

Technical Report
Transmitter Model XP7202
FCC ID# BRWXP7202

3.2 Block Diagram

(Reference is made to Figure 5.1)

The (up to) four control potentiometers are at the down left side of the schematic drawing.

The control potentiometer, which is mechanically coupled to the control (joy) stick, is supplied with the regulated 5.0V voltage. The wiper on this pot is exactly centered in the neutral control stick position. All analog processing is performed as deviations from this center (reference) voltage.

After the mixing of each channel, control voltage is changed to Pulse Train, through encoder circuit.

The Q11(2SC4519) is an LC-type VCO(Voltage Controlled Oscillator), which is designed to oscillate with about 72.550MHz. Its output is led to amplifying stage for transmitting through a buffer(Q12), while it is also led to the PLL through a buffer(Q13). The pulses generated by the CPU are transferred to the VCO so as to modulate the radio wave. this part is strictly shielded from electric/magnetic noise.

The IC3(BU2630F) is a PLL(phase Lock Loop).

Exact 13.000MHz is generated by an internal crystal oscillator, and divided by 5,200 for 2.5kHz.

VCO wave is also divided by a definite number, which is 29,004 in case of 72.510MHz, for getting 2.5kHz.

Two 2.5kHz's are compared in the phase and the VCO is so controlled that the error gets minimum, while the modulation is so fast that the filter between the PLL and the VCO cancels an error fluctuation.

The set up of the frequency is done with Encoder unit. This frequency data is stored in the IC(H8/HD64F368FP) as an above-mentioned dividing number, and transferred to the PLL as the serial data while the transmitter is in normal operation mode. Frequency data can be changed only in system set-up mode with the power of the RF section being cut. Directly after it has turned on normally, though the CPU starts sending the PLL the data, the radio wave is still silent because the RF amplifier (Q1,Q2) is not supplied with the power yet. After a while, certain stabilizing time for the PLL, the Q4(2SA1298) starts to supply them with the power so that the radio wave is transmitted.

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The modulated signals supplied from Transmitter are PCM and PPM, and this modulated signal data is Set by IC(H8/ HD64F368FP). The modulated signal is conducted through phase-modulator, and the deviation value of the center frequency is fixed and changed by the wave form, symmetric in PCM and asymmetric in PPM. (For example, deviation in PCM is 0, the deviation in PPM is about 1.1KHz) This deviation value is supported by varying the impressed voltage to D6 (HVC350B).

Q2 drives the Power Amplifier (PA). The straight-through PA stage(Q3) is followed by a matching and band pass/low-pass network. This network matches the low PA stage output impedance to the whip antenna.

DC Supply Voltage enter the RF section: 12 Volt "law" battery voltage supplies the PA stage only. PLL stages, and bias current for all stages, including the PA, are derived from the regulated 5.0 Volt.

4.0 FAILURE ANALYSIS

A failure analysis was conducted to ascertain that single-component failure will not result in unauthorized radiation.

It should be noted that component failure would result in return of the unit to the factory, or to an authorized repair station.

(Reference is made to Figure 5.2, Transmitter Schematic Diagram)
Failure of any of the transistors (predominant failure mode: emitter-collector short) will result in the unit becoming inoperative: In the case of Q11 oscillator short, RF output will be non-existent. Q12, Q1, Q2 or Q3 failure will result in very low, if any, output.

Failure of the MOD IN input (latch at 0 or 12 Volt) or modulator transistor Q9, Q10 and variable diode D4 (open or short) will result in carrier frequency.

Although this failure would render the unit inoperative, the frequency tolerance would still fall within the channel bandwidth and tolerance requirements of .002% of 72 MHz = 1.44 KHz.

When PLL circuit is broken, for example, crystal X1 break down, or IC101(BU2630) for PLL is broken, PLL will stop functioning.

All other incidental failures will render the unit inoperative and because for return of the transmitter to the service facility.