

Restoring the KLH Model Eight Table Radio

the best radio ever built

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For those not familiar with this excellent radio, Andrew Hayden’s article “KLH Raises the Bar” is recommended reading:

http://www.antiqueradio.com/Jun05_Hayden_KLH.html

This Henry Kloss marvel is unique in many ways: It was probably the first high fidelity table radio and it is the ONLY tube table radio with an acoustic suspension speaker. Music lovers and collectors prize these radios, but being a half-century old, they inevitably require some refurb and restoration work.

This guide is based on my experience restoring dozens of these and is intended for the advanced hobbyist. You don’t have to be a technician (I’m not) or have the ability to read a schematic. If you were comfortable building a *dynakit* you should be able to follow these instructions.

Which version do you have?

The Model Eight was introduced 50 years ago and was produced from 1960 until 1965. During that time it underwent some changes. I don't know exactly how many were made, but certainly more than 11,000 (based on samples I have worked on, up to S/N 11188).

The earliest Model Eights were Revision A (May, 1960). On August 13, 1960, they switched to Revision B with Serial Number 950. That makes the Rev A Model Eights very rare. I have one—Serial Number 00467. Oddly, the Rev A radios had no fuse.

To my knowledge all subsequent Eights were Rev B, but there were some cosmetic changes. The earliest Eights had black knobs, solid walnut cabinets and two three-inch speaker drivers. Over the years they switched from solid walnut to furniture-grade walnut veneer, replaced the dual 3" drivers with a single 4" driver and offered radios with white knobs to match the KLH Model Thirteen.

Accessories

There were a number of useful and interesting accessories for the KLH Model Eight:

- A carrying case (*fig 1*). These are extremely rare.
- A phono adaptor/preamp. This allowed a mono turntable or tape deck to be connected to the Eight. There were two versions of the adaptor. One had a power cord and was to be used with Rev A receivers, the other was for Rev B receivers and had no power cord (*fig 2*).
- Extension speaker. This was a second speaker, identical to the KLH Eight speaker but it had a volume control and a unique plug (*fig 3*) that was sandwiched between the Model Eight speaker plug and the receiver. These are rare, and even when they do turn up they are often missing the special plug adaptor and have two banana plugs so the speaker can be used instead of the original.
- The Model Thirteen. The Thirteen consisted of a second box and another speaker, to convert the Eight to stereo (*fig 4*). The FCC had not yet approved stereo FM broadcasts when the Eight was introduced in 1960 but approval was imminent and KLH was prepared when it came just one year later. The Model Thirteen represented the switch from vacuum tubes to solid state. It may have been the first compact stereo system, with inputs for Phono and Aux.



fig 1—carrying case



fig 2—phono adaptor/preamp



fig 3—extension speaker plug (left)



fig 4—KLH Model Thirteen

Common cosmetic issues

An inspection of the KLH Model Eight should cover the following points. Some problems can be fixed, so don't rule out a radio in sad shape. Challenges can be fun!

- What is the condition of the cabinets? Are there any scratches, gouges, corner dings, water stains, etc? Early cabinets were solid walnut while later ones were high quality walnut veneered plywood. A look at the back edges on both the receiver and speaker will reveal what you have (*fig 5*).
- How does the faceplate look? The faceplate is painted Masonite.
- Is the black bakelite plate on the back broken?
- Are all of the knobs there and are they original? The smaller tuning knobs were easily lost. On some radios an on/off switch may have been replaced and a different knob installed. The tuning has a “vernier dial” in which the outer ring turns more slowly than the inner knob, to allow for fine tuning. Are the knob and dial there and intact? Does the tuning work properly?
- How does the speaker cloth look? Water stains are common. Is the KLH logo badge on the cloth?
- Is the 30 foot white twisted pair speaker wire intact? The proprietary double banana plug (on the right in *fig 3*) is often missing due to a design flaw (weak point where the wire meets the molded plug), and typically will have been replaced with two standard banana plugs.
- Are the plastic cleats on the back of the speaker intact? These are often broken.
- Other things to look for are the metal labels; two on the back of the receiver and one on the back of the speaker. Serial numbers rarely match (I have an original factory carton, with serial numbers of the receiver and speaker on the outside. They don't match). Check the AC power cord for cracks and stiffness. There should be 3 knurled nuts and a small strap on the back of the receiver for the antenna connections (*fig 6*).

Problems in any of these areas are not necessarily sufficient reasons to pass on a Model Eight you may be considering. Some (such as a missing volume knob or a scratched cabinet) are fairly easy to remedy while others may be difficult (a scratched faceplate) to

impossible (a broken tuning mechanism) to fix. To find out how to address some of the more common and repairable problems, read on.



fig 5 --Veneer (bottom) and solid (top) cabinets



fig 6 – Radio back

Disassembly and cabinet restoration

The receiver chassis can be removed by *gently* removing the knobs and unscrewing the four Phillips-head screws holding the feet to the bottom of the cabinet. To remove the knobs use your fingers and fingernails only. Rock and pull straight out. Do not use a screwdriver or any other tool to pry the knobs—you run the risk of breaking the brittle plastic or damaging the painted faceplate. Removing the feet first will allow the chassis to shift and may give you more room to grasp the knobs. If needed, make a knob-puller from the cardboard center of a roll of packing tape (*fig 7*). Cut a notch and slip it under the knob, so the shaft slips into the notch (thanks to Tim Schwartz of Bristol Electronics for this and many other tips).

Once the knobs and feet have been removed, slide out the chassis and set it aside. The painted faceplate can be cleaned with soap and water, *Fantastik*, *409* or similar cleaner. Do NOT use any kind of abrasive! If the faceplate is scratched or the lettering is rubbed off there is little you can do. I have touched up small scratches and chips by spraying almond spray paint into a cup, then brushing it on with a very fine paintbrush but the repair will be visible (*fig 8*).



fig 7—Tim’s knob-removal “tool”



fig 8 – repaired paint chip

After the face is clean and thoroughly dry, mask it with painter's tape. Now turn to the speaker and decide whether the cloth should stay. In my experience, there is no suitable way to clean this cloth if it is stained. If the cloth looks good enough to keep, cover it with cardboard and painter's tape. If it is stained, torn or frayed; remove it. The cloth is quite stiff and is only about 1/8" larger than the front frame. The edges are tucked into a groove that runs around the perimeter and the cloth is glued to the baffle. Pull off the KLH logo (it is glued on) and try to lift the cloth. At this point don't worry about damaging it but be very careful not to poke anything into the speaker drivers! Early speakers had two 3" drivers; later ones had one 4" driver. Use a putty knife to work around the edge of the cloth—it should come off easily. Once it is off, cover the front baffle with cardboard to protect the driver(s).

If a cleat is broken, you can remove it by drilling out the metal rivets. This is best accomplished from inside the speaker cabinet. Assuming the grille cloth has been removed, unscrew the #4 flat head Phillips screws holding the speaker baffle in place, and pull the baffle off. It is caulked with putty that is probably dried out and may require some gentle prying (be careful of the walnut frame), but it will come loose. Inside is some pink fiberglass insulation. Remove it (gloves and a mask are a good idea) and save it in a plastic bag. Now drill out the rivets from the inside. Later the cleats can be reattached with #4 machine screws, lock washers (or *Loctite*) and nuts.

To restore a cleat, I made a cast of an intact cleat using Plaster of Paris. A better choice would be a product for making molds, sold in art stores. After you have your mold, set the broken cleat in it, then pour in a mixture of *Plas-T-Pair*. This product may also be used for patching broken knobs.



fig 9 – broken cleat & plaster mold



fig 10 – repaired cleat

Plas-T-Pair is available online at <http://www.radiodaze.com/spec-plas-t-pair.htm> It consists of powdered plastic and a liquid solvent. Follow the directions and work in a ventilated area. The product will dry cream-color, so to repair black plastic add a few drops of *Evercoat* black coloring agent to the mix. It is sold in auto body or marine supply stores. Pour the black *Plas-T-Pair* mix into the mold, let it cure 24 hours and remove your restored cleat (figs 9 & 10). A similar method can be used to make repairs to the plastic knobs (more on that later).

If the *Plas-T-Pair* requires cutting or sanding it is best to let it cure at least a week—a month is better.

Plas-T-Pair will not work on bakelite. If the back plate is broken, try *Q-Bond* or a strong epoxy like *JB Weld*. *Q-Bond* is black; epoxy can be tinted with black *Evercoat*. Be careful of the lettering and the wires attached to the plate. In some cases it may be necessary to drill out the rivets and remove the plate for repair. You can reattach it with machine screws.

At this point you'll have to decide whether the cabinets need to be refinished. A good way to strip off the old varnish is to use *Formby's Conditioning Furniture Refinisher*.

<http://www.formbys.com/products/refinisher.cfm>

This is a gentle stripper, but use gloves and work in a well ventilated area. The solid cabinets can be sanded aggressively with an orbital sander if necessary. I would NOT sand veneer unless absolutely necessary—and then only by hand. For veneer cabinets I recommend *Howard's Restor-a-Finish*, available at hardware stores, online and Home Depot.

<http://www.howardproducts.com/restora.htm>

You cannot put polyurethane or any hard finish over *Restor-a-Finish*, but *Minwax Antique Oil Finish* works well and will result in a hard, low luster finish. *Tung Oil* is another option. The Model Eight's original finish was lacquer, not oil. If you have a solid cabinet and strip it with *Formby's*, then sand it down you could use varnish or lacquer if you choose. I will not go into the steps of using successively finer sandpaper grades and applying finishes. There are many books and online articles to cover furniture refinishing. Here is one on how to apply an oil finish:

<http://antiquerestorers.com/Articles/SAL/smoothoil.htm>

One useful trick I learned from John O'Hanlon is worth mentioning: For big gouges, corner bashes or open seams a filler can be made from 2-part clear epoxy and a pigment called *Mixol*.

<http://www.woodcraft.com/family.aspx?FamilyID=5522>

Mixol is sold in art supply and woodworking stores. It comes in a small (20 ml) bottle, costs about \$5 and you need less than a drop added to your epoxy. "Tobacco" #22 is a good match for the dark walnut wood. On corners, build a dam out of masking tape and pour the epoxy mixture in (*fig 11*). Open seams can be re-glued by forcing the tinted glue into the joint with a razor blade or X-acto knife, then clamping (*fig 12*). After 24 hours it can be filed and sanded down. It is MUCH more durable than "plastic wood".



fig 11—corner bash, tape dam and epoxy filler



fig 12—clamping

After the cabinets have both been refinished and the cleats reinstalled, replace the fiberglass stuffing and reattach the speaker baffle. Use the screws you removed and some window putty or caulk to get an airtight seal.

There is a schematic diagram pasted to the bottom of the receiver. If this is missing or damaged, you can download it and print it, then glue the new one to the cabinet bottom:

<http://www.freeinfosociety.com/media.php?id=5045>

There are also downloads here: http://www.somerset.net/arm/fm_only_klh_8.html

Replacing the grille:

Oddly, speaker grilles on the Model Eight are often water-stained. And like many parts of the Eight, the speaker grille fabric (shown in *fig 14*) is 100% “unobtainium”. It is very stiff and was cut just about ¼” bigger than the opening so it could be slipped into a groove around the perimeter. If you try to wash it, it will shrink and/or unravel. After much experimenting my favorite replacement is this: Cut a piece of 1/8” Masonite 9 13/16” x 4 13/16”. Use a hole saw to make two 3¼” cutouts (for a 2-driver speaker) or one 3¾” cutout (for a 1-driver speaker). Sand the edges of the cutout, then paint the board black. This board will be covered with linen. Irish Linen or a similar fabric was used on many early New England speakers, and although it is not an exact match for the original KLH cloth, it has an appropriate “vintage” look. The linen can be purchased at reasonable cost at Michael’s craft stores. Look for *CharlesCraft Irish Linen* cross stitch fabric 28 count in “Tea.”

<http://www.charlescraft.com/shoppingcart/customer/viewproductdetails.jsp?pname=Irish+Linen+Evenweave&catid=30>

Michael’s also sells *Zweigart 28-count Cashel Raw Linen* and *M.C.G Textiles 32-count Belgian Linen* in natural. Both work well. There are other linens that look good. 18-count Linen in “lambswool” color from this site is especially nice for classic speakers:

<http://www.123stitch.com/cgi-bin/itemdetail.pl?item=59-135X>

Irish Linen makes an excellent, acoustically transparent grille. I’ve used other cloth also—white burlap that I dyed with coffee (but it is less acoustically transparent) or salvaged cloth from other speakers like the KLH Model Five. Linen burlap rug-hooking fabric is attractive and probably more transparent than regular burlap. You only need a small piece but be sure to use a natural fiber like linen, wool or cotton—**not** synthetic (if you use a heavy fabric like burlap you will have to make the Masonite boards a little smaller).

Cut a piece of the speaker cloth about 5¾” x 10¾”. Run a bead of *Aleene’s Tacky Glue* (available in craft or fabric stores) around the back edge of the Masonite and smooth it out with your finger. Now place the board face down on the cloth and fold over each of the 4 corners, keeping the cloth straight and square, and pulling it snugly (you don’t have to get it *too* tight). Next, glue down one entire edge at a time. The *Aleene’s* is water-soluble and dries quickly. You can use your fingers to work the cloth into the glue, and you may want to use small clamps or clothespins to hold it in place while it dries. This site shows the general procedure, although it shows the stretchy synthetic cloth:

<http://www.humanspeakers.com/howto/grill-cloth.htm>

Be very careful not to get glue on the face of the speaker grille cloth. After the glue is totally dry (overnight) use a spray bottle to spritz water on the face of your grille. Blot with a towel

then dry with a hair dryer. The fabric will shrink to be as tight as a drum (*fig 13*). You can spray it with *ScotchGard* if you want, then glue the KLH logo on with *Aleene's*. If the logo was missing, there is no suitable replacement (more unobtainium!). Your best bet is to watch eBay, but be sure to get the one pictured. It was only used on the Model Eight (*fig 14*) and the Model Eleven “suitcase stereo”.

Your completed grille can be glued to the front baffle with *Aleene's*, *Elmer's* or hot melt glue.

This should complete the cosmetic work, except for the knobs, if needed. Next—on to the electronic restoration!



fig 13—Irish Linen grille cloth

What if a speaker driver is damaged?

The 3” drivers were used only in the Model Eights, and if one is damaged it cannot be replaced. Options in this case would be:

1. Replace the two drivers with modern replacements. *Tang Band 3”* drivers are well regarded, but they are not authentic. Same goes for *Aurasound*. I have some surplus *Miller & Kreisel* drivers to experiment with. If you go this route, wire the new drivers in series. It may be necessary to make a new Masonite baffle, depending on the diameter of the replacement speakers. Some good small drivers are reviewed here: <http://www.zaphaudio.com/smalltest/>
2. Later Eights used a single 4” driver and this driver is VERY common. It was used in the Model 21 radio as well as the 5, 11, 12, 14, 15, 19 and several other KLH speakers. They are often found on eBay. Just remove the double 3” speaker baffle and make a new baffle out of 1/8” Masonite with a 4” hole in the center. Note: If you have the original plug, the positive terminal on the speaker is connected to the plug at the tip of the arrow (*fig 15*). Polarity is only an issue when connecting the speaker to the rare KLH Model Thirteen Stereo Adaptor or if using it with the even rarer Model Eight Extension Speaker with its unique “piggyback” adaptor (*shown in fig 3*).

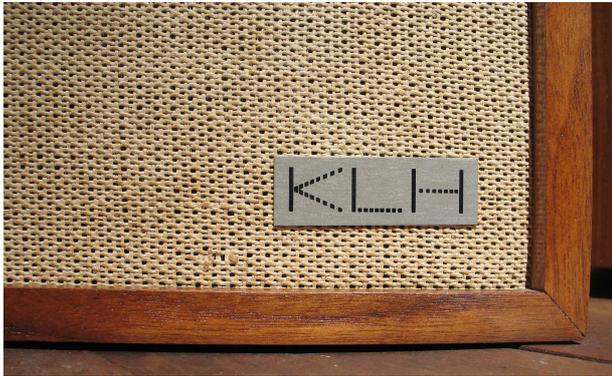


fig 14—Original grille cloth and logo



fig 15—speaker plug

Working on the chassis

The KLH chassis is pictured here, with the main components labeled (*fig 16*). The seven vacuum tubes are readily available but usually do not need to be replaced. Things like Power Transformers and Tuning Capacitors are unobtainium—if you need one your best bet is to find a “parts” Eight to cannibalize.

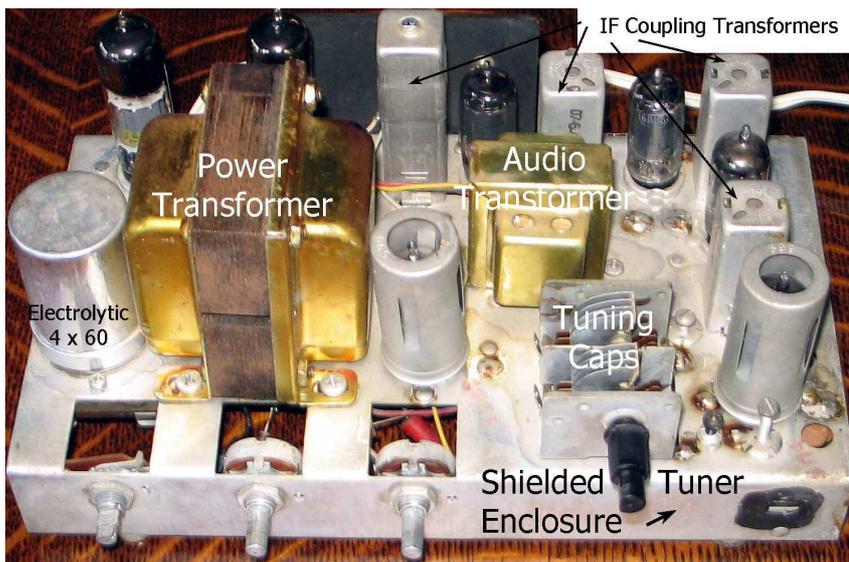


fig 16—chassis

So what should you replace? If the power cord is stiff, cracked or damaged (look very carefully at where it meets the strain relief), replace it. Some online suppliers sell non-polarized power cords, but most have plugs that do not look like the originals, and the insulation is thicker, making it difficult to clamp it into the strain relief. Bob’s Antique Radios <http://www.radioantiques.com/> sells very nice 8 foot brown or black SPT-1 (thin wall) non-polarized line cords. The thin wall insulation matches the original and is easier to fit in the strain relief. Or you could just buy a 10-foot extension cord and use that. The wider prong can be cut down if you wish to make it more authentic. If you decide to use a new cord/plug and leave the polarized plug as-is, be SURE the wire to the wide prong is connected to neutral on the chassis (you can trace the “hot” side from the on/off switch).

REPLACE ALL ELECTROLYTIC AND PAPER CAPACITORS! Really. Caps go bad. For an excellent overview on replacing caps, see this article:

<http://antiqueradio.org/recap.htm>

Helpful tips (and new caps) may be found here:

<http://www.justradios.com/captips.html>

The Model Eight has five electrolytic capacitors. It may have up to seven paper caps. In the photos (*figs 23 & 24*) the red tubes that look like firecrackers are paper caps. Some Eights used film caps in some of those spots, so you *may* not need to replace all seven. For example, the green Cornell-Dubilier cap in *figure 23* has a part number on it that showed it to be a plastic film cap. On the other hand, many Eights have brown Dart or Good-All caps that look like plastic film but they may be plastic-coated paper. They have a band around one end, which suggests they are paper. The safest option: **Replace them all.**

First is the 4-part “can” power supply filter cap. The can is aluminum and one of the ground lugs will be soldered to the plated steel chassis. **USE THE RIGHT TOOL FOR THE JOB.** You will need a soldering gun, capable of producing enough heat to melt the solder (*fig 17*). Don’t use your pencil soldering iron (*fig 18*)—it won’t get hot enough and you’ll just burn the tip. When you replace the cap again use the gun to be sure the solder flows and adheres to the chassis forming a good ground (and use flux). Otherwise you may get hum.



fig 17—soldering gun



fig 18—pencil type soldering iron

A new 4-section cap is about \$35 + S/H from Antique Electronic Supply <http://www.tubesandmore.com>. The original cap is 60- μ F, 150-Vdc per section. The replacement is 50- μ F, 350-Vdc per section (part number C-EC50X4-350).

I sometimes “stuff” my own, using these high-temp miniature 47 μ F caps (the actual value is not that critical for filter caps):

<http://www.parts-express.com/pe/pshowdetl.cfm?Partnumber=020-1692>

Total cost: \$5 + S/H. Here’s how:

1. Unsolder the connection to the old can. One tab will be soldered. All four tabs will be twisted for a tight fit. Remove the can, being careful not to break any of the tabs.
2. Using a cutting wheel in a Dremel tool, cut along the bottom seam (*fig 19*).
3. Remove the top of the can and remove/discard all of the stuffing (*fig 20*).

4. Clean the parts in water and baking soda to neutralize the acid.
5. Drill 1/16" holes in the lugs and through the phenolic bottom plate for the cap leads.
6. Insert the leads of the new caps through the holes. Positive leads go to the 4 lugs, negative go to the outer grounded mounting tabs.
7. Solder the leads.
8. Epoxy the can top back on (*fig 21*).
9. Reinstall the rebuilt cap (*fig 22*). Although it is not critical, try to keep the orientation right (the lug marked with a triangle goes toward the front of the chassis and has the two 220Ω resistors soldered to it).



fig 19—cutting can



fig 20—removing insides



fig 21—completed stuffed can

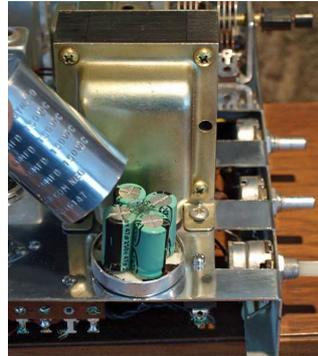


fig 22—installed on chassis

Reconnect all of the wires and components. Because of the higher voltage rating of the new cap, I replace the two 2-W, 220Ω resistors with 5-W resistors and replace the 200-mA diode with a 1N5408 3-A 1000-V rectifier diode because the old diode might not be able to take the new capacitor set's faster charging speed (*fig 23*). The 5-W resistors are tight, but they will fit. You could probably use new 2-W flame-proof metal film resistors but the 5-W sand cast ones are cheap and safe.



fig 23—new 3-A diode and 5-W resistors

The values of the paper caps are marked on the photo (fig 24) but sometimes the original caps are different. In one radio for example, the $.068\mu\text{F}$ cap was $.008\mu\text{F}$ and the $.006\mu\text{F}$ cap was $.03\mu\text{F}$. In those cases I replace with the same values as printed on the originals. Be aware that $\pm 10\%$ is considered to be within spec (it's OK to replace a $.03$ with a $.033$).

A good source for replacements is www.justradios.com although for one radio it may be more practical to buy the parts locally, IF you can find them. Use good quality film caps of at least 200 volt rating (I use 600 to 630-V whenever possible). Antique Electronic Supply <http://www.tubesandmore.com> also has the appropriate caps (search their site for “tubular capacitor”).

I have used the small tubular caps in some radios, orange drops in others. I prefer the tubulars because they are a bit smaller and easier to work with. Your mileage may vary.

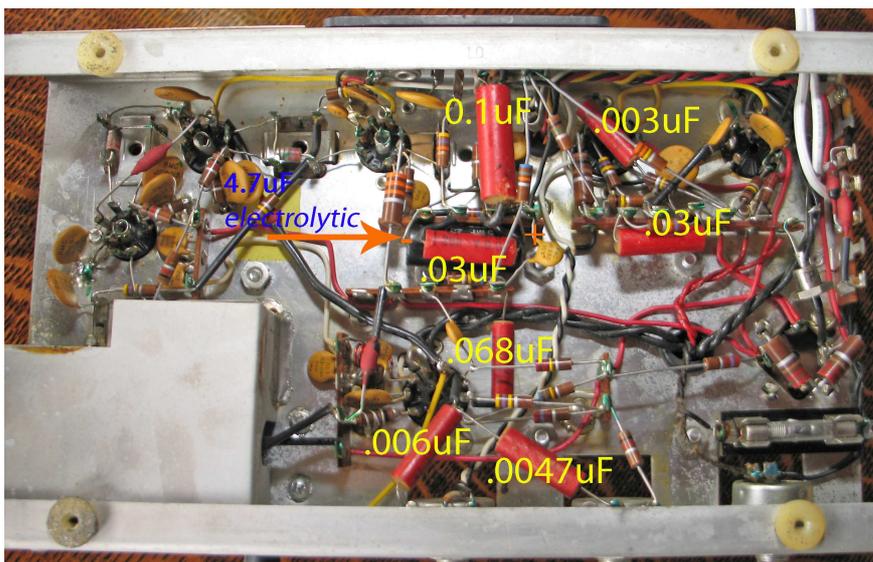


fig 24—capacitor values

The only other electrolytic (besides the big 4-section can) is a 5- μ F in the middle of the chassis (the black cap under the 0.03- μ F red paper cap in *fig 24*). You can replace this with a 4.7- μ F 50-V electrolytic (*the light blue cap in fig 23*). BE SURE TO OBSERVE CORRECT POLARITY! Better yet--you can use a 4.7- μ F 100-V film cap *if* you get one that is physically small enough. The ERO MKT1813 polyester film cap is just 11mm x 30mm and fits nicely. The TECATE 4.7- μ F metalized polyester film caps are a snug fit at 13mm x 30.5mm. Both are available from eBay seller *AudioGrade*.

As shown in *figure 25*, the Tecate has a slightly larger diameter than the ERO. The new blue electrolytic is tiny by comparison. An original Sprague 5- μ F cap pulled from a Model Eight is shown for comparison.

Electrolytics leak as they age, resulting in capacitance changes. Spragues were some of the better electrolytics, but after 50 years this one is shot! It tested as 7.5- μ F.

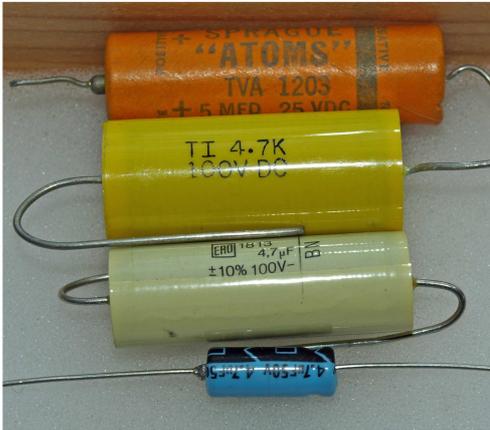


fig 25—Original Sprague electrolytic, Tecate film, ERO film, and new electrolytic

Here is a completed chassis with all new (yellow) caps, new 5 watt resistors and diode (*fig 26*)

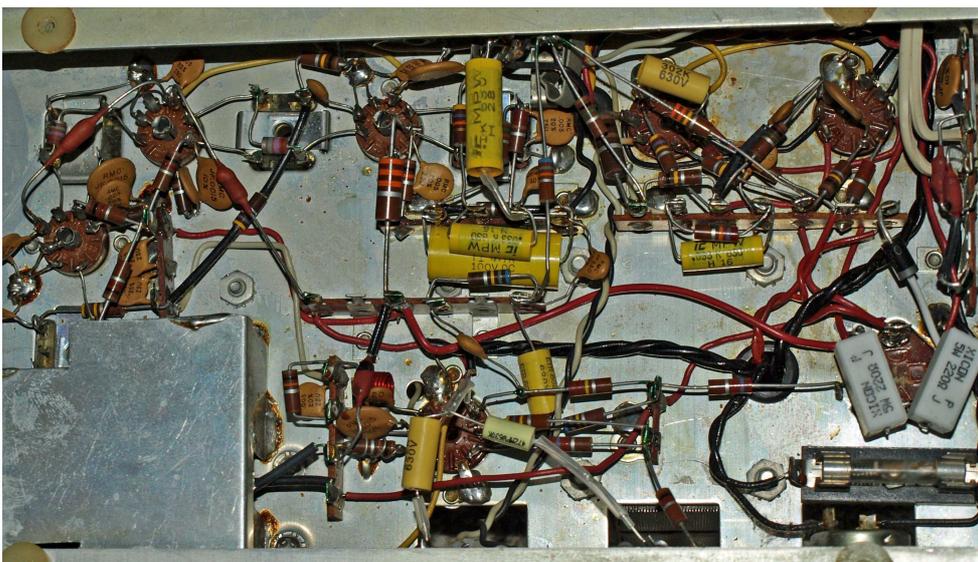


fig 26—completed chassis

Resistors are pretty durable, but it may be a good idea to check them with an ohmmeter. Disconnect one end of the resistor to avoid false readings. If a resistor goes to a tube socket, pulling the tube will effectively disconnect one end. Some resistors will have to be disconnected to replace caps and it may be convenient to just cut the leads and replace those.

Resistors are coded with stripes to indicate their value. A convenient way to read them is to plug the colors into a resistor color code calculator like this one:

http://samengstrom.com/nx1/3660/4_band_resistor_color_code_page.en.html

The first three bands tell the value, the 4th band tells the tolerance. Thus a resistor with red-violet-orange-silver bands is 27000 ohms (2.7K ohms) with 10% tolerance. The resistors in the Model Eight are either ½ watt, 1 watt or 2 watt. When replacing, you should use the same value and wattage. I would opt for 5% tolerance when available, and be sure to use “flame proof” resistors of at least 350 volts rating. The JustRadios.com site says that you may want to replace ½ watt resistors with 1 watt resistors. That should be fine as long as they are not too big physically, and they are flame proof, 350 volt. A new 1 watt film resistor is smaller than an old ½ watt carbon resistor. Like capacitors, a +/- 10% range is close enough (you can replace a 2.7K resistor with a 3K). There are some purists who insist on using carbon composition resistors because they look authentic.

The volume and tone pots can be cleaned with a spray control cleaner. The on/off switches are sometimes broken, and oddly enough it is very difficult to find a simple on/off rotary switch. It should have a solid ¼” shaft and about a 30 degree on/off range, but these are nearly impossible to find. Some restorers have resorted to using just the on/off section of an on/off/volume switch, but even these are generally salvaged used parts (and may have a splined shaft). I found some OK replacements at Apexjr.com (CTS SPST Rotary on-off power switch). But the shaft is too short and the “D” profile is not right for the KLH knobs. I ended up slipping a plastic straw over the shaft, filling it with JB Weld and then cutting and filing it to shape (*fig 27*). Very labor-intensive for a 79 cent switch, but it works!



fig 27—CTS on/off switch with extended shaft (left)

“Re-tubing” (replacing all the tubes) is NOT necessary. Tubes last a long time. BUT—you should test them. A tube tester is a good investment—I picked one up on Craigslist for \$40 and it has been very useful. Tubes for the Eight are readily available but keep increasing in price. The Model Eight uses two ECL82/6BM8, three 6AU6A, one 6U8A and one 6BS8 vacuum tube. A couple of years ago ECL82s were about \$10. Now they are \$20 and up. A

good source for these is the Ukrainian or Russian sellers on eBay. You can get NOS Svetlana 6F3P tubes (ECL82 equivalent) for about \$3.50 each plus shipping.

Make sure all the tubes are seated and that they all light up. The 6BS8 and 6U8A tubes must have tube shields. If these have been lost you can get acceptable (not exact) replacements from Antique Radio, ApexJr.com, and eBay sellers to name a few (or you may get lucky and find the exact Elco tubes with “599” on top). You need a 2” tall shield that is designed for a 9-pin socket.

The neon pilot lamp is an NE2, still available at good electronics stores. It is under the metal shield (lower left-hand corner in *fig 26*). The shield is soldered on and can be removed by desoldering. Be sure to resolder when you are finished. As with the large can capacitor, soldering to the steel chassis is a pain, so be sure to use a solder *gun* and plenty of flux.. The bulb is held in place by a metal clip that is riveted on. I drill out the rivet and replace it with a small machine screw/lock washer/nut. The leads of the neon bulb are soldered to a 68K resistor and to the chassis ground. Instead of soldering to the chassis, I just wrap the lead around the newly-installed machine screw (*fig 29*).

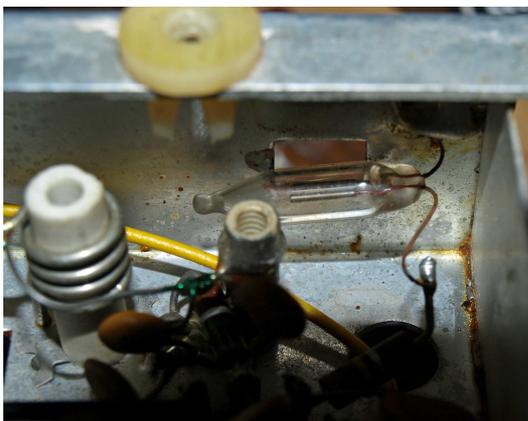


fig.28—pilot lamp NE2

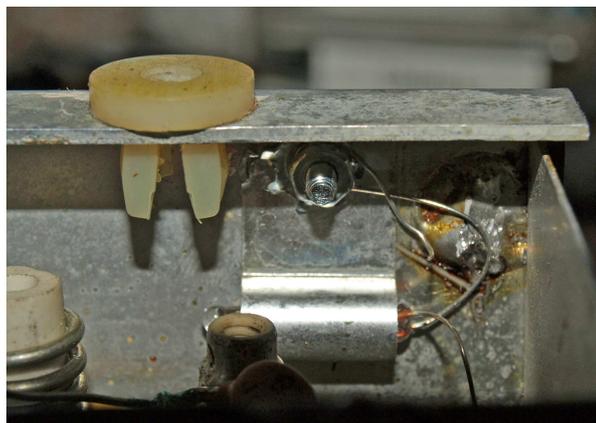


fig. 29—installed lamp, machine screw

Did your radio forget the words? There are a couple of possible causes of hum through the speaker. The most common is bad power supply caps (so replace that 4-part can!). Hum can also be caused by a bad ground (so use the right soldering gun on that can!). But if your radio’s *chassis* hums, when the speaker isn’t plugged in, it is the transformer.

I have found no suitable replacement for the Model Eight transformer, so if yours is bad you may be out of luck. Humming comes from a breakdown of the varnish between the transformer’s plates. There are services that will rebuild a transformer but you may be able to lessen hum by tightening the four bolts that hold the transformer together. It’s difficult, because the transformer was dipped in hot varnish during manufacture and those nuts do not want to break loose!

A tip from Tim Schwartz: If the hum is not too bad, try putting rubber washers on the mounting screws, between the transformer and the chassis.

Speaking of chassis: If you are compulsive (like me), you can polish the chassis and shields with *MAAS Metal Creme*. This is a tedious task but the result looks nice! (*fig 30*).

Alignment: If a radio needs to be aligned I take it to a tech. If you replace tubes, the radio should be realigned. And it is likely your half-century-old radio needs alignment regardless. To check, tune in to known stations at the bottom, midpoint, and top of the dial. If the stations come in at the right dial positions, the radio does not need alignment. But if for example 93.9 is coming in at 95MHz or so, the alignment is off. An analog dial will never be perfect, like a digital tuner, but it should be pretty close across the spectrum. I now take every radio I restore to Bristol Electronics for alignment and check-out.

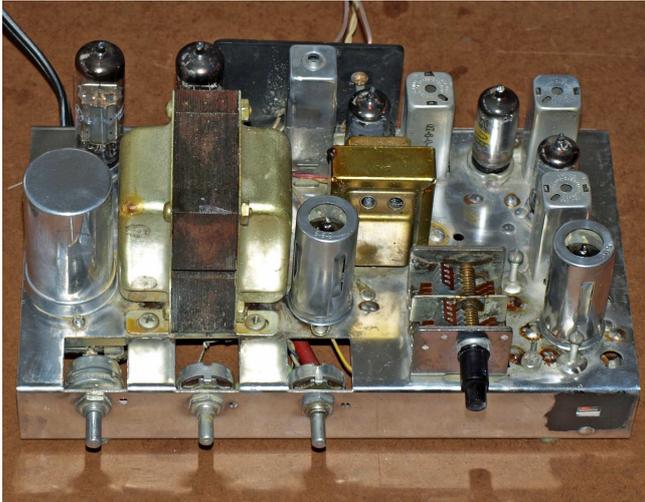


fig 30—polished chassis

Reinstall the chassis and attach the knobs

Now that the electronics are complete, you can put the chassis back in the cabinet and reinstall the knobs. There will be some wiggle room, so before you tighten the 4 mounting screws on the bottom, try to center the tuning dial shaft in its hole.

If the small knobs are missing, or if a control pot has been replaced with one that has a splined shaft that will not accept the original knob, some acceptable replacements are available: The *Kilo International*, part number DDS-90-4-5 in matte black is a high quality solid aluminum knob with 2 set screws that is very close in appearance to the original plastic knob (*fig 31*). They are available from a number of online sellers and local electronics parts shops.



fig 31—Kilo aluminum knob left, original plastic knob right

If the on/off switch has been replaced with one with a solid shaft, the needed “flat” can be made with a file so the original knob will fit.

There is no perfect replacement for the center tuning knob. I found a 1.9" diameter knob that is close (*fig 32*), but it had an aluminum insert on the face and a 1/4" mounting hole. Remove the aluminum disc (place it in the freezer overnight and the disk should pop off) and sand the center to look like the original (attach it to a 1/4" rod, chuck it into an electric drill, and sand the face while it spins). Use a brass adaptor bushing to make it fit on the 1/8" shaft (*fig 33*). These are discontinued but a good replacement is a 1/4" OD aluminum spacer from "Aluminum Spacers"

<http://www.aluminum-spacers.com/?gclid=CKTC3PzEnpwCFQRM5Qodxy9cfQ>

Cut a slit along the length of the spacer with a cutting wheel in a Dremel tool so the spacer can be crimped on to the shaft.

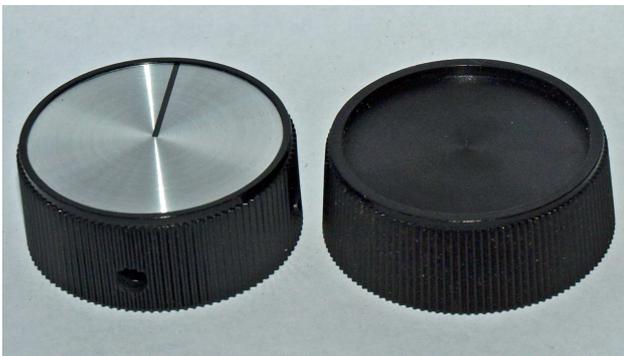


fig 32—new & old tuning knob



fig 33—installing shaft bushing

The outer tuning dial may present a problem. If it is cracked or chipped it can be repaired with *Plas-T-Pair*. But if it is missing, there is no replacement. I had some hand made by a woodturner who happens to be a close friend, but if you had to pay for them. . . .

Here's how to repair a chip: Put tape over the void on the front of the knob and on the edge to make your "dam." Mix some *Plas-T-Pair* and *Evercoat* as previously described and slowly (to avoid air bubbles) pour it in from the back (*figs 34 & 35*). After 24 hours, remove the tape. Wait a week or more before sanding any irregularities. A final buff with steel wool should make the patch all but invisible. In *fig 36*, the patch is at the top of the dial. I had to enhance the photo in PhotoShop to make it visible at all!



fig 34—broken tuning dial



fig 35—Plas-T-Pair poured in tape mold



fig 36—patched dial

The knurled nuts for the antenna, if missing, may be replaced with solid brass knurled nuts available in hardware stores. If the antenna strap is missing, a piece of bare wire, bent to an S shape, (or even a paper clip) can be used as a jumper.

After following these guidelines, you will have transformed your Model Eight from this:



to this:



Now that the radio has been repaired and refurbished, place it in a prominent spot, turn it on (and wait while it warms up!) and enjoy the rich, full sound.

One last note: Be sure to allow plenty of air circulation around the receiver, and do NOT place anything (like the speaker for example) on top of the receiver. Many old Eights have split or blistered top panels on the receiver cabinet from excessive heat.

Acknowledgements

Thanks to Tim Schwartz of Bristol Electronics for his excellent service and for sharing repair tips.

Special thanks to John O'Hanlon, without whose tutelage I would not know an electrolytic cap from a baseball cap. John has provided long-distance instruction on everything from identifying capacitors to mixing up epoxy wood filler. John edited the excellent *Restoring the AR-3a* manual, which inspired me to write this booklet.

http://www.classicspeakerpages.net/library/acoustic_research/original_models_1954-1974/original_models_schematicss/restoring_the_ar-3a/

Thanks to other *CSP* contributors, for freely sharing tips, advice and support.

And to Mark Spencer, for providing and maintaining **The Classic Speaker Pages**—a big thanks from us all!

