Circuit Description

1. Frequency Configuration

The receiver utilizes double conversion superheterodyne. The first IF is 49.95MHz and the second is 450KHz. The first local oscillator signal is supplied from PLL circuit. The second local oscillator signal（50.4MHz）is generated from the frequency tripling of TCXO (16.8MHz).

The PLL circuit generates the frequencies needed in the transmitter

Frequency Range: 136 MHz—174MHz

3.1 MIC Circuit and Modulation Circuit

The AF signal from MIC is amplified by IC204 after passing through the MIC control switch (Q507). The resulting signal is then amplified by IC106 and pre-emphasized, encoded. It is passed to IC121 (electronic switch) before reaching IC125. The signaling is inputted into IC125 and enters VCO for modulation.

3.2 Power AMP and Post AMP

TX-RF signal is outputted from Q703 in VCO circuit and amplified by Q126, Q127 and Q128. The amplified signal is then fed to IC102 and passes through LPF before reaching the antenna terminal.

3.3 APC

The APC is used to keep the power output at a constant preset value. D105 and D106 transform the signal from detector into DC voltage which is then compared with the reference voltage from CPU in IC118 and outputted as DC control voltage. The DC control voltage controls the output power by controlling the grid of IC102.

4. PLL

PLL circuit generates the first local oscillator signal for reception and the RF signal for transmission. PLL circuit consists of TX frequency oscillator (Q701), RX frequency oscillator (Q702), buffer amplifier (Q703), RF amplifier (Q124), PLL IC (IC801), LPF (Q804, Q805) and TX/RX VCO control switch (Q704, Q706).

In transmit mode, IC120 transmits the frequency data to PLL IC. Q704 is turned on to activate TX VCO. The outputted signal is amplified by Q703, Q124, then divided by PLL IC into 2.5KHz, 5KHz or 6.25KHz signal. The divided signal is compared with 2.5KHz, 5KHz or 6.25KHz reference signal from 16.8MHz crystal oscillator (2.5 PPM frequency stability) in the phase comparator. The frequency control voltage outputted from the phase comparator is sent to TX VCO after passing through LPF (Q804, Q805). In the meantime, modulation signal (TX) is passed to TX VCO for frequency modulation.

The working principle in receive mode is similar to that in transmit mode.

3. Control Circuit

Circuit in this section is comprised of CPU, reset IC, power supply controller and FLASHROM.

3.1 CPU

IC120 (CPU) operates at 9.8304MHz. It controls the data transmission between receive circuit, transmit circuit, control circuit, display circuit and peripheral circuit.

3.2 Power Supply

Power supply of the radio is derived from the battery which supplies battery B+. D135 and D137 are over-voltage protection diodes. Power-on/off can be controlled by software.

Vout provides power supply to IC115, IC114, IC113, IC111, and IC112, which produces 8V, 9V, 5V, and 3.5V voltage to the circuit.

4. Display Circuit

Display circuit is comprised of CPU (IC503), LCD module, LED and other components. Radio features are programmable by PF1-PF6. Data is displayed on the 12-digit and 4-digit dot matrix LCD in alphanumeric form.