

# XL1000 PRO RETROFIT KIT

## THEORY OF OPERATION

### Introduction

The XL1000 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, along with support equipment for the assembly, that was part of the original equipment.

### System Operation

The XL1000 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 4 watts and amplifies the signal to the 1000 watt peak visual power level and 100 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 measured at the output connector 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.

An exhaust fan on the top of the cabinet provides cooling for the system. Cool air is drawn through highly reliable fans in the individual amplifier modules and exhausted at the back of the amplifiers. The exhaust fan pulls the warm air from the amplifiers up to the top of the cabinet. In addition, cool air is drawn through the rear panel of the system and exhausted at the top of the cabinet.

### 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 front of the power supply chassis. The signal from the upconverter is applied to the driver stage. The class A driver stage serves as a low distortion linear amplifier that increases 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 1000 watts of visual peak power and 100 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. Integral AC fans provide direct cooling air to the amplifier heatsinks to ensure that the heat is removed efficiently from the PA modules. The air filter on the fans 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 consists of 28 volt DC switching power supplies. The unit accepts 220 volts from a 50/60 Hz source. 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 internal fans. 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.