

# UST 106 PRO RETROFIT KIT

## THEORY OF OPERATION

### **Introduction**

The UST 106 Pro is comprised of a solid state RF amplifier, Power supply, RF Filter to reduce spurious products and harmonics, and hardware kit to assemble the entire unit. The purpose of the kit is to replace the tube and cavity assembly that was part of the original equipment.

### **System Operation**

The UST 106 Pro is designed to easily replace the existing tube amplifier and cavity assembly from a physical and operational point of view. The solid state power amplifier accepts the combined visual and aural on-channel RF signal from the upconverter at approximately 200 mW and amplifies the signal to the 100 watt rated visual power level and 10 watt aural power level.

The RF filter accepts the on channel signal produced by the solid state amplifier and reduces the level of any out of channel intermodulation, harmonic, or spurious signals as viewed at the output ensuring compliance with all FCC regulations.

The power supply converts the AC line voltage to a filtered DC voltage that is held constant independent of modulated RF waveform type and overall load.

The power output control of the system continues to operate in the normal method as before the replacement of the tube and cavity system.

Cooling is provided by an integral fan that is part of the amplifier module itself so no additional cooling is required.

### **Solid State Power Amplifier**

The solid state amplifier consists of 2 stages of amplification using LDMOS technology. The amplifier is placed into operation by a circuit breaker switch located on the outside of the unit. The signal from the upconverter is applied to the driver stage. The class A driver stage serves as a low distortion linear amplifier that increase the combined visual and aural signal roughly 13 dB. This signal is routed to the parallel configured final amplifiers. The signal is split equally between 2 amplifiers and recombined to produce 100 watts of visual peak power and 10 watts of average aural power. The driver and final amplifier transistors receive 28 volts DC from the power supply. VSWR protection is provided in order that the transistors are not damaged from high reflected power operating conditions. An integral AC fan provides direct cooling air to the heatsink to

ensure that the heat is removed efficiently from the PA module. The fan should be periodically cleaned to ensure reliable operation. The air filter on the fan should be examined and cleaned as necessary. The heatsink temperature is monitored and whenever it exceeds 64 degrees C, the front panel LED indicator is illuminated and the module shuts off. When the temperature decreases back to 53 degrees or less, the module automatically re-enables to the On state. Because the PA unit is broadband, it requires no tuning or adjustments. Two amplifiers are used to cover the entire UHF TV band.

### **Power Supply**

The power supply architecture is a 28 volt DC power supply. The unit accepts a 110 or 220 volt 50/60 Hz source and is determined by a switch available from the outside of the unit. The output voltage is tightly regulated in order to eliminate any amplitude modulation on the output RF signal. Current limit protection is built in to the power supply should it accidentally encounter a very high current demand. The output voltage range is adjustable from 26 to 29 volts and is set by an adjustment located on the rear panel of the power supply. The power supply is cooled by an internal fan. Power connections are made between the power supply and the power amplifier unit by mating plug connectors.

### **RF Filter**

The RF filter is an 8 section bandpass filter designed to pass signals in the designated channel and reject all others. Connections for the RF input and output are made through 50 ohm Type N connectors. The number of sections of the filter does not permit field tuning of the filter without the use of a tracking generator and spectrum analyzer or network analyzer. The filter has approximately 1.0 dB insertion loss in the desired channel.