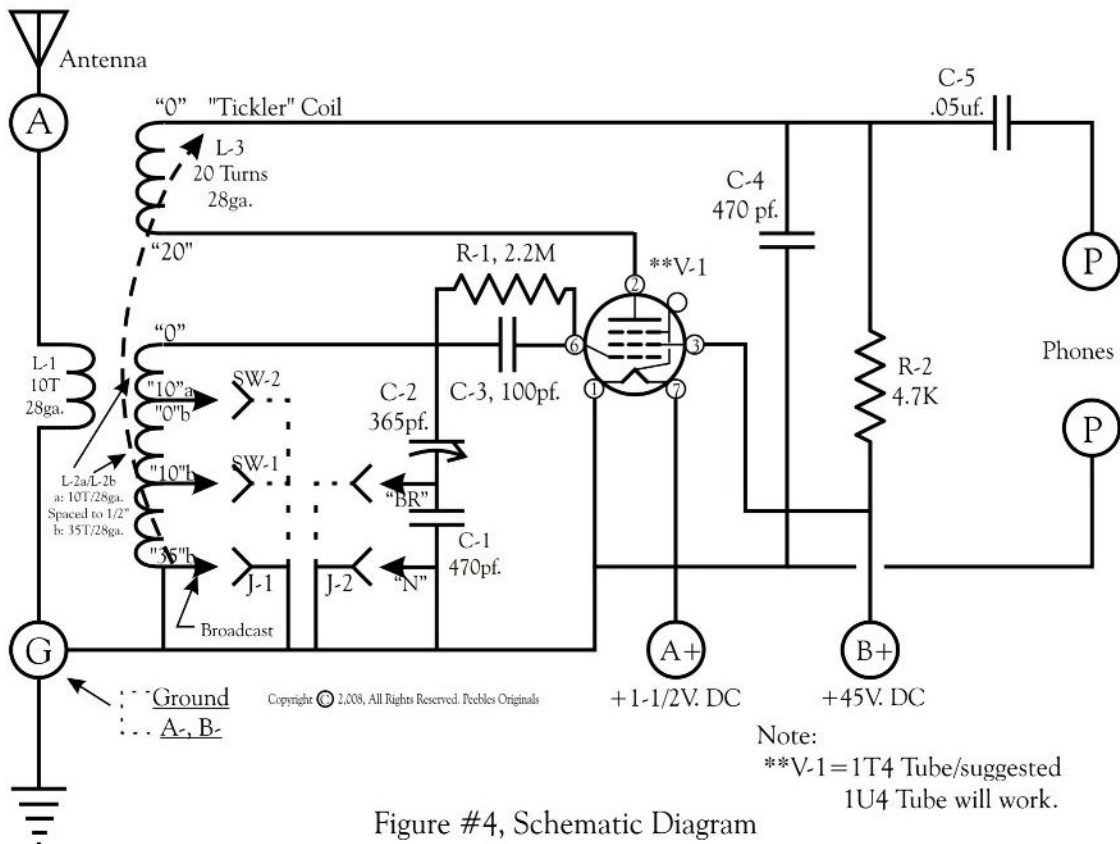
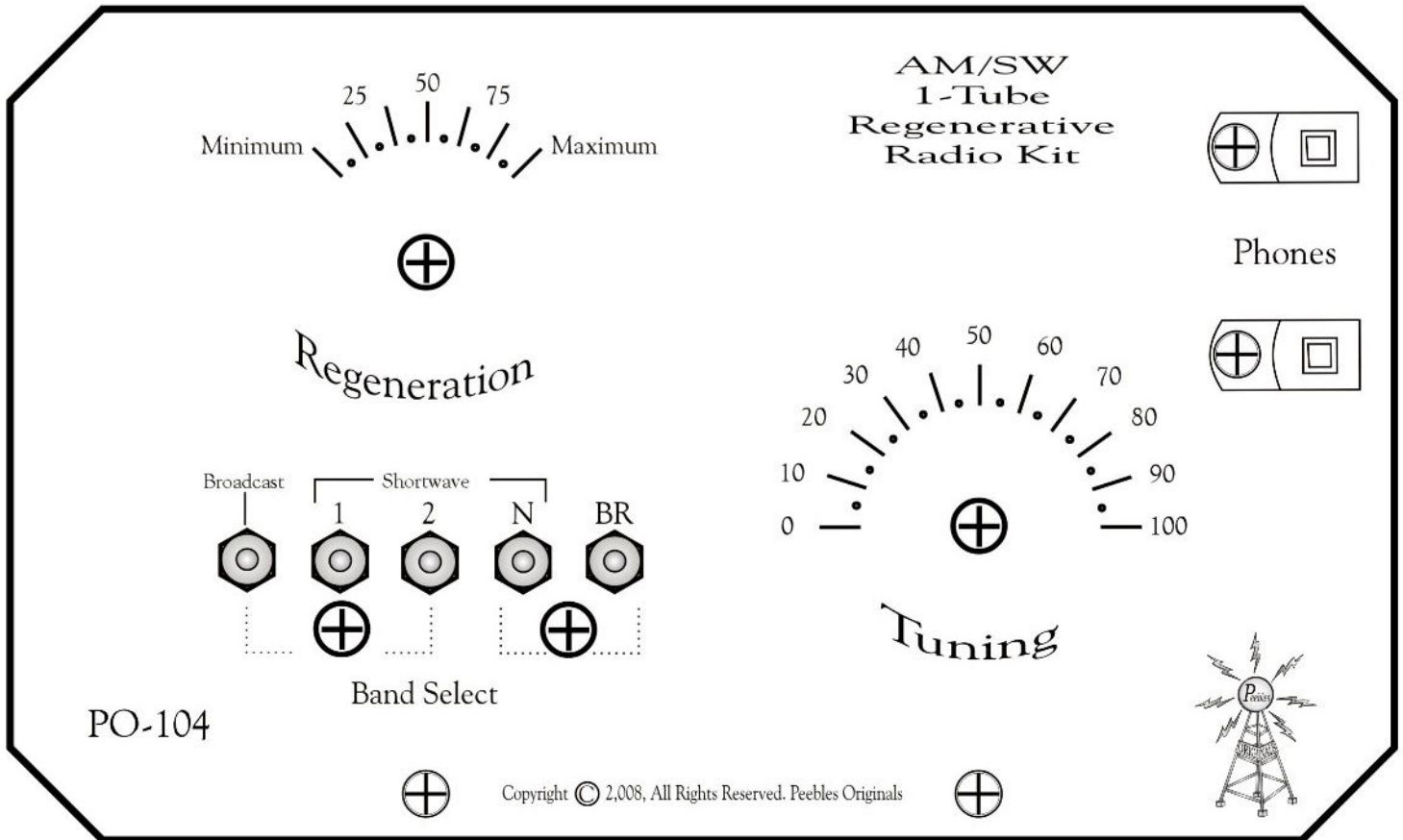


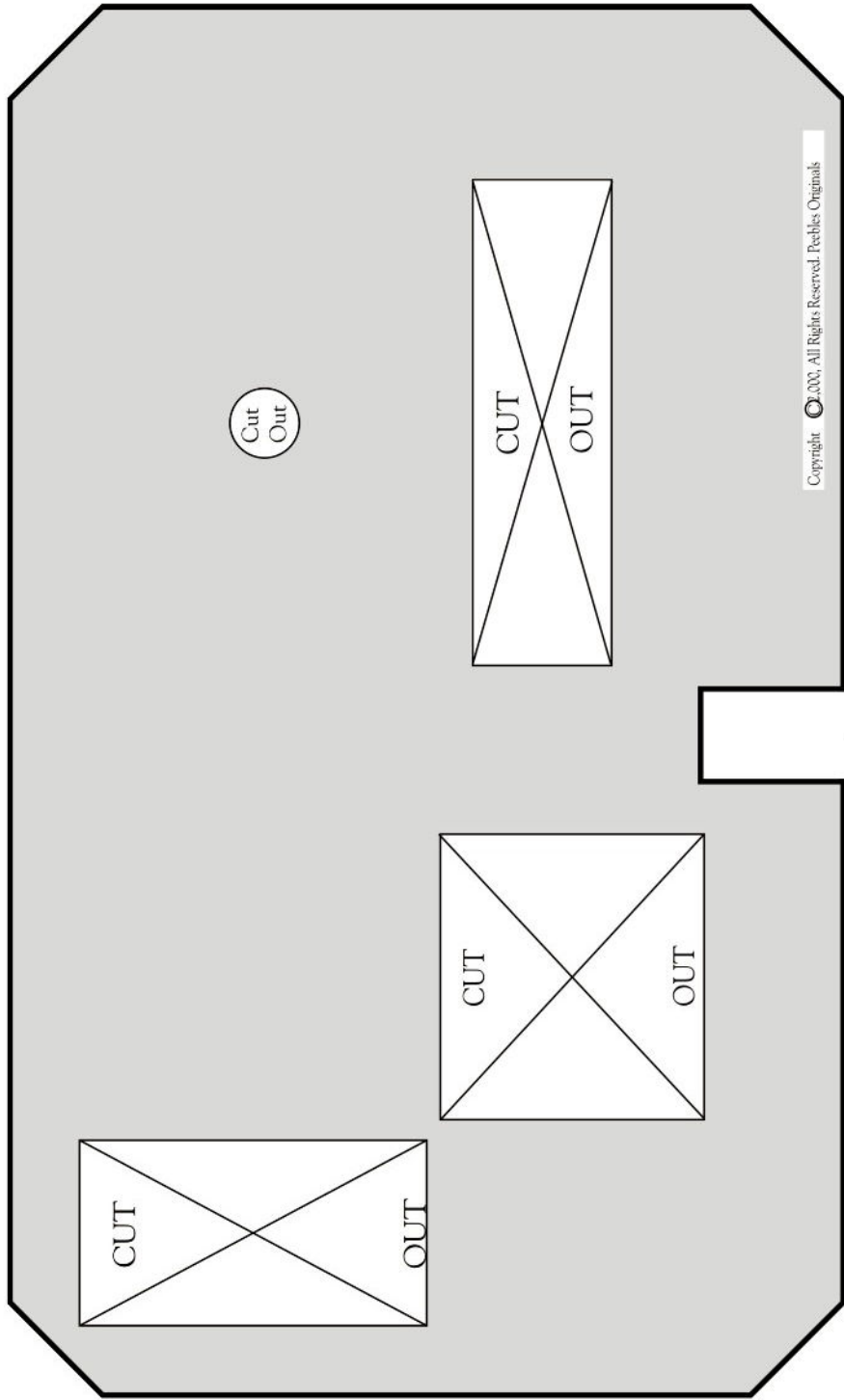
Figure #4, Schematic Diagram

PO-104, One Tube Regenerative Radio w/Vario-coupler Coil, Parts List:

Qty	Description	Qty	Description
2	Ceramic Disc Cap, 470pf (471), C-1, C-4	4	Machine Screws, 6-32 x 3/8"
1	Variable Cap, 365pf, C-2	5	Machine Screws, 6-32 x 1/2"
1	Ceramic Disc Cap, 100pf (101), C-3	9	Hex Nuts, 6-32
1	Ceramic Disc Cap, .05uf (503), C-5	2	Machine Screws, 4-40 x 3/4"
1	Resistor, 2.2M (Red/Red/Green), R-1	2	Hex Nuts, 4-40
1	Resistor, 4.7K (Yellow/Violet/Red), R-2	2	Spacers, 3/8"
1	Tube, 1T4 (or 1U4), V-1	1	Rubber Grommet, 1/4" I.D. (2 Halves)
1	Tube Socket, 7-Pin Min, V-1	1	Chassis Panel, 4-3/8" x 6-3/8" x 1/8"
66'	Magnet Wire, 28ga, L-1, L-2, L-3	1	Dial Panel, 4-3/4" x 7-3/4" x 1/8"
2'	Hook-up Wire	2	Chassis Rails, 5/8" x 3/4" x 6-3/8"L.
2	Alligator Clip-Lead, 6" (approx.), J-1, J-2	1	Coil Form, 2-1/8" Dia. x 2", L-3
2	Pointer Knob, Black	1	Coil Form, 3-1/8" Dia. x 3-3/4"L, L-1/2
6	Fahnstock Clips, #6	1	Coil Mount, 3/4" x 3/4" x 3", L-1/2
17	Solder Lugs, #6	1	Actuator Rod, 5" x 1/4" Dia. Dowel
12	Sheet Metal Screws, #6 x 1/2"	1	Ceramic Earphone
2	Machine Screws, 6-32 x 1/4"	1	Instruction Manual

Cut-out, outside of heavy line, cut-out: ⊕ 4each.





Foil showing, here

Cut-out around outside/heavy line. Paste on Foil, Cut-out "X" Areas and Paste to Back-Side of "Dial-Panel"
Foil Template