CIRCUIT DESCRIPTION For Model WT-0188-JPN

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Transmitter Section

RF Frequency Oscillator(VCO)

Q209 functions as a voltage control clap oscillator (VCO).The frequency is determined by Q209,C264,C266,C262,C267,VD02 & L203.The RF output of VCO is fed to Q208 and output from the Collector of Q208 , fed to PLL IC U201 prescaler RF driver of transmitting by the buffer Q212.

PLL CIRCUIT

U201 on RF PBC is a phase locked loop (PLL) IC. The output of the oscillator Xout (20.95MHz) is input to the programmable reference divider. This 20.95MHz frequency is divided to 6.25KHz as the reference frequency built in the PLL IC.RF frequency from VCO is still divided t o about 6.25Khz by the prescaler built in the PLL IC .The phase difference between the reference frequency and the divided frequency by the presacler will output to the tracking filter(R208,R218, C237,C236, R230, R231,C259 & C260) for locking the frequency. The DC voltage by filtering from the tracking filter is fed the varactor diode to control the VCO oscillator frequency until the VCO frequency is locked. The VCO will be locked at 1/4 of the desired carrier frequency . VC201 on TCXO is used to adjust RF frequency. The choice of TCXO and components is such that the required frequency tolerance is maintained over the required range of temperature and voltage.

RF Amplifier and Power Amplifier

In the transmitter mode, RF signal form the oscillator Q209 is fed to the base of Q212 through the RF driver Q211 by the coupled capacitor ,Q211 is RF amplifier.

Circuits for Suppression of Spurious Radiation

In addition to inter stage filtering the out of final Q211 coupled to the antenna through C277, Duplex CF201 C208, C271 which server both to match and reduce harmonic to adequate level. The RF maximum power is 8dBM.

Modulation and Response

U102 is compandor. The amplified audio signal from pin8 of U102 is fed to VD202 for making F3E modulation.

Circuit for Limiting Modulation

U102 function as a compandor for limiting TX & max RX Audio output .

MCU Controller

U104 on main PCB is a MCU controller. It is used to control the unit in the transmitter (Q103) and / receiver mode (Q106), RX Mute and function control (SW103,SW104).

X101,C132, & C133 function as oscillator (4MHz) for logic control to control the PLL.

Power Supply
U101 is regulator that the output DC voltage is 4V. This stable output is used to feed to VCO circuit, receiver part and PLL part. SW101 is used to control the power supply ON/OFF.

Receiver Section

The receiver is a conventional double conversion superheterodyne with the first local oscillator controlled by VCO operating at frequency 21.4MHz below the received frequency to produce the first IF 21.4MHz and the second local oscillator 20.95MHz to produce the second IF 450KHz.

Local Oscillator
When the unit is in the receiving mode, MCU control PLL circuit to make the VCO frequency is locked at 1/4 of desired carrier frequency. This VCO output is used as the first local oscillator that feed the first mixer(base of Q205 on RF PCB).X201,C234 and the circuit built in U202 is given the second local oscillator.

RF Amplifier
RF signal from antenna is fed to the base of Q201.and output from the collector of it. Then feed to the G1 of Q202 for the first mixing.

Mixer Circuit
Q202 functions as the first mixer. The second mixer is built in the U202(TB31136FN).

IF Amplifier
Q213 functions as the first IF amplifier, which the first IF signal is fed from the first mixer Q202 through C211, and output from the collector of Q213, then through the IF filter F202 to the second IF amplifier is built in U202 (31136FN) through the second IF filter CF203.

Demodulation
T201 and the built circuit of U202 (31136FN) function as the demodulation circuit.

Audio Power Amplifier
U103 is an audio amplifier. The gain of amplifier determines by R132,R133,VR101.

Auto Squelch
When there is Co-channel RF signal ,PIN12 of U202 will output high DC voltage and feed to Q204, which is fed to MCU. MCU output the or low level that making Pin 13 of U102 goes low . The audio is into muting status.VR201 is used to adjust the starting mute point.