

## FRB 5 Watt Transmitter

The FRB 5 watt transmitter is a economical, easy to build transmitter suitable for micro power radio. It is capable from operating from 50 to 150 MHz putting out 4-6 Watts into a 50-75 Ohm antenna load. The frequency stability is approximately 10 kHz. It has an audio frequency response of 20 Hz to 20 kHz in mono. A stereo generator can be easily attached to the input circuitry. Audio input impedance can be set to 600 or 10 K ohms. And harmonic suppression is better than 20 dB.

### Theory of Operation

Resistor R1 is selected to match the output impedance of you audio source. This is usually 600 Ohms for Broadcast Audio standard equipment or 10K Ohms for most consumer electronics such as cassette and disk players.

FM Broadcast band transmissions use *pre-emphasis* at the transmitter and *de-emphasis* at the receiver. This provides a boost of the higher audio frequencies during transmission, and a corresponding cut during reception. This helps reduce background noise. Since all FM band receivers have a de-emphasis network built into them, music would sound very flat if pre-emphasis is not used in the transmitter. If the transmitter was to be used for voice only, the pre-emphasis network loses most of its importance. Components R2 and C1 form the standard 75 microsecond pre-emphasis network required for faithful music transmission in the United States. Europeans should change the value of R2 to 10K to conform to the European standard of 50 Microseconds.

The audio input level required for 100% modulation with the pre-emphasis network installed is about 0 dBm ( or 1 volt peak to peak into selected impedance of 600 or 10 K ohms). If the circuit is to be used for voice only then R2 and C1 can be left out with the input being feed directly to the modulation control (R5). The audio input level for 100% modulation without R2 and C1 is about -20 dBm. It should be noted here that if a stereo generator was to be used with this transmitter, that you would feed the stereo composite signal directly to the modulation control of (R5). You would not want to run the stereo composite signal through pre-emphasis. The stereo composite generator would have its own pre-emphasis, and it would take place before the composite signal was generated.

The oscillator and tuning supply voltage is held at a constant by means of Zener diode D2 and capacitor C6. Variable resistor R4 applies a voltage via R7 and R5 to D1. D1 is a variable-capacitance diode whose capacitance depends on the value of the voltage applied to it. The movement of R4 varies the amount of that voltage and therefor can be used for adjusting the operating frequency slightly. Tuning range of this resistor has been measured at about 1 MHz. R3's value could be lowered slightly to extend this range another .5 Mhz or so. But I wouldn't allow the voltage at the output of R4 to be able to be adjusted less than 2 Volts since D4 has a very non-linear response under 2 volts and could create a bad sounding signal.

The audio signal level is determined by R5 is fed through C2 and R5 to D1. This signal appears to D1 as a voltage which is changing along with the audio feed in. This causes capacity changes