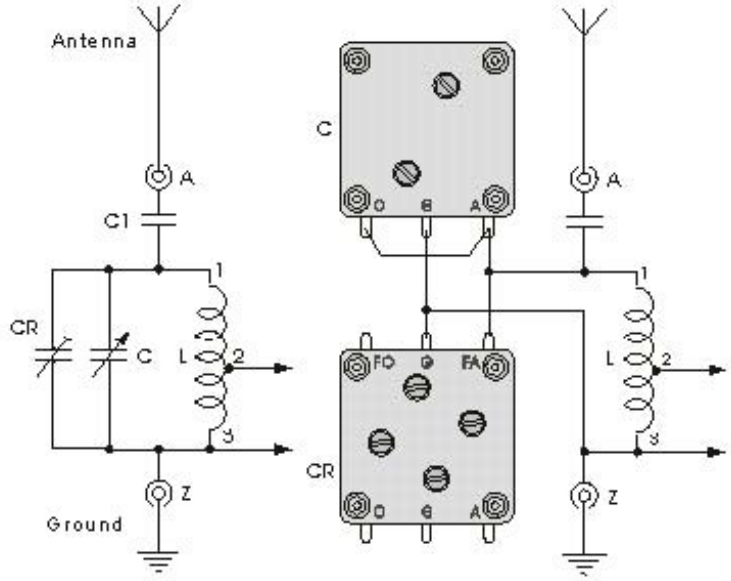
Electronic Tuning

Instead of the capacitor CR, that was used for fine tuning in the previous project, a capacitive (varicap) diode can be used.

It's a special HF diode which is polarized by exposing it to DC voltage in order to be non-permeable (+ to the anode, - to cathode). By changing the voltage diode's capacitance also changes, which allows for it to be utilized as variable capacitor. If, acc. to pic.5.13-a, the DC voltage between the cathode and anode (UAK) varies from U1 to U2, diode's capacitance goes from Cmax till Cmin.

The electronic diagram for the electronic fine tuning circuitry is given on pic.5.13-b. Diode capacitance is changed by moving the slider of the P1 potentiometer. By means of trimmer TP the necessary Cmax is set, and when this is done TP can be replaced by an ordinary resistor. All the components are mounted on the PCB, together with other parts of the receiver, except the P1. It is mounted on the front panel, and connected to the PCB with 3 ordinary wires.

* The variable capacitors that were used for tuning in all the receivers described so far are solid, lasting, reliable



Pic.5.12. Fine Tuning
(stretching a part of the bandwidth)

components. Their mishap is they are hard to purchase, they are quite robust (compared to other device components), and their mounting isn't simple because the shaft for the knob must go through the front plate of the device box. That is why varicap diodes are also replacing them. With the diode that has Cmax/Cmin ratio that is big enough, say, Cmax/Cmin>15, the circuit form pic.5.13 can be used as the variable capacitor (C is simply omitted). In that case, some bigger knob with an arrow is mounted on the P1 handle, and numbers from 1 to 10 are written on the panel, as shown on pic.5.13. This scale allows the listeners to see what station is the receiver tuned at. Of course, for the MW band, the numbers as those on pic.3.7 can also be written.

* In case of SW band, the P2 potentiometer is added for fine tuning.The optical indication of the tuning, with and knob with arrow is the simplest solution possible. More prettier one is using a small movable-coil instrument (V), such as those used as battery indicators in industrial devices, or for tuning indication and similar.

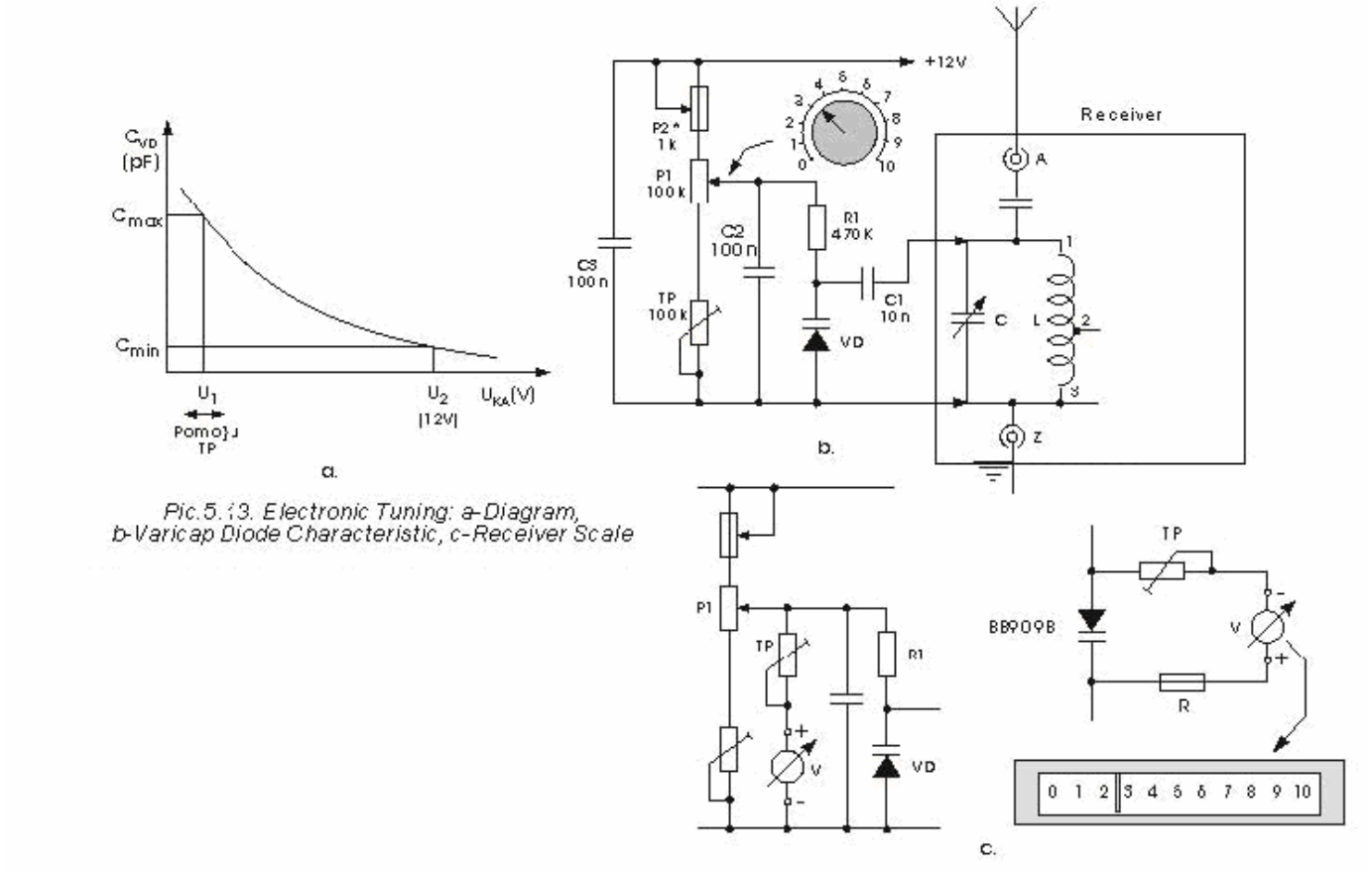
The connecting is done acc. to the diagram on the left part of the pic.5.13-c. In series with the instrument, the TP potentiometer is attached.

Its resistance depends on the maximum instrument current, and can be found experimentally. For start, you may use a 1 MOhm linear trimmer, with its slider at lowest position (so that its resistance is maximum).

Put the P1 slider also at the lowest position. Turn on the receiver. Start moving the P1slider upwards, and observe the instrument needle. if it soon goes to the end, you'll have to take a trimmer with greater resistance or to add another resistor in series with it, so that when the P1 slider gets to its rightmost position, the needle goes somewhere around the middle of the full scale.

If the needle, with P1 in topmost position, moves too little, you'll need a smaller resistance trimmer. When you succeed in having the needle in the middle of the scale with P1 in topmost position, start moving the TP slider until the needle reaches the end of scale.

The circuit is well adjusted if the needle goes from zero to full scale while P1 slider is moved from bottommost to topmost position. The instrument can have any shape, but the most appropriate (and cheapest) is square, like the one on the picture.



Pic.5.13. Electronic Tuning: a-Diagram, b-Varicap Diode Characteristic, c-Receiver Scale

The optical indication of station tuning at the receiver with electronic tuning, as those on pics.4.12,4.14 and 4.19 is accomplished with the instrument that is connected in parallel to the varicap diode. The diagram is shown on the right part of pic.5.13-c. In the lower part of the picture the movable-coil instrument is shown.

Scales of these instruments are most often marked from 1 to 10, but if you are skilful enough, you can wite down numbers representing frequencies in MHz (e.g. 88…96….100……108 MHz).