

## **HAND-HELD TRANSMITTER**

### **CIRCUIT DESCRIPTION AND OPERATING INSTRUCTIONS**

This transmitter is crystal controlled on a single channel, and can be set up to operate anywhere between approximately 450 and 470 MHz without component changes. The radio frequency generator is a cascade of four transistors. It consists of a third overtone crystal oscillator followed by two frequency tripler stages, driver and power amplifier. The crystal runs at approximately 51 MHz, and subsequent stages are tuned to approximately 153 MHz and 459 MHz. All interstage coupling networks are double tuned band pass filters, and the power amplifier is followed by an eight element low pass network. The entire RF lineup is enclosed in its own screening can to eliminate spurious radiated interference. The output power is fed directly to the base of a shortened helical aerial, and the effective radiated power is estimated to be around 80 milliwatts.

The transmitter runs from two internal nickel hydride cells, and is entirely software controlled. Logic signals from the microcontroller are level shifted and low pass filtered before being applied to the frequency modulator. The deviation is internally adjustable, and is normally set to  $\pm 2.5$  kHz or  $\pm 4.5$  kHz dependent on channel spacing requirements. The data format is non return to zero, frequency shift keying, so that with no modulation the transmitter frequency is offset from the nominal by approximately half the deviation.

The transmitter is manually controlled from two blue buttons at the side and two on the top adjacent to the display. Using the current software, the upper blue button cycles through 1. Software and microcontroller running. 2. RF carrier on. 3. Continuous modulation on. To switch off, press the button adjacent to the loudspeaker symbol in the display.

The nominal battery capacity is 1.6 ampere hours and given a full charge, should provide three to four hours of continuous carrier for test purposes. However, if it becomes necessary to recharge the battery, place the transmitter in its charger which is supplied.

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20.06.01