

2 CIRCUIT DESCRIPTION

2.1 TRANSMITTER

1) MIC Amp. Circuit

Voice signal from condenser MIC is amplified in U2. Then, as taking the procedure of Limiting and Low-Pass Filter, this signal keeps the frequency characteristic of +6dB/OCT Pre-emphasis over audio frequency range (from 300Hz to 3KHz) and is adjusted the maximum deviation by VR106. This signal is fed to VCO for frequency modulation.

2) IN SUB-AUDIO operation, through U3, pre-defined and pre-programmed frequency tone is modulated by reference OSC

3) VCO & Amplification Circuit

Signal generated by VCO, and amplified by Q303 is fed to Tx/Rx switching diode, D112.

4) Power Amp. Circuit

Signal amplified by Q107 is fed to U102 and increases more than 4.8W and can be adjusted to standard output using VR104 (HI - POWER) and VR103 (LOW - POWER).

2.2 RECEIVER

1) Antenna Switching Circuit

Received signal from the antenna is fed to antenna switching circuit through Low-Pass-Filter consisting of L103~L105, C161~ C163, C213 and C214. In receiving, D113 turns off and it makes isolation from the transmitter circuit, and the incoming signal is fed to the RF amplifier through L106.

2) RF AMP Circuit

The signal from switching circuit is fed to the RF amplifier Q101 through Band-Pass-Filter that decreases over-the-ranged signal.

3) First Mixer Circuit

The amplified signal is fed to the GATE 1 of the first mixer Q102. And output of VCO is fed to the GATE 2 of the Q102. Therefore the first IF signal of 21.4MHz is taken from the DRAIN of Q102.

4) IF Circuit

The first IF signal is increased by Q103 through FL101, X-TAL filter. And it is fed to U101 consisting of the second local oscillator, second mixer, Limiter, and detector. The second local oscillator generates signal at 20.945 MHz, and it is fed to the second mixer. Then output of second mixer is the second IF signal of 455kHz, FL102 makes that has desired selectivity. Therefore, detected signal is taken from 9th terminal of U101 through limiter amplifying circuit and detecting circuit.

5) Audio and Squelch Circuit

The detected audio signal is fed to speaker via de-emphasis circuit (R170, C209) of 6dB/OCT frequency characteristic and U107, audio amplifier which output is more than 0.4W. VR107 adjusts audio output.

Noise signal from 9th terminal of U101 is fed to 10th terminal through high pass filter circuit. Then it is taken from 11th terminal via internal filter circuit. The output signal of 11th terminal is rectified and fed to 12th terminal. By the way, output signal of 13th terminal is fed to U8 (μ -COM) that makes squelch operation. Also, VR107, external squelch adjuster controls squelch operation.

2.3 VCO CIRCUIT

Output of VCO is generated by DC voltage fed to D301, D302, C303, L302 and D305, D306, L304, C315. In receiving, activated Q302 helps Q303 operate, and output signal is fed to Q102, Mixer through D112. In transmitting, activated Q304 helps Q303 operate, and output signal is fed to Q106, Mixer through D112. And audio output of U2 is deviation limited by VR106, then limited signal is fed to D304 of VCO.

2.4 CONTROLLER

1) Reset Circuit

When turning on the radio, As the charging time of R70, C71 and D05, High pulse of 6mS in Collector of Q4 resets the CPU.

2) Power Circuit

Power is stabilized 5V at U5 and supplied to U1 – U4 and U6 – U8. Rx & Tx power is stabilized by U103. Output of Q111 is Rx power from μ -COM and output of Q110 is Tx power. Also, PLL IC and VCO are stabilized by U104.

2.5 ALIGNMENT

2.5.1 PLL VCO

Connect the Voltmeter to TP4 jack, and adjusting the L302, L304 as following.

| | | |
|-------------|----|------|
| 165.0125MHz | Rx | 2.3V |
| | Tx | 1.8V |

2.5.2 RECEIVER

- 1) Adjust SG to channel frequency 165.0125MHz, and signal level 1mV, 1KHz to 1.5KHz FM, and then connect to antenna jack.
- 2) Connect the Scope to IF DET jack of JP101 and adjust the T105 until DC voltage turns 2.1V.
- 3) Adjust T101~T104 in 165.0125MHz band in detail, find minimum signal level which makes SINAD be 12dB. This time, SQ has to keep turning off.

2.5.3 TRANSMITTER

- 1) In transmitting, reference frequency is adjusted to 165.0125MHz
- 2) Adjust output power to be high (4.8W) by VR203 and low (2.0W) by VR103.



Circuit Description

- 3) Adjust TX frequency in detail using VC101.
- 4) After turn VR105 and VR106 fully (CCW), feed signal of 10mVrms at 1.0 kHz without tone to MIC jack, and adjust VR106 in order that deviation is turned to 2.0kHz(In some tester, use LPF whose band is 15kHz or 20kHz).
- 5) Feed tone 67Hz(CTCSS) and adjust the VR105 until the deviation is 0.39kHz. In this condition, make sure that deviation of CTCSS tone in 67Hz and 250.3Hz is 0.35~0.6 kHz. Also when audio signal of 1kHz and with tone are modulated together, confirm that deviation of CTCSS tone is ± 2.5 kHz or less.

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