

## CT-X and CT-45 Operational Overview

The Cornerstone Transmitter CT-X and the Cornerstone Amplifier CT-45 are designed to work exclusively together.

### Cornerstone Transmitter CT-X

The CT-X is powered by a regulated 5.0 VDC power adapter.

There are four regulated internal voltages:

- 3.3 VDC for the digital ICs
- 3.3 VDC for the Direct Digital Synthesizer
- 1.25 VDC for the Digital Signal Processors
- 3.4 VDC for the liquid crystal display backlight

The operation of the CT-X is controlled by the main digital signal processor (DSP) in conjunction with two other DSPs. The audio enters the transmitter through two balanced line inputs on the front of the transmitter and four RCA jacks on the top of the transmitter.

Op amps are used to adjust the gain and protect the analog to digital converts.

Analog to digital converters (ADC's) digitize the audio at 24 bits, 96 kHz.

The digitized audio is then processed by the audio DSP in the following order:

- Mix the audio inputs to the Left and Right channel
- Apply compression
- Apply pre-emphasis filter
- Apply 15kHz low pass brick wall FIR filter
- Send the Left and Right audio to the Direct Digital Synthesis (DDS) DSP

The DDS DSP does the following:

- Configure the DDS to output the specified carrier frequency
- Synthesize a 19 kHz pilot tone and 38 kHz stereo tone at 384 kHz
- Modulate the carrier frequency with the L+R, 19 kHz pilot, L-R (38 kHz), and any SCA frequency

The DDS has a base clock frequency of 16 MHz supplied by a temperature compensated crystal oscillator.

The DDS has an update frequency of 384 kHz.

The output of the DDS is the modulated carrier.

The output of the DDS then goes through a 150 MHz low pass filter and to the CT-X RF output.

### Cornerstone Amplifier CT-45

The CT-45 uses an internal power supply to generate 12 VDC and 5 VDC from 120 VAC or 220 VAC.

The CT-45 is controlled by a 8 bit microcontroller in conjunction with the CT-X.

The RF output of the CT-X is connected to the RF input of the CT-45.

The CT-45 requires a Digital IO cable to be connected to the CT-X at all times for the final amp to operate.

RF input goes directly to a PLL following filter to remove all artifacts generated by the CT-X DDS.

If at any time the PLL loses lock, the final amplifier will turn off.

The output of the PLL following filter goes directly to a variable gain 1 Watt amplifier.

The output of the 1 Watt amplifier goes directly to the input of the pallet amplifier:

Delta RF Technology  
Model: P50-FM-30  
30 dB Gain  
Low Pass Filter

The output of the pallet amplifier is connected to the SWR board.

The output of the SWR board exits the transmitter at the N-Type RF connector.