

## Circuit Description

### 1. Specations

COMMUNICATION FM TWO-WAY  
OPERATING FREQUENCY : FM433.925MHz  
MODULATION TYPE : FSK  
MODULATION DEVIATIONSTD 3KHz  
ANTENNA IMPEDENCE OF R/C50¥Ø  
FREQUENCY STABILITY;¼5ppm(-10;É ~ +50;É)..  
BRAIN OPERATING VOLTAGE 12V DC from CAR Battery  
DIMENSION BRAIN: 135(W)X90(H)X33(T) ( mm )  
OPERATING TEMPERATURE -20;É ~ +70;É

## Technical Theory

### 1. General

Air-X5000B designed to use 12V DC of a car battery.  
And its operationg frequency is from 433.925MHz  
The Receive part of Air-X5000B is Double Super Heterodyne and the Transmit part is Transistor.

### 2. Circuit Description

#### 1) RF section

##### Antenna

The antenna system for the Air-X5000B is formed by the metal helical ANT1 in series with capacitor L1. Capacitor C2 matches the antenna impedance and RF amplifier. By adjusting C3 , the antenna can be turned to the Air-X5000B's operating frequency.

##### Front-end

The signal out of C2 is injected into a 2-stage common-base amplifier Q1 and Q2 which typically has 13dB gain. The first stage has about 8dB of gain and the second stage about 5dB. This topology affords a stable design without the need for neutralization as well as a reasonable input impedance level 50ohm. The input of Q1 has a broadband match which optimized the stage noise figure. The output of this stage is matched to 50ohm using C7.

## Local oscillator

The local oscillator signal is derived from a crystal controlled oscillator circuit using crystal X3 as a reference. Crystal X3 is a highly stable part over temperature and operates at 45.83556MHz.

An adjustment circuit consisting of L31 and VC1 is used to set the Air-X5000B to the desired channel frequency. Transistor Q5 provides the gain needed for oscillation and the 9th harmonic (9fo) output of Q5 is injected into the multiplier via C32&C33.

## First mixer

The signal out of filter F1 is injected into the base of the mixer transistor Q3 and capacitor C12. Q3 is a static part, handle with the proper static precautions. The mixer input is matched to the filter with the network consisting of C54, L52, and C55. This network also provides 5dB of image rejection.

Inductor L5 is used to supply bias to Q3.

The output of the mixer is matched to the crystal filter F2.

## TX PART(Q8,9,10,11)

### TX Local oscillator

TX local oscillator signal is derived from a crystal controlled oscillator circuit using crystal X4 as a reference. Crystal X4 is a highly stable part over temperature and operates at 48.13888MHz.

An adjustment circuit consisting of Q11, X4, L20 and VC2 is used to set the Air-X5000B to the desired channel frequency. Transistor Q11 provides the gain needed for oscillation and the 9th harmonic (9fo) output of Q11 is injected into the multiplier via L19&C57. Q9 and 10 are for tuning and buffer transistor of 433.925MHz. Q8 is for TX power amplifier

## 2) DIGITAL SECTION

### Microprocessor(MPU)

The Air-X5000B is controlled by the microprocessor. The microprocessor has clock which generated by the 8MHz crystal.

Microprocessor has ROM, RAM, A/D converter, In/Out port, SIO and LCD driver

When power is applied, the microprocessor operates (with lamp) by using the I/O port, then address data is send to address register of decoder IC.

When data is applied from decoder, the information in the microprocessor is displayed on the LCD with the internal operation

The operation of key is detected by using the interrupt I/O port.

