CIRCUIT DESCRIPTIONS

Pursuant to 47CFR 2.1033(c)10

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CARRIER FREQUENCY GENERATION AND STABILIZATION

The Station Reference Circuitry consists of a Phase-Locked Loop comprised of a high-stability VCO and a PLL IC. The output of the loop is a 16.8 MHz sine wave signal which is fed to the DSP ASIC, which divides the signal by 8 and outputs a 2.1 MHz sine wave signal. The 2.1 MHz sine wave is then split and output to both the Exciter Module and the Receiver Module as 2.1 MHz REF. The carrier is generated by the PLL and VCO loop in the Exciter Module using the 2.1 MHz REF from the Control Module.

During normal station operation, the Station Reference Circuitry control voltage is turned off (via control voltage enable switch) and the high-stability VCO operates in an open loop mode. Stability of the VCO is ±1 PPM. Periodically, a calibrated external frequency counter and the Radio Service Software may be used to fine-tune the VCO. This procedure is covered in the user's manual.

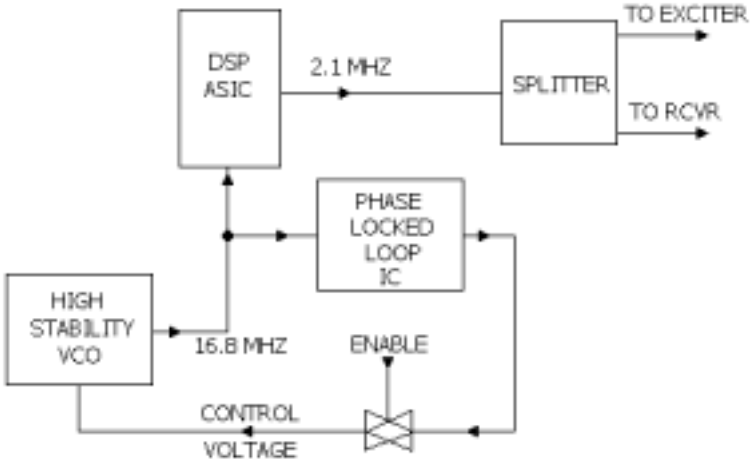

Figure 1: Reference Circuitry

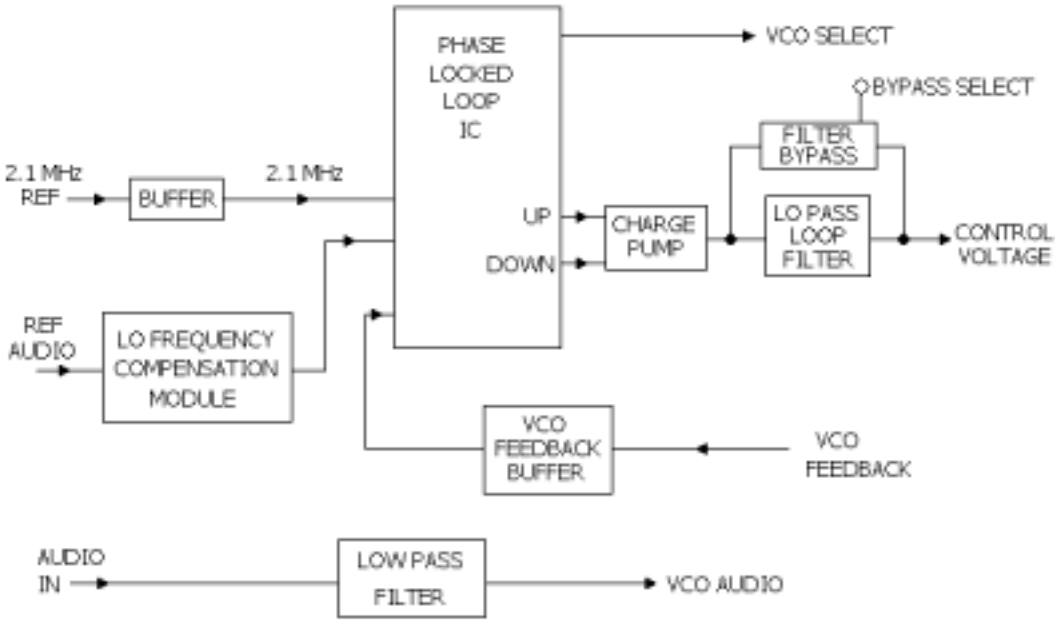

Figure 2: Phase Locked Loop Circuit

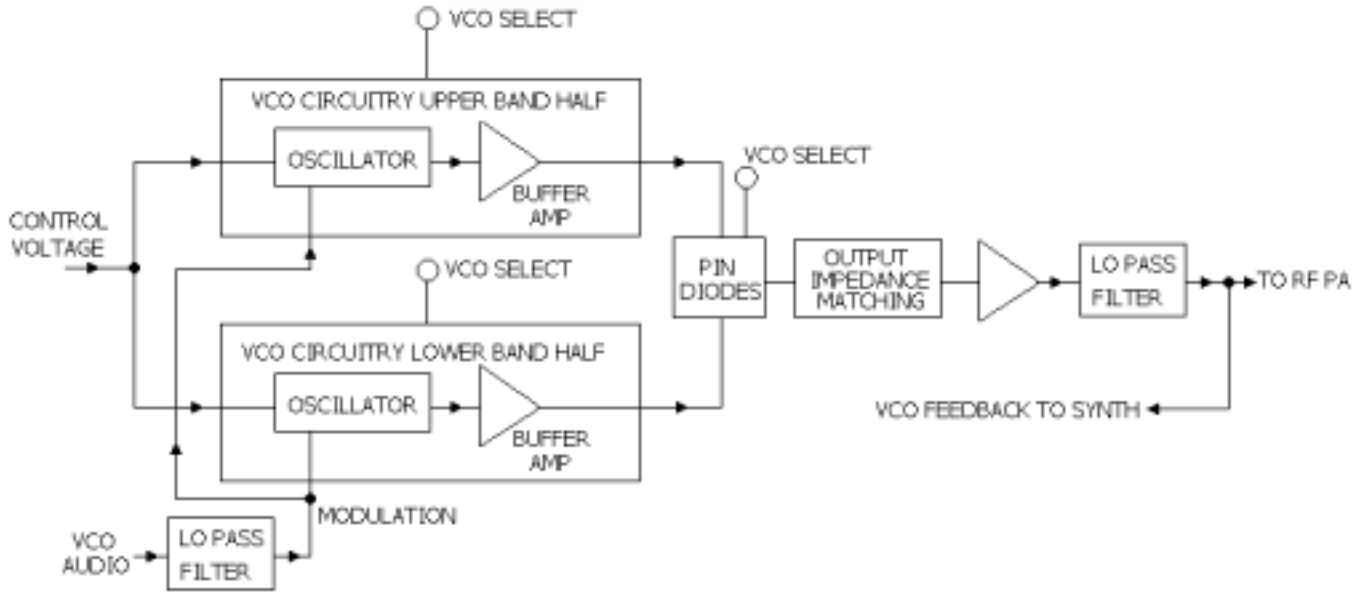

Figure 3: VCO Circuitry

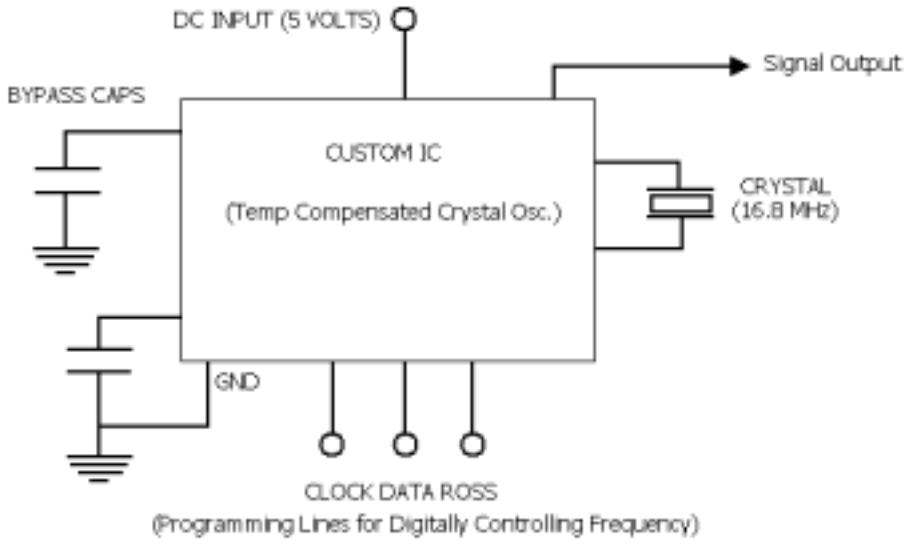

Figure 4: Reference Oscillator

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MEANS FOR LIMITING MODULATION

The transmitted audio is processed using software algorithms in a digital signal processor (DSP) that automatically prevents modulation in excess of 100 percent. This device, an “instantaneous deviation control” (I.D.C.) software algorithm, precedes the frequency modulator of the transmitter. The I.D.C. software algorithm instantaneously controls the modulating waveform applied to the modulator.

Audio signals from the station receiver or from a remote control console (coming to the station via a telephone wireline pair) are applied to the DSP transmit audio software. The software algorithm acts as a symmetrical clipper which clips positive and negative peaks over a predetermined value. It is preceded by audio summing software which causes any audio signal selected for transmission to be routed through the deviation limiting software. The output of the deviation limiting software is adjustable to produce the maximum channel deviation. The adjusted signal from the deviation limiting software is applied to the splatter filter which reduces the higher frequency content of this signal as is required. The splatter filter is another software algorithm whose output is sent to the modulator as shown below.

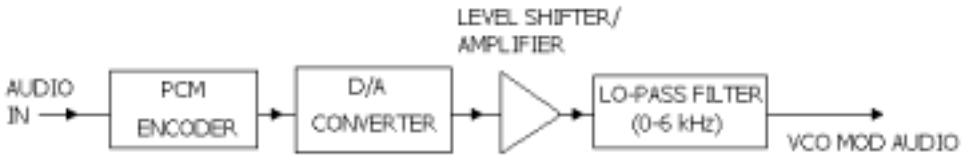

Figure 5: Audio Filtering Circuitry

MEANS FOR OUTPUT POWER LIMITING

A feedback and control loop configuration is used to regulate the Power Amplifier (PA) output power. The Directional Coupler generates a DC voltage proportional to the PA Module output power. This voltage is fed to the TX Power Control Circuitry in the Exciter Module. The Forward Voltage is then compared to calibrated reference voltages and a DC power control voltage is generated.

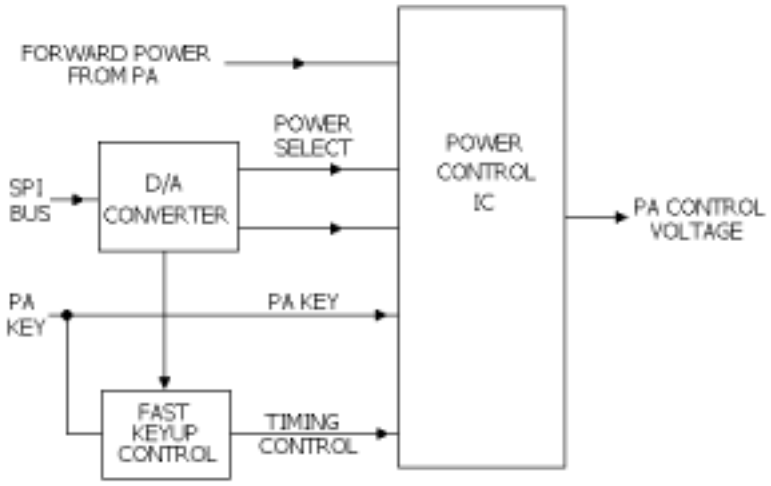

Figure 6: TX Power Control Circuitry

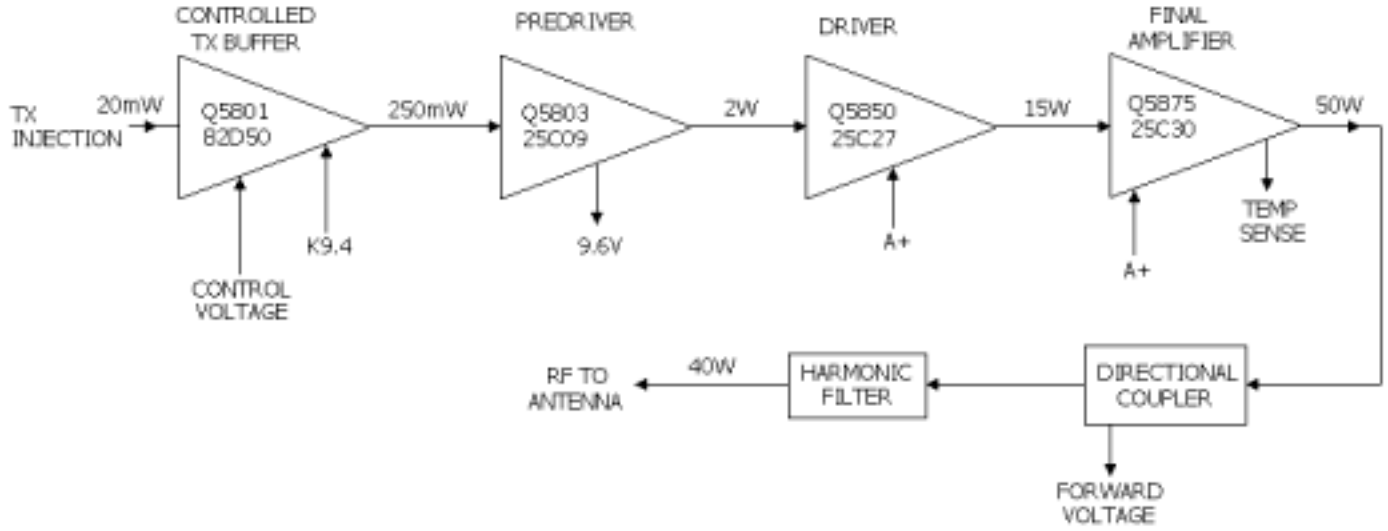

Figure 7: Power Amplifier Circuitry

SPURIOUS AND HARMONIC EMISSIONS LIMITING

Spurious and harmonic emission suppression is accomplished by using a passive low pass filter inserted between the output of the transmitter and the antenna port. Additional spurs are eliminated with the proper shielding of RF circuitry.