

CIRCUIT DESCRIPTION

Frequency configuration

The receiver utilizes double conversion. The first IF is 10.695MHz and the second IF is 455kHz. The first local oscillator signal is supplied from the PLL circuit.

The PLL circuit in the transmitter generates the necessary frequencies. Fig. 1 shows the frequencies.

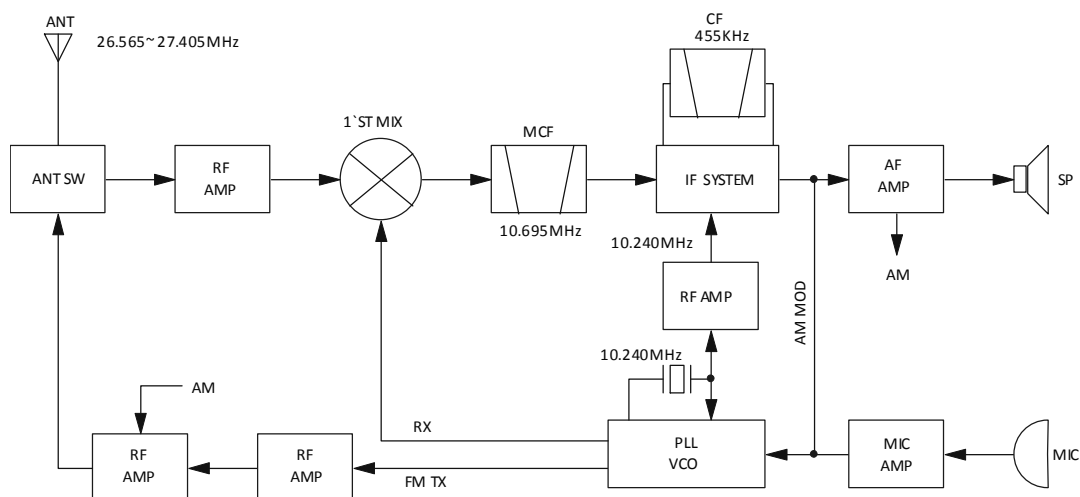


Fig. 1 Frequency configuration

Receiver

The frequency configuration of the receiver is shown in Fig. 2.

■ Front - end RF amplifier

An incoming signal from the antenna is applied to an RF amplifier (Q1) after passing through a transmit/receive switch circuit (D1 and D2 are off) and a BPF (T1 and varactor diodes : D3, D4). After the signal is amplified (Q1), the signal is filtered by a BPF (T2, T3 and varactor diodes: D5, D6) to eliminate unwanted signals before it is passed to the first mixer.

The voltage of these diodes are controlled by tracking the MPU (U16) center frequency of the band pass filter.

■ First Mixer

The signal from the RF amplifier is heterodyned with the first local oscillator signal from the PLL frequency synthesize circuit at the first mixer (Q8 and Q9) to create a 10.695MHz first intermediate frequency (1st IF) signal. The first IF signal is then fed through Ceramic Filter (MCFs:CB1 and CB2) to further remove spurious signals.

■ IF amplifier

The first IF signal is mixer by Q4. The signal is heterodyned again with a second local oscillator signal within Q4 to create a 455kHz second IF signal. The second IF signal is then fed through a 455kHz ceramic filter (CF1) to further eliminate unwanted signals before it is amplified. The filtered second IF signal is amplified by the first IF amplifier (Q6, Q11, Q12) and then applied to the IF system IC (U4). The amplified second IF signal is amplified by the limiting amplifier and demodulated by the quadrature detector with the ceramic discriminator (Y1). The demodulated signal is routed to the audio circuit.

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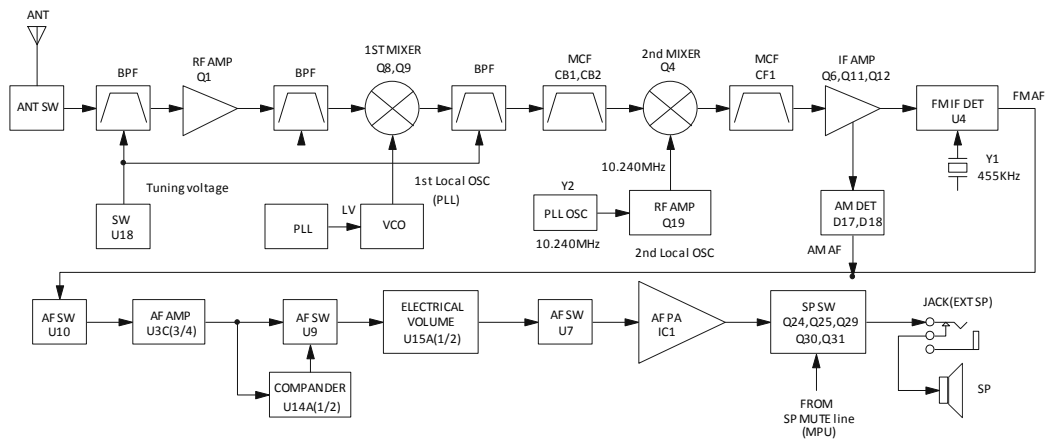


Fig. 2 Receiver section configuration

■ AF amplifier

The FM IC output passes through the electrical switch (U10) or The AM demodulated signal from Q12 goes to electrical switch (U10) through D17, amplifier (U3C 3/4), Compander IC (U14A 1/2), electrical switch (U9), electrical Volume (U15A 1/2), and electrical switch (U7). After goes to AF power amplifier IC (IC1). Is routed to an audio power amplifier (IC1) where it is amplified and output to the speaker. To output sounds from the speaker, U16 sends a high signal to the SP MUTE line and turns Q29, Q30 on through Q24, Q25 and Q31.

■ Squelch

A squelch circuit is provided to prevent no-signal noise or weak signals from outputting to a speaker during transmission.

PLL frequency synthesizer

The PLL circuit generates the first local oscillator signal for reception and the RF signal for transmission.

■ PLL

The frequency step of the PLL circuit is 64 or 66.

A 10.24MHz reference oscillator signal is divided at U12 by a fixed counter to produce an oscillator (VCO) output signal which is buffer amplified by Q20 then divided in U12 by a programmable counter. The divided signal is compared in phase with the 62 or 66 reference signal from the phase comparator in U12. The output signal from the phase comparator is filtered through a low-pass filter and passed to the VCO to control the oscillator frequency.

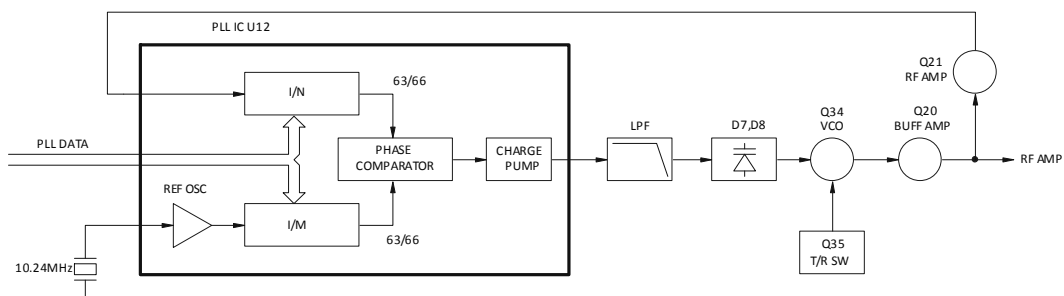


Fig. 3 PLL circuit

CIRCUIT DESCRIPTION

■ VCO

The frequency is created by Q34 at Transmit/Receive mode. The oscillator frequency is controlled by applying the VCO control voltage, obtain from the phase comparator. to the varactor diodes (D7 and D8). The VCO EN pin is set low (Receive: high) in transmit mode causing Q35 to turn off. The outputs from Q34 is amplified by Q20 and sent to the buffer amplifiers.

■ UNLOCK DETECTOR

If a pulse signal appears at the LD pin of U12, an unlock condition occurs, and the DC voltage obtained from D25, R39 and C66 causes the voltage applied to the microprocessor to go low. When the microprocessor detects this condition, the transmitter is disabled, ignoring the push-to-talk switch input signal.

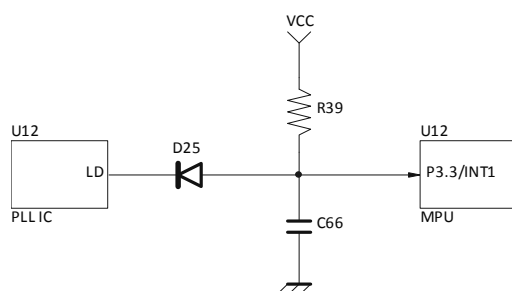


Fig. 4 Unlock detector circuit

Transmitter

■ Transmit audio

The audio signal from the microphone passes through the MIC amplifier (U2). The signal goes through the Compander IC (U14B 2/2), and resulting signal passes through electrical switch (U8) and goes to the low-pass filter. The signal then passes through low-pass filter (splatter filter) (U3A 1/4, U3B 2/4 and U5D 4/4) and cuts 3kHz and higher frequencies, passes through a electrical Volume (U15B 2/2) circuit, and resulting signal goes to the VCO through the VCO modulation terminal for direct FM modulation. The AM modulation signal enter into RF amplifier after passing through AF amplifier IC1, T8 and D22.

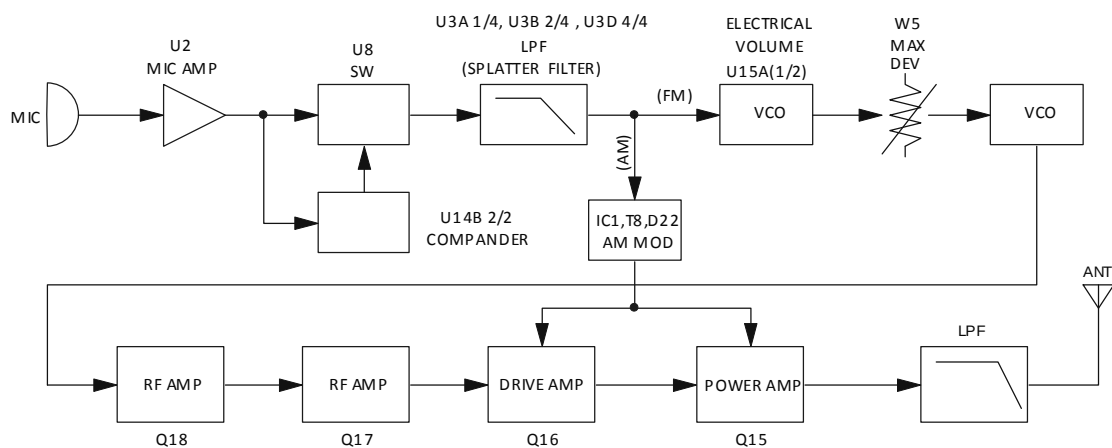


Fig. 5 Transmit circuit

CIRCUIT DESCRIPTION

■ Power Amplifier Circuit

The transmit output signal from the VCO passes through the buffer amplified (Q20) and amplified by Q16, Q17 and Q18. The amplified signal goes to the final amplifier (Q15) through a low-pass filter. The lowpass filter removes unwanted high-frequency harmonic components, and the resulting signal is transmitted through the antenna terminal.

Power Supply

The power supply voltage is maintained to 5.0V by the series regulator (U13). It is used as MPU power 5M. 5M for microprocessor is always output while the power is on. The 8V, 8R, 8T and 5V voltages are regulated by the U17.

8V is a common 8V.

8R is 8V for reception and output during reception.

8T is 8V for transmission and output during transmission.

5V is a common 5V.

Control Circuit

■ MPU

The microprocessor (U16) operates at a clock of 19.200MHz.

The control circuit consists of a microprocessor (U16) and its peripheral circuits. It controls the TX-RX unit. U16 mainly performs the following:

- 1) Switching between transmission and reception by the PTT signal input.
- 2) Sending frequency program data to the PLL.
- 3) Controlling squelch on/off by the DC voltage from the squelch circuit.
- 4) Controls the second MPU.
- 5) Controls the compander unit.
- 6) Controls the power supply unit.

Microphone Circuit

The Microphone controls serial communications with the main unit control section, the key input circuit, the display circuit, and the brightness circuit through the MPU (U802).

■ Display Circuit

The MPU (U802) controls LCD drivers (U800). It displays it by connecting U800 (3 common dots and 20 segment dots) the LCD.

The MPU (U802) controls the LCD illumination. When power is on, the second MPU will use the LED EN lines to control the LCD illumination. The dimmer function is controlled by the switch Q800.