

Knight-Kit "Ranger II" AC-DC Superhet

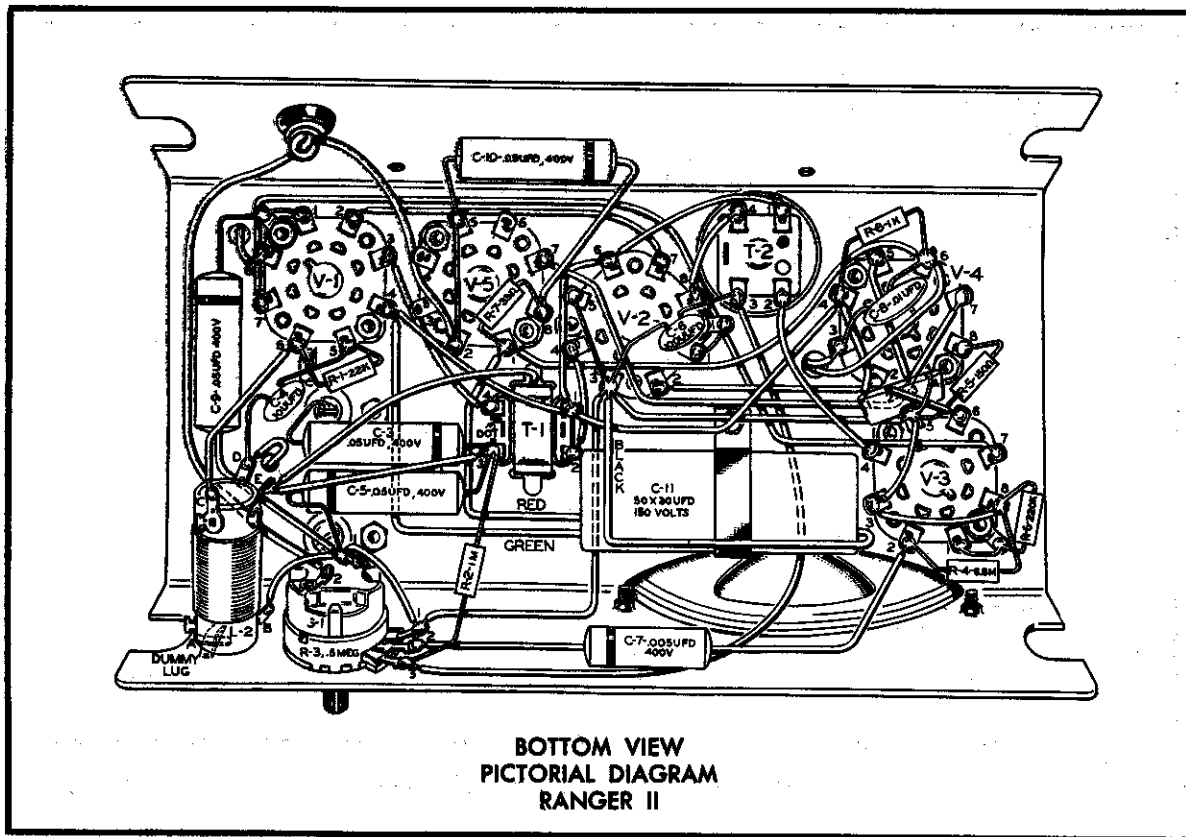
THIS circuit has many unusual features that make it worthy of study. It is so designed that the heaters of the tubes, connected in series, may be operated directly from 120-volt line without a dropping resistor. The heaters add up to 122.8 volts, but will operate from line voltages as low as 105.

The 12SA7 tube is the converter. It produces local oscillations at a frequency which can be varied. These oscillations beat with the incoming signal, and the combination of the two signals produces a beat signal known as the heterodyne signal. The name "Superheterodyne" is derived from the action. Heterodyning is used to change the incoming signal frequency to a predetermined intermediate frequency (known as I.F.) of 455 KC. The loop antenna is nothing more than an antenna coil, wound so that it is large in size without the necessity for an external antenna. However, if an external antenna is necessary for satisfac-

tory reception, it may be connected to the 10 mmf capacitor on the loop antenna without disturbing the tuned circuit (see schematic diagram).

In order to obtain an I.F. frequency of 455 KC, the oscillator must produce RF voltage at a frequency which is 455 KC higher or lower than the incoming signal frequency. In broadcast band receivers it is customary for the oscillator to be 455 KC higher. While the antenna section of the two-gang tuning capacitor tunes the loop to resonate with signals from 1620 KC to 540 KC, the oscillator section of the tuning capacitor varies oscillations from 2075 KC to 995 KC. The oscillator section of the tuning capacitor has a lower maximum capacity. The oscillator coil has lower inductance than the antenna coil, or loop, and the oscillator section of the capacitor and oscillator coil are designed to "track" with the antenna circuit.

The I.F. stage amplifies at higher efficiency because its function is to amplify only one fixed frequency.



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It is also possible to obtain high amplification because of the comparatively low I.F. frequencies.

The output of the I.F. stage is coupled to one of the diode detector plates in the 12SQ7 detector-AVC-1st audio amplifier. Here the audio modulation of the signal is separated from the radio wave that carried it. The output voltage of the diode detector appears across the diode plate load resistor, (the volume control). Adjustment of the volume control permits coupling just the right amount of this output voltage to the grid of the 1st audio amplifier to produce the desired listening level. The triode section of the 12SQ7, the 1st audio amplifier, amplifies the signal from the volume control and a signal many times the value of that applied to its grid appears across its plate load resistor. This voltage is fed to the grid of the 50L6 audio output stage through a coupling capacitor. The coupling capacitor also keeps the DC voltage from the plate of the 12SQ7 from being applied to the grid of the 50L6. The audio output stage

(also called the power amplifier) is capable of delivering 2 watts of audio power. The impedance of the primary winding of the output transformer matches the plate load resistance of the 50L6 for maximum efficiency. The impedance of the secondary winding of the output transformer matches the voice coil impedance of the speaker to provide maximum transfer of energy. A permanent magnet type speaker with a 3.2 ohm voice coil is used in this circuit.

The tubes obtain their DC operating voltages from an AC-DC type power supply using a 35Z5GT half-wave rectifier. Hum-producing ripple in the DC supply is filtered out by a resistor-capacitor network. A filter choke is not required because of the large amount of capacitance used.

This receiver will pick up an RF signal of only a few billionths of a watt and transform it into 2 watts of audio power—more than adequate for loudspeaker reproduction. The Knight-Kit "Ranger II", complete with cabinet, is listed in the Allied Radio catalog.