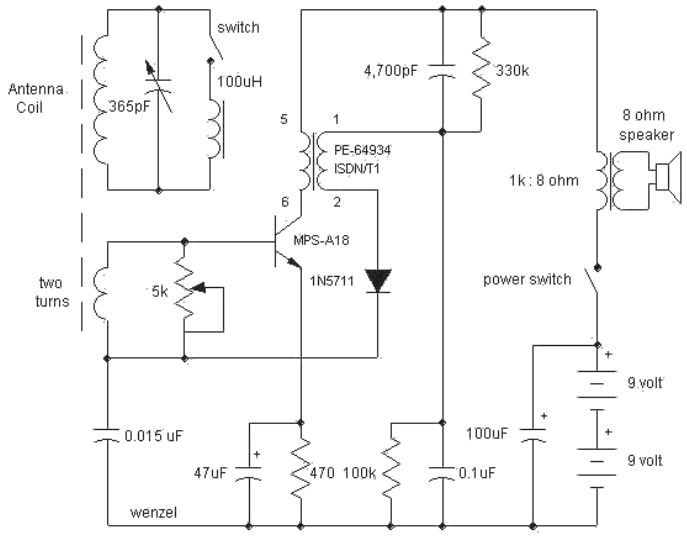
Wonderful One-Transistor Reflex Radio

If you are going to build a one-transistor radio, make it this one!

This reflex radio project was inspired by Robert Bazian 's design. His reflex radio is the "darndest" thing I have seen, and his spectacular results inspired me to come up with my own version.

My version is restricted to components that are fairly easy to get or make and the results are amazing. Instead of a loopstick antenna, I use an air-wound coil that is easy to make and I use an ordinary "telecom" transformer for the feedback signal. The one part that might be a little hard to get is the MPS-A18 and I don't recommend substitutions unless you can find a very high gain transistor. A Darlington can be made to work but there may be noticeable distortion. Here is the schematic:



The antenna coil is just 20 turns wrapped around four insulated posts as seen in the photos and shown in the diagram below. I used nylon posts but ordinary bolts covered with tubing would work fine. The dimensions are not particularly critical; those shown happen to fit inside the case I chose. If your antenna tunes too low, remove a turn or two and if it only picks up stations at the top of the band, add a couple of turns. The signal is coupled to the receiver by two turns wrapped right on top of the 20 turns. This winding technique is simple but it has the drawback of having more than desirable capacitance and that limits the tuning range with a standard 365 pF variable capacitor. To get around this limitation, a switch and 100uH inductor has been added as a band switch to allow the reception of the higher frequency stations. This antenna system also tends to give more regeneration at the high end of the band and the volume control (5 k) must be turned down a bit.

This circuit would make a great single-station radio! Leave out the switch and inductor and replace the 365 pF variable with a fixed value selected to tune the desired station. You might want to add a shunt resistor or trimmer across the 5k pot to limit its resistance to the value that gives maximum volume without distortion.

The telecom transformer is designed for high bandwidth ISDN or T1 digital signals and it doesn't have much of a response to the audio signal. Other types should work, including some pulse transformers and other broadband RF transformers as long as they look like a low impedance to the audio. Try winding your own on a piece of ferrite and experiment with different turns ratios.

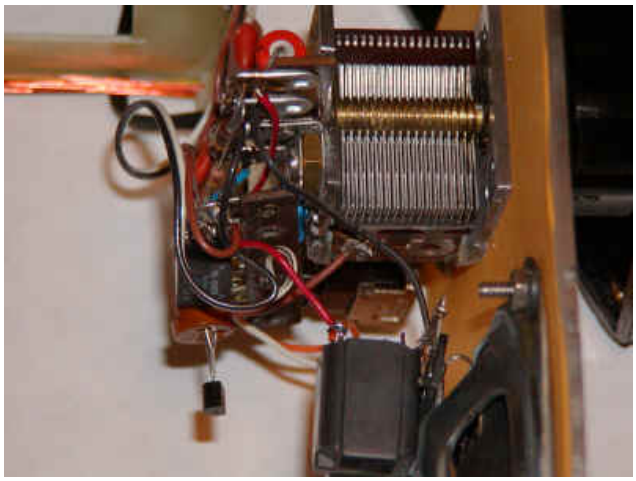
The detector diode is a Schottky type intended for RF applications but a germanium detector diode will also work. There is a bias current flowing so other types of diodes might be worth a try (see detector diodes). I may have to try an LED just because it is so odd.

The output transformer may be a 1k to 8 ohm audio type or even a 12 volt filament power transformer. Some power transformers sound muffled due to poor frequency response so if your radio sounds like the treble control is all the way down, try changing to a different style of transformer. But don't hesitate to try a power transformer; the best performance I got was with a power transformer, outperforming my smaller 1k to 8 ohm audio type seen in the photos and they are easy to find. (The 12 volt winding goes to the speaker and the 120 volt winding goes to the transistor.) Although I didn't try it, a 6 volt power transformer might work well with a 4 ohm speaker.

My radio is built into a phenolic box with a clear plastic lid. The legends were printed on colored paper and glued with spray adhesive to the inside surface of the plastic. A couple of terminal strips and the terminals of the speaker, switch and capacitor mount all of the parts. The center of the fiberglass antenna support was cut out to make room for the speaker magnet.

The black cord is from a 15 volt molded power supply that I used in place of batteries. If you don't like messing with batteries either, choose a supply near 18 volts.

The transistor is in a socket to allow for easy experimentation and is optional. Except for the transistor, the component values and types are pretty forgiving so substitutions may work fine.



The audio transformer in these photos (fastened directly to the speaker) is a gray potted type that isn't very common but "regular" types will work just as well as will many 12 volt power transformers. Choose one near 1k to 8 ohms.