

THEORY OF OPERATION

General

This product is a weather Radio with indoor thermometer and one remote thermometer, it is also a clock.

Weather Radio Band

1. PLL and VCO Circuit

The VCO circuit is oscillation circuit (Q10, Q11) whose frequency is controlled by a DC level from the PLL IC U2, the MCU U5 control the reference frequency of the PLL and this frequency couples to the mixer circuit.

2. RF and IF circuit

The RF signal picked up by the telescope antenna and couple to the mixer circuit Q3 through bandpass filter C2/L1, C4/L2, C9/L4 and C12/L5, the RF amplifier circuit (Q1/Q2), here the RF signal and the VCO frequency mixed out a IF (10.7 MHz). This IF feeds to IF detector U1 through the IF filter CF1 and IF amplifier Q4, then audio output to audio amplifier U3 and FSK detector circuit U6 and a digital signal (WASAME) is outputed to MCU.

Micro Control Circuit

All the operations are controlled by the MCU U5. When the unit is powered up, it should detect that the power is DC or AC, if the power is DC, the EL backlight will not be on continuous, if the power is AC, the EL backlight is on continuous. All the audio and tones is feeded to audio amplifier U3, the audio is amplified in U3 and sent to the speaker. Whenever the unit is in any mode, if alert signal comes, the MCU U5 should detect the FSK code and sent the alert tone and drive the LED display (LED1, LED2, LED3).The MCU U5 controls U9 to toggle the keys/switches function and LCD display.

Indoor Thermometer

Thermister R83, VR5, Q15, Q16, Q40 forms a oscillator. The oscillation frequency is changed when the temperature changes. The frequency is feed in MCU U5 and displays temperature on LCD1. The sample cycle is 10 seconds.

Outdoor Thermometer

The thermister R228, C201 and MCU U201 on remote sensor form a temperature detect circuit. Then U201 send data from pin24 to turn on RF oscillator formed by Y202 and Q202.

Q202 RF signal is sent to Antenna through C204, C203. Q27, Q6 on main unit forms a received circuit, It demodulate the data from remote sensor and feed into MCU U5. U5 displays remote temperature on LCD1. The sample cycle is 30 seconds.