

Initial FM signal generation is accomplished at Q202 and its supporting circuitry. This stage is a modified Clapp oscillator with the 18MHz crystal operating on the inductive slope of its parallel resonance curve. The collector circuit of Q202 is resonated at the second harmonic of the crystal frequency, (third harmonic on 220MHz versions), by a double-tuned filter, and is applied to the base of Q203, a frequency doubler. FM modulation is affected by "modulating" the crystal load capacitance with varactor diode CR203. A steady-state D.C. bias for CR203 is provided by R218, and the modulating audio signal is superimposed on this voltage through C209.

Modulating audio for CR203 is pre-emphasized by R203, C201 and C259, and is applied to IC201A where it is amplified by a factor of 68. The output of IC201A is applied to "back-to-back" diodes CR201 and CR202 which cause the audio signal to be limited to a maximum value of about 1.4Vpp. The limited audio signal is next applied to a 3 section RC lowpass filter which removes most of the high order harmonic distortion produced by the limiting process. The output of the lowpass filter is fed to IC201B for further amplification, and is finally connected to the varactor modulator through Deviation Pot R212.

The RF drive to Q203, now at 36MHz (55MHz in 220MHz versions), is doubled in frequency and is filtered by another double tuned circuit before being applied to the base of Q204. Q204 is another frequency doubler, and the 72MHz drive at its base (110MHz in 220MHz versions), is multiplied in the collector circuit to 144MHz (220MHz), the final output frequency. The signal is again filtered in a double-tuned circuit, and is fed to the base of pre-driver Q205. The signal is further amplified by Q206, and is applied as drive to the Class "C" amplifier chain consisting of Q207 and Q208. (In SCR1000 2M repeater applications, the output from Q206 is applied directly to Q208, and Q207 is eliminated. Power output from Q208 in this case is about 6-7 watts.) The output of Q208 (about 10-12 watts in 220MHz versions) is finally applied to a 2 section harmonic filter, and is routed to the RF output of the board. A sample of the RF output from Q208 is picked off before the harmonic filter, and is rectified by CR205 and CR206 to drive a Relative Output meter.

The 13.8VDC input is applied directly to Class "C" stages Q207 and Q208, and also to audio stage IC201. Oscillator stage Q202 is run continuously from a 9 volt zener diode regulator for maximum stability. Grounding the PTT input to Q201 causes Q201 to turn on, applying +13.5 volts to both frequency doubler stages and both pre-driver stages.

The RF output of exciter board is next applied to the final amplifier board. The final amplifier is Q208 (or Q209), an emitter ballasted RF power transistor. The power amplifier is designed with sufficient heat-sinking to provide a nominal output of 30 watts in continuous service when operated into a proper 50 ohm load. The power transistor is capable of withstanding open and shorted load conditions for short periods of time, but this should be avoided, since certain VSWR conditions can cause excessive heat buildup in the amplifier and possibly damage the device.

The output of the amplifier is passed through a 3 section (2 section on 220MHz) lowpass filter which greatly attenuates all harmonics. A diode rectifier provides a relative indication of peak output voltage which is sampled just ahead of the low-pass filter. R247 is set for a relative final output reading of 6-8 on the meter for approximately 30 watts out to a 50 ohm load.