

# Circuit Description

## 1. RECEIVER CIRCUITS

### 1-1 ANTENNA SWITCHING CIRCUIT

The antenna switching circuit functions as a low-pass filter while receiving and a resonator circuit while transmitting. It switches the flow of the transmitting and receiving signals.

Receive signals enter the antenna connector and then pass through the low-pass filter (L80 - L82, C81-C85).

The signals are then applied to the antenna switching circuit (D52, D90, L90, C90, C92).

The filter signals are then applied to the RF amplifier.

### 1-2 RF Amplifier Circuit

The signals from the antenna switching circuit are passed through a tunable band-pass filter (D92, L91~L94, C92~C104), and are applied to the RF amplifier (Q27).

Amplified signals are reapplied to the other band-pass filter (D130, L130-L133, C108, C130-C142) to suppress unwanted signals.

The filtered signals are mixed at the 1<sup>st</sup> mixer (Q150) with a LO signal to produce a 21.7MHz 1<sup>st</sup> IF signal.

### 1-3 IF Amplifier Circuit

After passing through the Q150 signals applied to a pair of crystal filters FI150, FI151 to suppress out-of-band signals.

The signal passed through the IF amplifier

(Q151) is applied to the IC170 (pin 16). The IC170 consisted 2<sup>nd</sup>. Local Oscillator, 2<sup>nd</sup> Mixer, Limiter, and Quadrature Detector.

The crystal of IC1 make a 21.25MHz as 2<sup>nd</sup> Lo and it goes out after buffering through the pin 17. The pin2 of IC170 apply 1<sup>st</sup> IF and the 450KHz of 2<sup>nd</sup> IF goes out through the pin 3.

The ceramic filter FI170 select the 450KHz and it apply to pin 5 of IC170 as input, Quadrature Detector detect the AF signal and send it out through the pin 9.

The Quadrature Detector consist of X170, R171 and phase Delay.

### 1-4 SQUELTCH CIRCUIT

The signal goes out via pin 9 of IC170 and after pass C175 its apply to IC190 for noise amplifier input. The amplifier (IC170) consist of R174~R176, C179, C180, then signal apply to the noise detector convert noise signal to DC voltage and then apply to IC360 A/D port at comparator section.

### 1-5 AF Amplifier Circuit

The output signal from pin 9 of IC170 enter to mute circuit of IC260 and after pass through the high-pass filter (IC200C, R271-R273, C264, C265).

After that by LPF filter (R279, C266) more than 3KHz frequency removed and signal on the VR board R1 adjust the amplitude and Q280 is mute circuit. De-emphasis

circuit, consist of R286, C285 and add  $-6\text{dB/oct}$  frequency characteristic, then signals apply to IC280.

The AF power amplifier circuit (IC-280) to obtain the 0.3W of audio output power at 8 Ohm load. The output voice signal from IC280 applied to internal speaker.

## **2. TRANSMITTER CIRCUITS**

### **2-1 MICROPHONE AMPLIFIER, IDC, SPLATTER FILTER**

The voice signal entered via microphone pass through the R253, C254 and pre-emphasis circuit to amplify for  $+6\text{dB/oct}$  pre-emphasis characteristics. Amplified signal by IC200B, pass through the mute circuit (IC260) and after controlling amplitude by IC200A, fed to splatter filter circuit to remove unnecessary signals more than 3KHz. Then signals are applied to the VCO for FM modulation.

### **2-2 DRIVER/RF PWR AMPLIFIER**

The output signal from VCO circuit pass through the T/R switching circuit (D50) and is amplified at the Q50, Q53 and Q54.

After buffering by Q50, signal applied to driver amplifier (Q53, Q54) and RF power amplifier circuit.

The APC circuits keep stable RF power output by Q53, Q54 and IC50 (APC circuit).

### **2-3 APC CIRCUIT**

The APC circuit (IC50) protects the power amplifiers form excessive current.

## **3.VCO, PLL CIRCUITS**

### **3-1 VCO CIRCUIT**

During transmission, varactor diodes D22, D23 and then L22, C26, C27 decide the oscillating frequency. The voice signal applied to D20 and FM modulation accrue. During receiving, D21 is ON and circuit will be short to ground through D20, R23 and Q20, then frequency of VCO oscillate will be shift to lower frequency.

The VCO outputs from Q21 and Q22 are applied to the buffer amplifier (Q23).

### **3-2 PLL CIRCUIT**

The PLL circuit, using one dual PLL IC (IC1) and it has consisted a pair of pre scale, program counter, and phase comparator and charge pump circuits. The reference frequency (21.25MHz) is oscillated by X1. During transmission and receiving, signals pass through the R8 - R10, R22, C10, C11 and C24 as PLL loop.

## **3. POWER SUPPLY CIRCUIT**

On VR board, turn on the R1 switch, then the 7.2 volt feed to VCC line via power line. There is a regulator (IC 220) to apply 5V for CPU.

From CPU 5VS signal pass through the Q223 - Q225 and by send signal Q24 and Q25 make the transmission 5V (T5) and via Q22 and Q23 receiving 5 volt (R5) accrue.