

CIRCUIT DESCRIPTION

Frequency Synthesizer

Introduction

The synthesizer is of a single-loop type with two VCO's. One for the transmit channel frequency and the other for receiver local oscillator injection frequency. All transmit and receive frequencies are controlled by a single high stability crystal-controlled reference oscillator. Modulation is added directly to the VCO (UNIT301) while transmitting. All the data required to define the radio channel frequency is contained in Flash ROM (included CPU). Channel changing is implemented by a microprocessor IC (IC101) which is prompted by operator use of the transceiver front panel controls.

Frequency Stability

The reference frequency for the PLL IC (IC308) is derived by feeding the output of the high stable quartz crystal oscillator at 12.5MHz (X302) which is $\pm 5\text{ppm}$ ($-30\text{~}\sim 60^\circ\text{C}$).

Out of Lock (PLL UNLOCK), Transmit Inhibit

The LD output (pin #14) of the PLL IC (IC308) is given as the LD signal to the microprocessor and TX INH circuit (Q333). This output functions to prevent radio equipment from malfunctioning when the PLL is unstable.

Modulation

Audio from a microphone is fed to the microphone amplifier, IC304. The amplifier has a frequency dependent feedback which makes it possible to obtain the required pre-emphasis characteristics of 6dB per octave from 300 to 3000Hz. IC308's 2nd amplifier clips the audio to provide deviation limiting. The microphone sensitivity is adjustable with the variable resistor, VR 303.

The pre-emphasized audio from IC303 is fed to the low pass filter (IC303 and 307) which provides a sharp cut-off for audio frequencies above 3000Hz and then to the TX VCO for modulation through the deviation adjustment, rheostat VR304.

TRANSMITTER

In the transmit mode, the synthesizer circuits are programmed to produce an RF signal from the TX VCO. The VCO output is amplified by a two stage buffer consisting of Q327, Q331 before being applied to the PA module (IC501). The transmitter PA stage amplifies the signal and provides filtering against carrier frequency harmonics. The variable resistor VR301 is for setting the power output level at the High power position and VR302 is for the Low power setting. This power control circuit, called the Automatic Power Control (APC), controls the voltage to the 1st stage of the PA module. The feedback voltage to the APC is picked up from the RF power output and converted to DC voltage by a rectifier circuit.

The transmitter power Amplifier RF output is fed to the Antenna Switching circuit where the signal is directly by diode switches to the antenna connector. Between the PA module and the antenna connector, there is a 4stage low pass filter to further reduce harmonic radiation.