FCC ID:ALH29351110(TK-6110 K)

FCC ID:ALH29351120(TK-6110 K2)

TK-6110 Circuit Description

The KENWOOD model TK-6110 is a VHF/FM mobile transceiver designed to operate in the frequency range of 29.7 to 50 MHz. 29.7-37MHz TK-6110K1(FCC ID:ALH29351110),35-50MHz TK-6110K2(FCC ID:ALH29351120)
The unit consists of a receiver, a transmitter, a phase-locked loop (PLL) frequency synthesizer, a digital control unit, power supply circuits and a signaling unit.

1. RECEIVER CIRCUIT

The receiver is double conversion superheterodyne, designed to operate in the frequency range of 29.7MHz to 50MHz.

1.1 FRONT-END RF AMPLIFIER

An incoming signal from the antenna is applied to a band-pass filter (L202) after going through a low-pass filter and an antenna switch (K1). The signal is then amplified by the RF amplifier (Q201) and again filtered by another band-pass filter (L203,L206 and L207).

1.2 FIRST MIXER

The signal from the band-pass filter is heterodyned with the first local oscillator signal from the PLL frequency synthesizer circuit at the first mixer (IC201) to become a 128.55MHz first intermediate frequency (IF) signal. The first IF signal is fed through two monolithic crystal filters (XF201) to further remove spurious signals.

1.3 IF AMPLIFIER

The first IF signal is amplified by Q202 and Q205, and then enters IC202 (FM processing IC).The signal is heterodyned again with a second local oscillator signal(129.005MHz) with in IC202 to become a 455kHz second IF signal. The second IF signal is fed through a 455kHz ceramic filter, CF201 and CF202 to further eliminate unwanted signals before it is amplified and FM detected in IC202.

1.4 AUDIO AMPLIFIER

The recovered audio signal obtained from IC202 is amplified by IC709, IC713, low-pass filtered by IC713 high-pass filtered by IC713 and band-eliminate filtered by IC713. The audio signals then passed through a de-emphasized by IC713. The processed audio signal passes through an audio volume control and is amplified to a sufficient level to drive a loudspeaker by an audio power amplifier BTL(IC102).

1.5 SQUELCH CIRCUIT

The output signal from IC202 enters FM IC again, then passed through a band-pass filter.
The noise component output from IC202 is amplified by Q206 and rectified by D205 to produce a DC voltage corresponding to the noise level. The DC voltage is sent to the analog port of the CPU(IC604).
And IC202 outputs a DC voltage(RSSI)corresponding to the input of the IF amplifier.

2. TRANSMITTER

2.1 MICROPHONE CIRCUIT

The signal from the microphone is high-pass filtered by IC713, passed through microphone mute and microphone amplifier circuit (Q703 and IC714), limited and pre-emphasized by IC713,D711.

2.2 MODULATOR CIRCUIT

The output of the Audio-processor (IC713) is passed to the D/A converter (IC710) for maximum deviation adjustment and the summing amplifier (IC711) before being applied to a varactor diode in the voltage controlled oscillator (VCO) located in the frequency synthesizer section.

2.3 DRIVER AND FINAL POWER AMPLIFIER CIRCUITS

The transmit signal is generated by the TX mixer(Q503). The transmit signal obtained from the buffer amplifier Q1 and Q2, is amplified by Q3 to approximately 30dBm. This amplified signal is amplified by Q4 and Q5 to approximately 8W. and this signal is passed to the FINAL stage. The RF power amplifier consists of transistor (Q6 and Q7) and is capable of producing up to 70W of RF power.

2.4 TRANSMIT/RECEIVE SWITCHING CIRCUIT

The final output signal is passed through a transmit/receive switching circuit (K1) before it is passed to the antenna terminal.

2.5 AUTOMATIC POWER CONTROL, CIRCUIT AND TRANSMITTER

The APC circuit consists of a RF level detector, an exciter control section and a temperature sensing circuit. The RF level detector senses the forward and reflected power. The transmitter output power is kept constant by the exciter control circuit which monitors the forward power and regulates the supply voltage applied to the exciter section.
If the antenna load becomes abnormal, the reflected power increases, causing the exciter control circuit to reduce the supply voltage to the exciter. In case of an abnormal temperature rise in the power amplifier section, the temperature sensing circuit detects this condition and send the information to the APC circuit. These actions reduce the transmitter output power to a safe operating level.

3. PLL FREQUENCY SYNTHESIZER

3.1 PLL

The frequency step of the PLL circuit is 5 kHz. A 16.8MHz reference oscillator signal is divided at IC501 by a fixed counter to produce the 5 kHz reference frequency. The VCO output signal is buffer amplified by Q505 and Q504, then divided in IC501, by a dual-modules programmable counter in this case. The divided signal is compared in phase with the 5 kHz reference signal in the phase comparator also in IC501. The output signal from the phase comparator is low-pass filtered and passed to the VCO to control the oscillator frequency.

3,.2 VOLTAGE CONTROLLED OSCILLATOR (VCO)

The operating frequency is generated by Hybrid Integrated Circuit(HIC) in transmit mode and HIC in receive mode. The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator to the varactor diodes.

3.3 UNLOCK DETECTOR CIRCUIT

If a pulse signal appears at the LD pin of IC501, an unlock condition occurs, the voltage applied to the UL pin of the microprocessor to go low. When the microprocessor detects this condition, the

transmitter is disabled by ignoring the push-to-talk switch input signal.

4. DIGITAL CONTROL CIRCUIT

4.1 KEY SWITCHES CIRCUIT

The key switches in formation are entered into the microprocessor (IC604) after passing through a IC901.

4.2 RESET CIRCUIT

When the power is initially turned on, the reset circuit (IC 601).

4.3 LAMP CIRCUIT

An LED is provided to illuminate the LCD and its operation is controlled by the microprocessor.

4.4 SHIFT REGISTER CIRCUIT

Serial data is sent to the shift register (IC 701, IC702, IC703 and IC704) from the microprocessor to control various functions in the unit.