

Modern Radio Laboratories® / Alfred P. Morgan Mash-up

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More parts. A "D" cell battery holder is lower right. I don't know how old it is, but it was made in New York.

Why go through all the trouble of making another MRL 1 Tube radio?

What got me started was an email from a person named Keith Ford. On November 3, 2018, Keith emailed me with questions about the MRL 1 Tube Receiver. He said he wanted to clone one, down to Elmer's home made coils and coil sockets. He asked for close-up photographs of the MRL coil socket, top and bottom. I had an extra (original, priceless) HB-4 handbook and mailed it to him. Ironically, while it was en route to his house the entire MRL collection of literature was put online.

Why would I mail an original MRL handbook to Keith? Because anyone who would want to copy an MRL coil socket deserves a handbook printed by Elmer Osterhoudt himself!

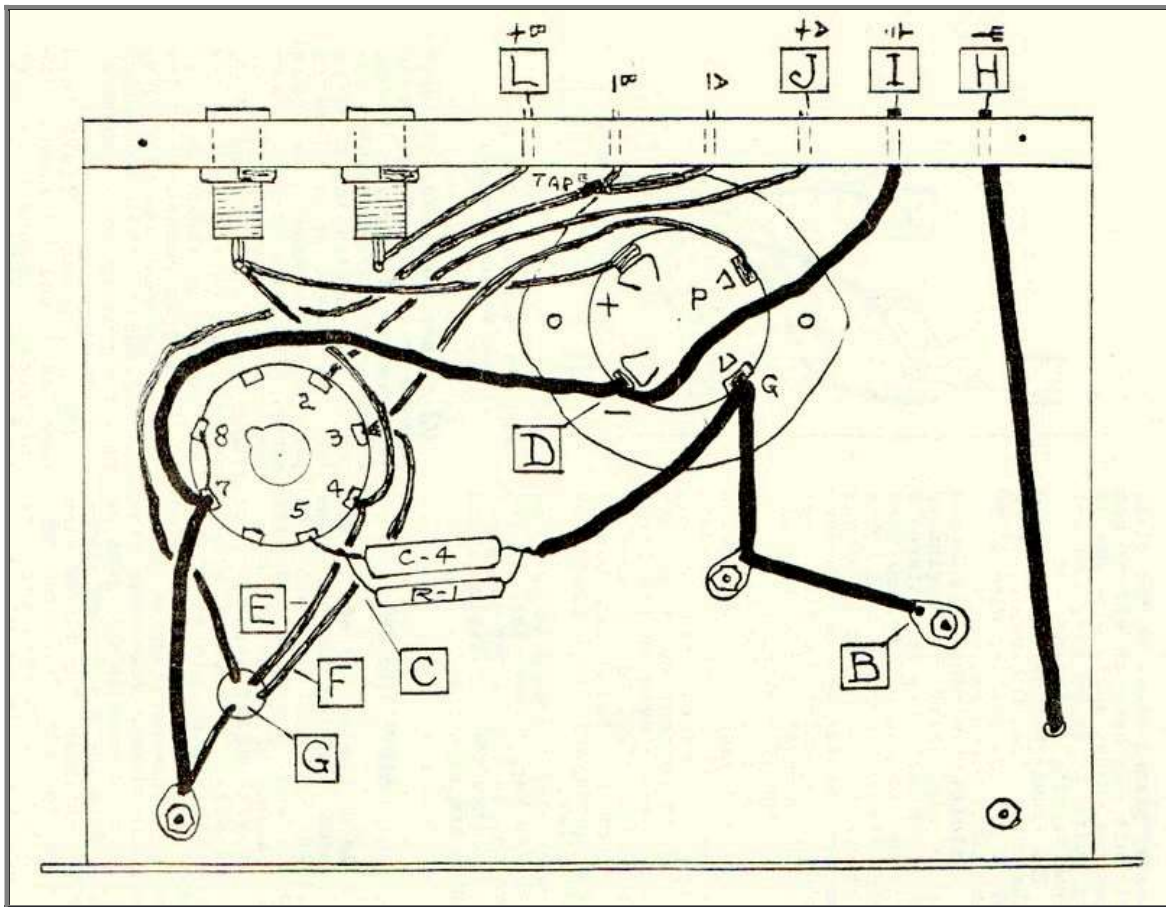
I liked the idea of building another one of these sets so much I decided to make one myself.



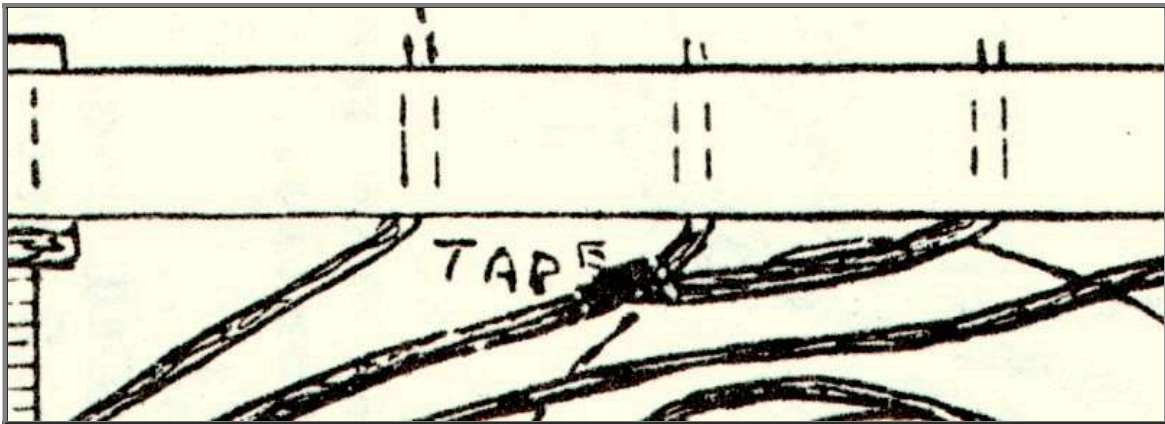
Parts mounted on the front panel and base. Because Sloan Freeman made me paranoid about the "conducting paint," the bottom of the antenna tune cap is covered with a piece of tape. The screw goes through an oversized hole and a mica washer prevents the nut from contacting the bottom of the base.



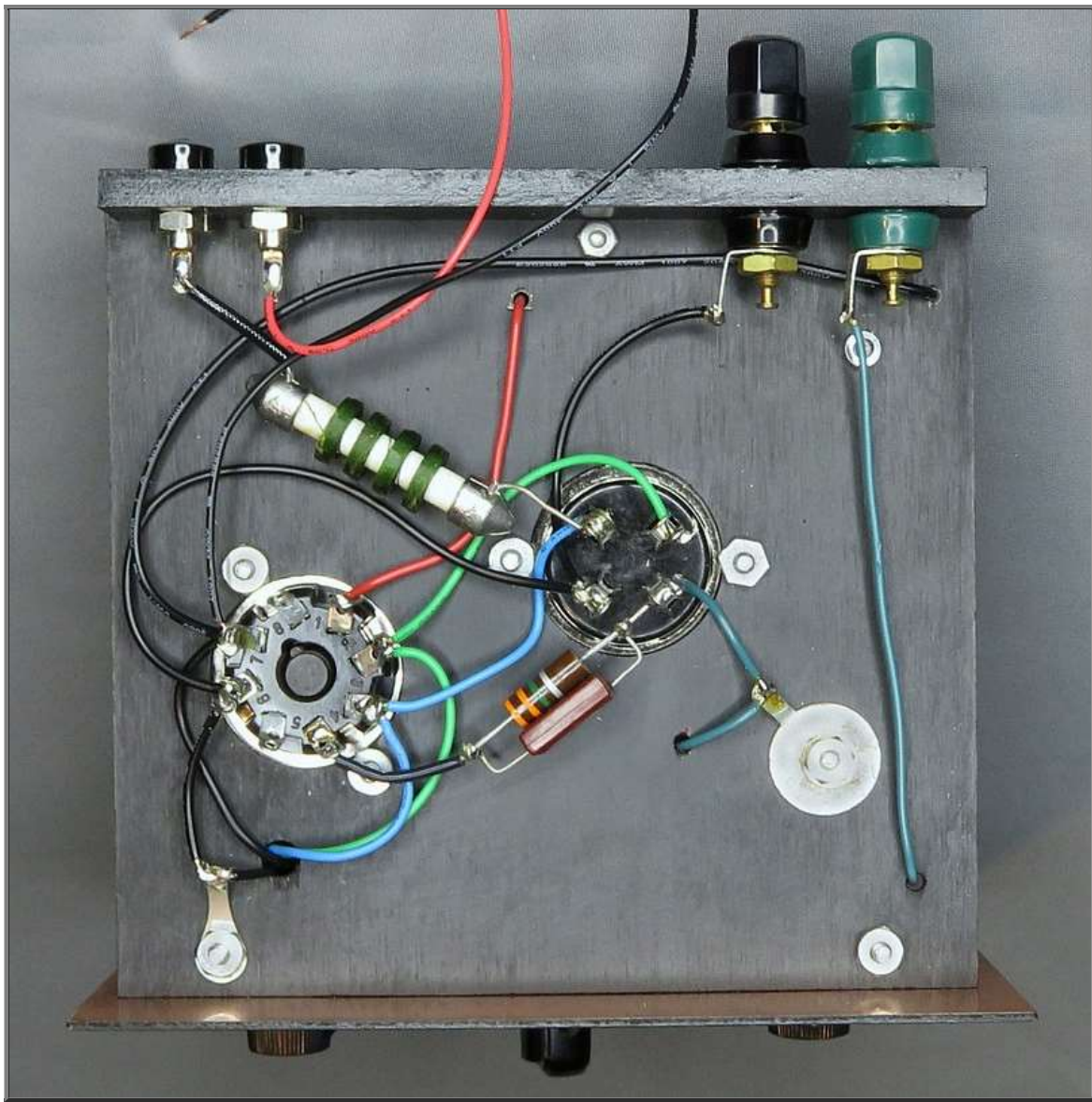
I also swapped my cool homemade binding posts with ones that don't conduct to the chassis.



The radio will be wired according to this easy to follow diagram- ...What the dickens?



Does that say **TAPE**?? C'mon man. [FUNK DAT!](#)



Here it is wired, with the choke in place. No tape; pin 8 on the tube socket is used as a tie point.
The explanation of the tape and pin 8 is on page 12-A in the handbook.

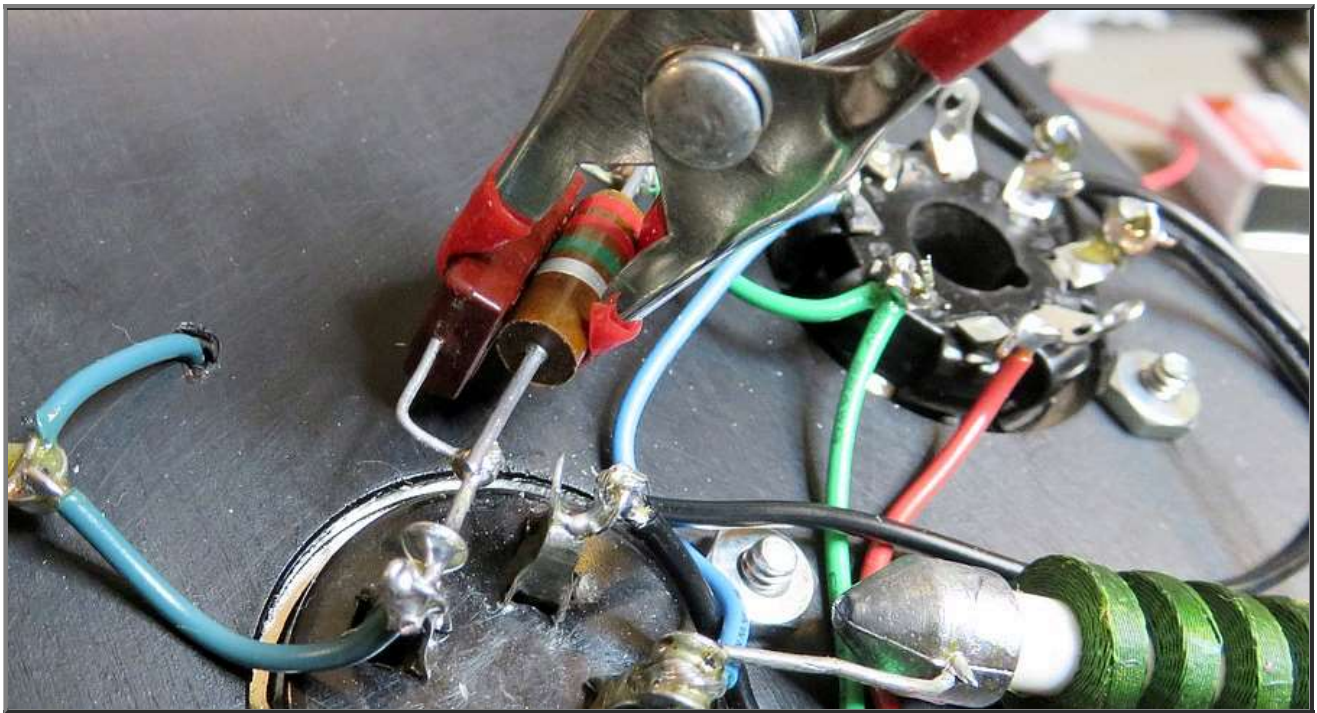


The completed MRL One Tube clone.

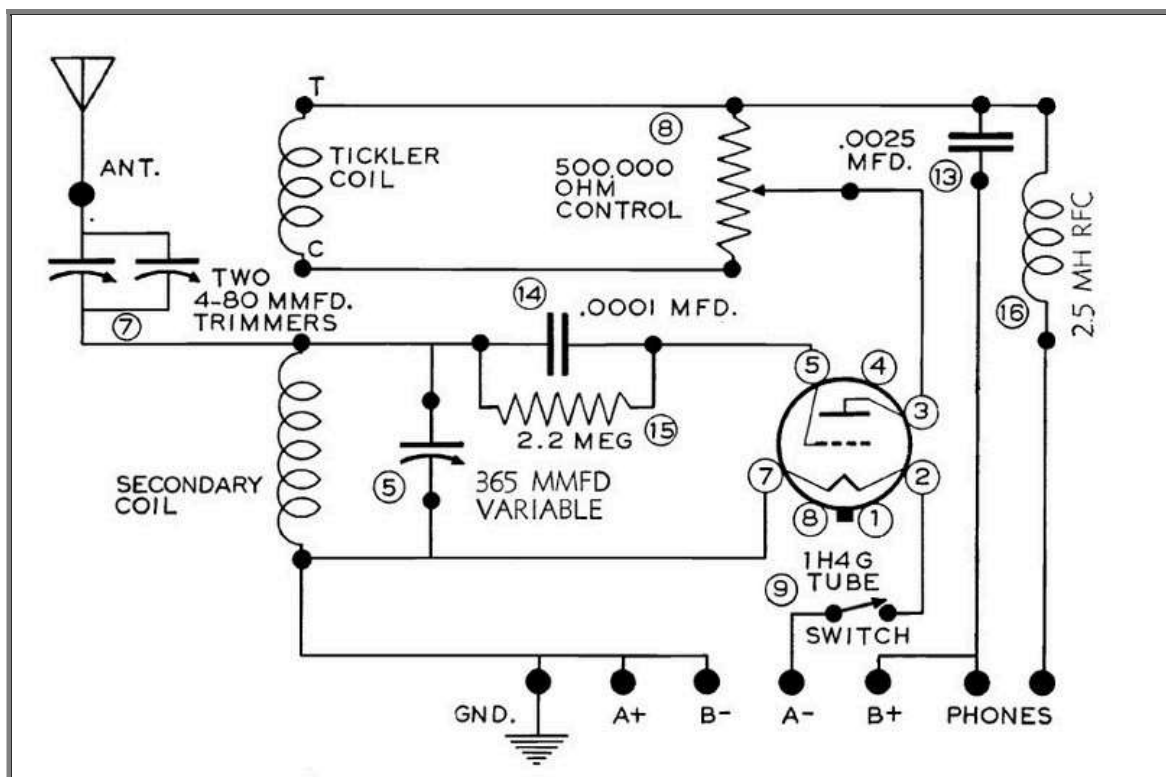
PROBLEMS!

After firing up the set it was found the regeneration was very hard to control. It would instantly go from no feedback to too much feedback. There was no "sweet spot" on the control knob. This made the set pretty much unusable.

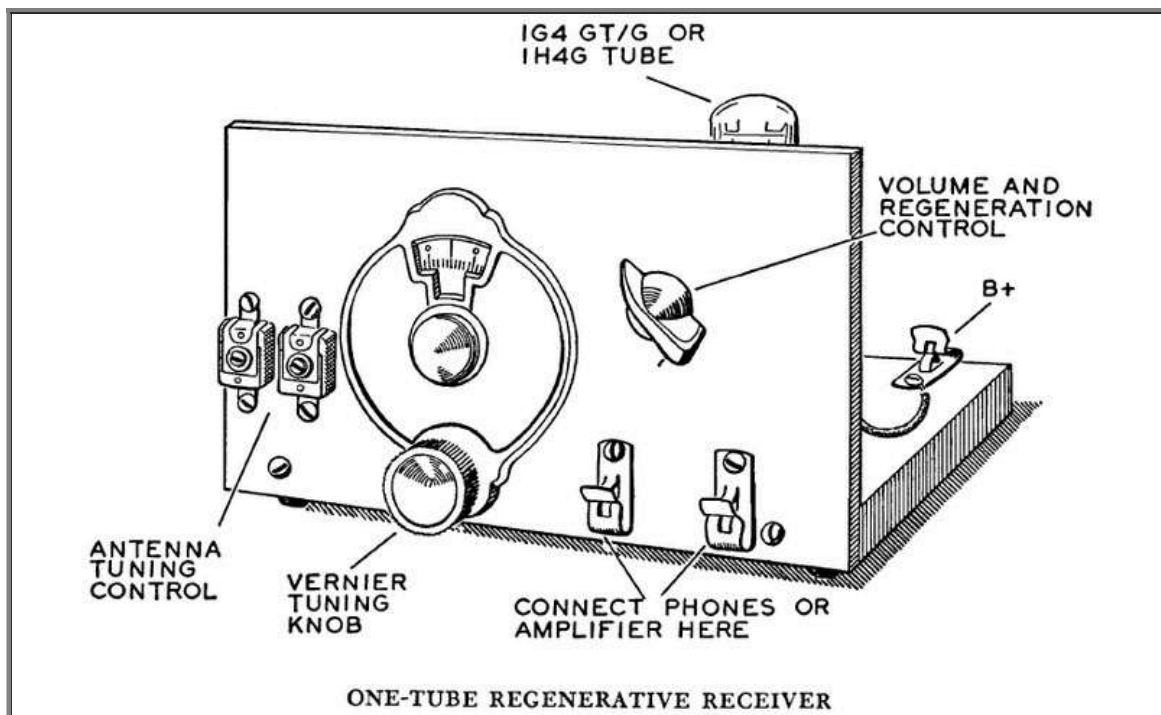
A guy named Sloane Freeman wrote to me and said I should have used Elmer's exact plan, which didn't have an RF choke. I jumpered the RF choke but it didn't make much difference. Then Freeman figured it out from 1,300 miles away. The regen pot had an audio taper. It should have had a linear taper.



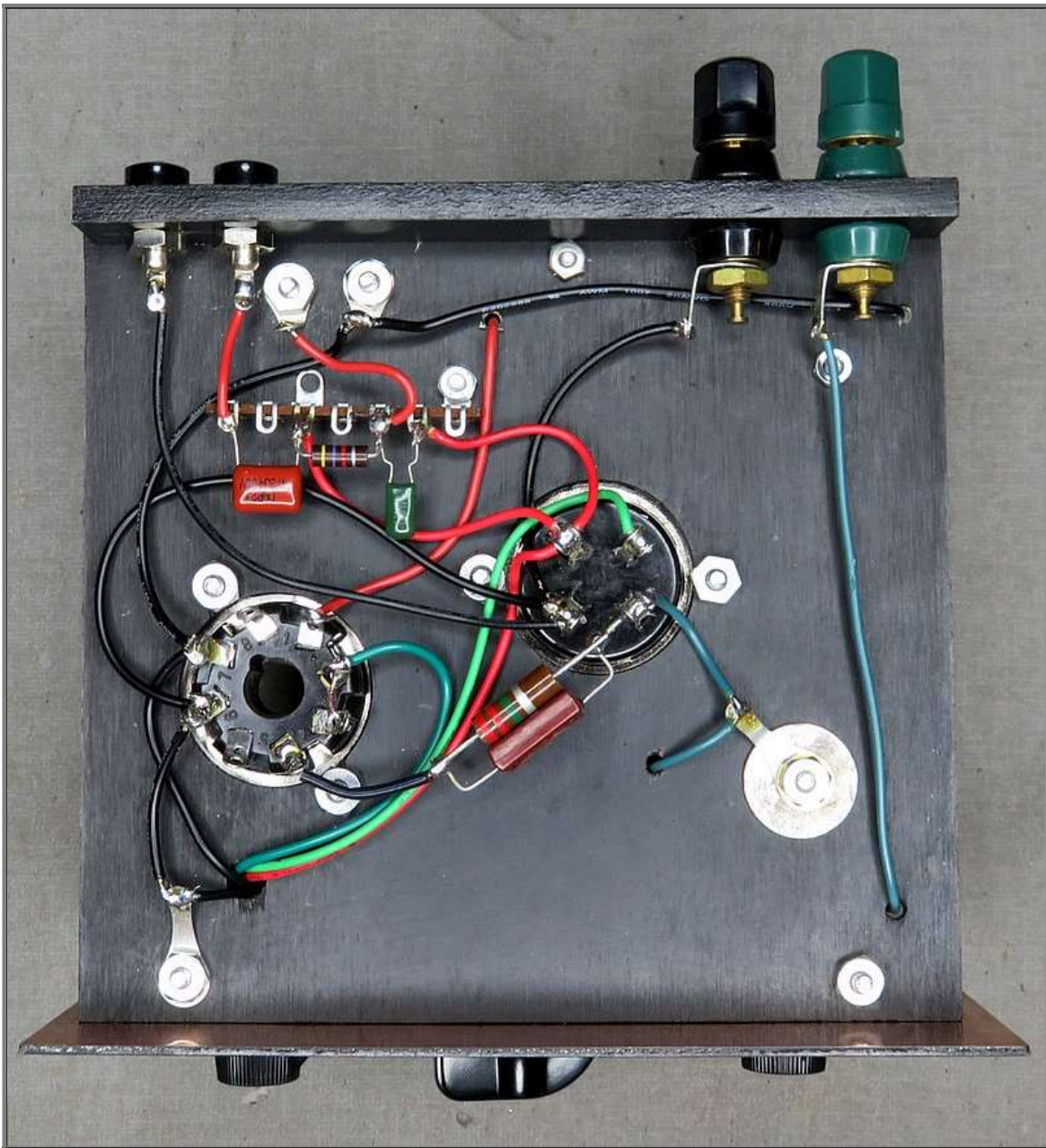
Changing the grid leak resistor from 3.3 megohms to 2.2 megohms. It's held with a clamp, waiting for solder.



There is more than one way to produce feedback. This is how Alfred P. Morgan did it in 1954. All that is needed to turn the MRL set into a Morgan set is to connect the wiper of the 500K control to the plate of the tube. (It was also necessary to tie pins 3 and 4 together on the 1C5 tube. Morgan used a 1H4 triode.)



I've always wanted to build one of these. For some reason I thought this radio was larger. It's the exact same height as the MRL 1 Tube! By moving a few parts around, the MRL set was made into a Morgan set. This is from [The Boys First Book of Radio and Electronics](#).



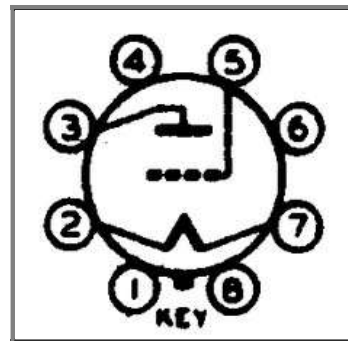
Rewired per the Morgan schematic. The green capacitor is part No. 13 on the Morgan schematic. The resistor and the brown capacitor are from page 12-B in the MRL handbook. Basically, the resistor is wired in place of the headphones and the audio is picked up between the brown capacitor and ground. Now the B+ doesn't go through the headphones, the choke isn't needed and the set can be connected to an amplifier.

Mike Peebles also uses this setup in his tube radio kits.

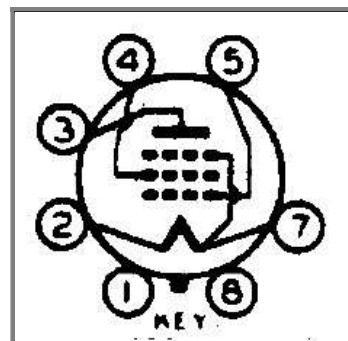
1C5 tube vs. 1H4 tube



Before we test the radio, let's look at the two different vacuum tubes.
MRL used a 1C5. Alfred Morgan used a 1H4. What are the differences?



The 1H4 is a **Triode**. Filament voltage is 2 volts @ .06 amp
Pin 3 is the plate, pin 5 is the control grid.



The 1C5 is a **Pentode**. Filament voltage is 1.4 volts @ .1 amp
Pin 3 is the plate, pin 4 is the screen grid, pin 5 is the control grid.

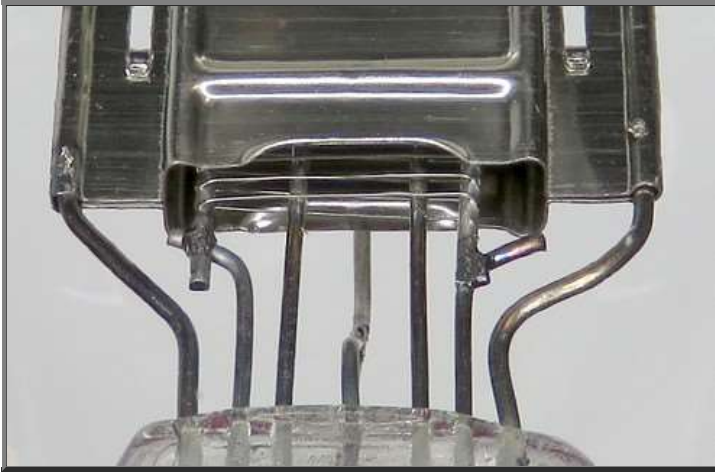
A Triode is the simplest form of vacuum tube, invented in 1906 by Lee de Forest. To use the 1C5 Pentode as a Triode, we just connect pins 3 and 4 together on the socket. Now both tubes can be used in the Alfred P. Morgan

circuit.

Observe the filament voltages for the tubes. Using a flashlight battery will overdrive the 1C5 filament by .1 volts, and it burns a tenth of an amp, so it gets hot! The radio will easily work with 27 volts (three 9 volt batteries) on the plate.

The 1H4 filament is rated at 2 volts, so the flashlight battery isn't quite up to snuff. It also runs at a cool .06 of an amp. The filament battery will last quite a bit longer with the 1H4, but 27 volts on the plate isn't going to cut it. There aren't enough electrons coming off the filament because it isn't hot enough. We need the 45 volts on the plate that Morgan said to use.

Both tubes can handle 90 volts or more on the plate. Here are the full specs for the tubes: [1H4](#) [1C5](#)



Vacuum tubes have almost magical properties, considering they're just strategically assembled bits of metal. This is the 1H4. On the left you can see the grid going up inside the plate. On the right is the getter. The tube has a very small getter mirror on the glass, which shows it was made with a very hard vacuum.

The tube is branded "Greylock." According to a thread on the Antique Radio Forum, "Greylock was one of the shady operators in the tube rebranding industry. They would take surplus stock, military surplus, manufacturers overstock, and seconds, wash off the brand markings, and stamp the tubes afresh, and then market these (oftentimes used or out of spec) tubes as new, under their own name, at a discount price."

The tube was acquired from a tube seller who had tested it and compared the results with a New Old Stock tube. (A tube tester pushes the tube past what it would encounter in a radio.) After some research, I've found that this tube was probably made by RCA around 1952.

See one taken apart [here](#).



The Greylock tube box. It looks like somebody added the bricks to the lighthouse by hand before printing it. It's also labeled, GESCO PARTS QUALITY PRODUCTS."



The radio with the 1H4 tube installed.
