

CIRCUIT DESCRIPTION

1. Overview

This transceiver is a UHF portable transceiver designed to operate in the frequency range of 400 to 470MHz.

The unit consists of RF module, transmitter, power supply, APC circuit, Componder circuit and control circuits.

2. Frequency Configuration

The frequency configuration is shown in Figure 1 and Table 1.

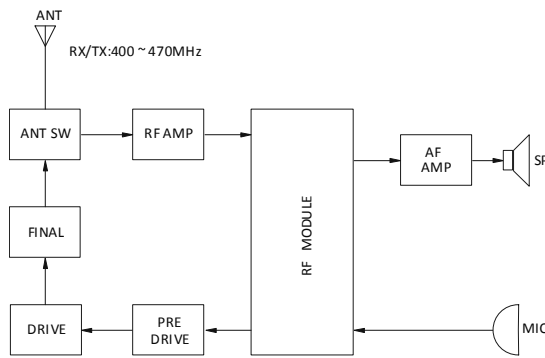


Fig. 1 Frequency configuration

3. Receiver System

3-1. Receiver Circuit

The received signal from the antenna passes through a low-pass filter and then through a transmission/reception switching circuit (antenna switch) and is demodulated by the RF module U200 (LNA, MIX, IF, RSSI, CTCSS/DCS, VCO, AFC, MOD, PLL, LOOP FILTER, VOX, DTMF and PRE/DE-EMPHASIS). The demodulated signal is routed to the audio circuit. (See Fig. 2)

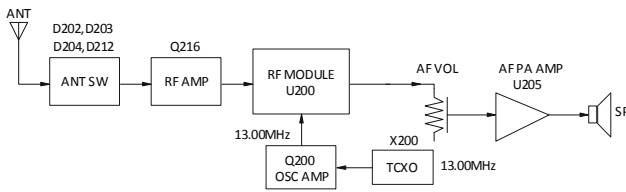


Fig.2

3-2. Audio Amplifier Circuit

The Audio signal from U200 goes to AF amplifier (U205). The signal then goes through an AF volume control, and is routed to an audio power amplifier (U205) where it is amplified and output to the speaker. (See Fig. 3)

3-3.Squelch

And the noise component is amplified and rectified by a filter and an amplifier to produce a DC voltage corresponding to the noise level.

The DC signal from the RF module goes to the analog port of the microprocessor (U204). U204 determines whether to output sounds from the speaker by checking whether the input voltage is higher or lower than the preset value.

To output sounds from the speaker, U204 sends a high signal to the P24 line and turns U205 on through Q212, Q213 and U205. (See Fig. 3)

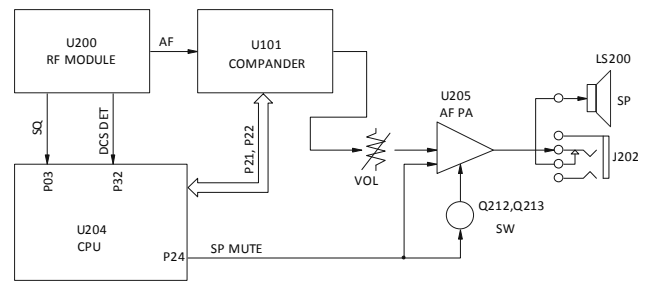


Fig.3

3-3.CTCSS/DCS

The output signal from RF module (U200) enters the microprocessor (U204). U204 determines whether the CTCSS or DCS matches the preset value, and controls the P24 and the speaker output sounds according to the squelch results. (See Fig. 3)

4. Transmission signal system

4-1.Microphone Amplifier Circuit

The signal from the microphone goes to the RF module (U200) modulation. (See Fig. 4)

4-2. CTCSS/DCS

CTCSS/DCS signal transmit through RF module (U200) inter generator, mixes with the audio signal, then input into inter moderm. (See Fig. 4)

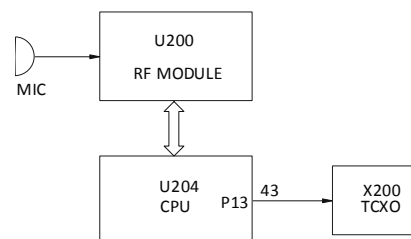


Fig.4

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4-3. Drive and Final Amplifier Circuit

The signal from the RF module (U200) is amplified by the pre-drive (Q210) and drive amplifier (Q205) to 40mW. The output of the drive amplifier is amplified by the RF power amplifier (Q202) to 4W (1W when the power is low).

The RF power amplifier consists of two MOS FET stages. The output of the RF power amplifier is then passed through the harmonic filter (LPF) and antenna switch (D204 and D212) and applied to the antenna terminal. (See Fig. 5)

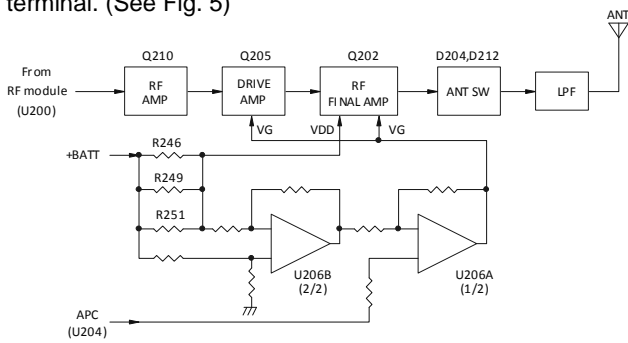


Fig.5

4-4. APC Circuit

The APC circuit always monitors the current flowing through the RF power amplifier (Q202) and keeps a constant current. The voltage drop at R246, R249 and R251 is caused by the current flowing through the RF power amplifier and this voltage is applied to the differential amplifier U206B(2/2). U206A (1/2) compares the output voltage of U206 (2/2) with the reference voltage from U204. The output of U206A (1/2) controls the VG of the RF power amplifier, Drive amplifier and Pre-Drive amplifier to make both voltages the same.

The change of power high/low is carried out by the change of the reference voltage. (See Fig. 5)

5 Control Circuit

The microprocessor (U204) operates at a clock of 13.000MHz.

The control circuit consists of a microprocessor (U204) and its peripheral circuits. It controls the TX-RX unit. U204 mainly performs the following:

- (1) Switching between transmission and reception by the PTT signal input.
- (2) Reading system, tone, frequency, and program data from the memory circuit.
- (3) Controlling squelch on/off by the DC voltage from the

squelch circuit.

- (4) Controlling the audio mute circuit by the decode data input.
- (5) Transmitting tone and encode data

5-1. Low battery warning

The battery voltage is monitored by the microprocessor (U204). When the battery voltage falls below the voltage set by the Low Battery Warning adjustment, the red LED flashes to notify the operator that it is time to replace the battery. If the battery voltage falls even more (approx. 6.0V), a beep sounds and transmission is stopped. (See Fig. 6)

Low battery warning	Battery condition
The red LED flashes during transmission	The battery voltage is low but the transceiver is still usable.
The red LED flashes and a continuous beep sounds while PTT pressed.	The battery voltage is low and the transceiver is not usable to make calls.

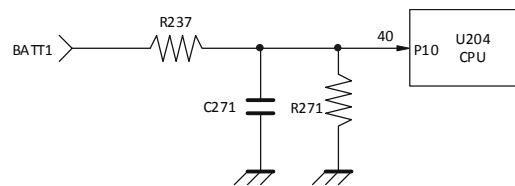


Fig.6

6. Power Supply

Battery +B is supplied via a ferrite chip from the battery terminal connected to the TX-RX unit. After passing through the power switch, power supply (BATT1) is applied to the three AVRs. U201 supplies 5V (5V) to the common circuits, and U206 supplies 3.3V (3.3V) to common circuits.

During transmission, P25 becomes Low and Q211 is turned ON to supply 3T3 (3.3V) to the TX circuit.

During reception, GPIO3 becomes Low and Q213 is turned ON to supply 3R3 (3.3V) to the RX circuit.

(See Fig. 7)

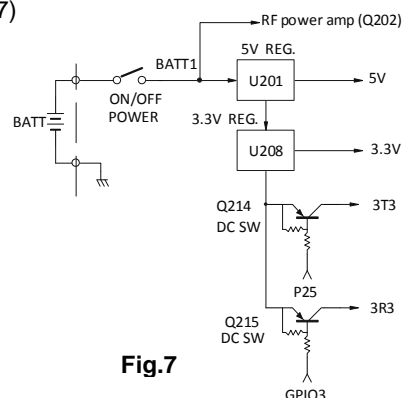


Fig.7