

3. THEORY OF OPERATION

INTRODUCTION

ARH-465 is a micro size 15 channel portable FM transceiver constructed with a microprocessor controlled, temperature compensated Phase Locked Loop (PLL) frequency synthesizer. The radio features a double conversion receiver and a direct FM transmitter modulator. A special integrated circuit provides support to sub-audible signaling (CTCSS) and most of the receiving parts are switched off periodically in the power saver mode to reduce battery current drain during standby.

The Block Diagram RF and Control Circuit Diagrams for ARH-465 shall be used in associate with the following circuit description.

CIRCUIT DESCRIPTIONS

1) PHASE-LOCK LOOP (PLL) CIRCUIT

* REFERENCE OSCILLATOR

The reference oscillator consists of X3 in U3 with a frequency of 12.8MHz. This comparison frequency is selected by decoding the first three bits of the data input from microcomputer.

* PROGRAMMABLE DIVIDER

The programmable divider in U3 consists of a prescaler with a 7 bit control register followed by a 11-bit internal programmable divider. The overall division ratio is selected by a single 19-bit word located on the serial data bus.

* PHASE COMPARATOR

A digital-type phase comparator in U3 with output and an open drain lock detect output compares divided VCO frequency with the comparison frequency. It generates a correction voltage that is applied to a low-pass filter consisting of R68, R69, R70 and C137, C136, C135, EC5 then sent to the VCO circuit.

* VCO CIRCUIT

The transmit/receive frequency is directly generated by the Colpitts oscillation circuit contains Q23. The oscillation frequency is variable by applying the VCO control voltage to variable to variable capacitors D103, D154. To switch between the transmit and receive frequencies, Q22 turn on oscillates when the T/R pin is low.

2) TRANSMITTER

* MIC AMP CIRCUIT

Voice signal from the microphone is applied to microphone amplifier U1. U1 contains a high-pass filter, low-pass filter that has a 6dB/oct response between 300Hz and 3 kHz, and eliminates harmonics above 3 kHz. The pre-emphasized audio signal is applied to Q10, 12, 14 to adjust maximum frequency deviation.

* VCO AND AMPLIFIER

The VCO signal output is fed through D6-1/2 to be amplified by Q18, Q37 and then fed to power amplifier Q30.

* POWER AMPLIFIER CIRCUIT

Q30 provides approximately 7.5V DC power source. Q35 and Q36 adjust RF power output. Signals from Q30 is supplied through antenna switch D201 to a low-pass filter made up of L2, L3, L4 and C1-C4, then applied to Antenna Jack.