

Section III - Overview

Standard Features

- Narrow output bandpass filter allows adjacent channel operation
- Front panel Liquid Crystal Display (LCD) to monitor forward and reflected RF power, and DC voltage
- Microcontroller-based monitoring and control ensures amplifier will never be overdriven and high VSWR will not damage amplifier
- AC circuit breaker on back panel to eliminate replacement of fuses
- All aluminium enclosure maintains power amplifier's light weight
- Simple design using commonly available parts ensures reliable operation
- Predominate and third-order intermodulation distortion exceeds Industry Canada and FCC specification.

Principle of Operation

The TAV-1000 power amplifier supplies a 1000-watt peak video signal with 10% aural power on any of the VHF television channels 2 through 13. Please note that channel selection must be made at time of order, as the transmitter or translator is calibrated and tested to the channel requested and is not field tuneable. The TAV-1000 power amplifier is a modular solid-state 1000-watt broadcast amplifier utilizing readily available RF components wherever possible, thus enhancing the serviceability of the equipment. The TAV-1000 features ultra linear amplification and individual channel RF output bandpass filtering. The amplifier modules are stable for high reliability and long service life.

The amplification of the TAV-1000 is comprised of (2) TAV-500 500-watt power amplifiers. Firstly, the output of the modulator or processor gets split into (2) RF signals of equal amplitude. Each output of the 2-way power divider is then fed into a TAV-500 Power Amplifier. Finally, the outputs of each TAV-500 are combined to generate 1000-watts of peak visual power in addition to an aural carrier, as seen in the TAV-1000 block diagram.

TAV-1000 block diagram PDF inserted here.

Inside each 500-watt power amplifier, the signal gets split into (2) signals for final amplification using a 2-way Wilkinson power divider. The final amplification stage is comprised of (2) P400-VHF-L or (2) P400-VHF-H final amplifiers, for low or high band VHF, respectively. The outputs of the (2) final amplifier pallets are combined with a 2-way Wilkinson combiner and pass through a dual directional coupler for protection and monitoring purposes, as illustrated in the following TAV-500 block diagram.

TAV-500 block diagram PDF inserted here

After amplification, the signal exits the power amplifier enclosure and goes into the combiner/filter enclosure, where the signals from each 500-watt amplifier are combined. After combining, the amplified signals are filtered with a bandpass filter and monitored again with another directional coupler before heading out to an antenna for broadcast, as depicted in the following combiner block diagram.

Combiner block diagram PDF inserted here.

Specifications

The following specifications were taken with a Technalogix modulator/processor. Should a different modulator or processor be used, specifications could vary. For this reason, we recommend that any different modulator/processor be shipped to Technalogix so the system can be matched and set up optimally. In addition, the audio/video ratio the input to the power amplifier needs to be -10 dB in order for the software and LCD readout to be accurate. All specifications below were taken with the audio/video ratio set -10dB.

RF Characteristics

Frequency range	any specified VHF Channel 2 to 13
Frequency Response (one channel)	±0.5 dB
Frequency Stability	±250 Hz
Selectivity	60 dB (adjacent channel)
Minimum Input Level	0 dBmV
Rated Visual Output Power	1000 Watts
Rated Aural Output Power	10% of peak visual power
IF Output Level	-12 dBm nominal
Input Impedance	75 Ohms
Output Impedance	50 Ohms
Harmonics	> 60 dB below rated power
Predominant Intermodulation Distortion	dBc = decibels below visual carrier
+ 920 kHz	> -53 dBc
- 920 kHz	> -53 dBc
+ 2.66 MHz	> -53 dBc
- 2.66 MHz	> -53 dBc
+ 5.42 MHz	> -53 dBc
+ 7.16 MHz	> -53 dBc
3 rd Order Intermodulation Distortion	
- 4.5 MHz	> -60 dBc
+ 9.0 MHz	> -60 dBc
All others	> -60 dBc
Spurious Emissions	> -60 dBc

NTSC Video Characteristics

Input Level to modulator (for 87.5% modulation)	1.0 V _{pp} (100IRE + 40IRE sync)
Differential Phase (at 87.5% modulation)	±2 Degrees
Differential Gain (at 87.5% modulation)	2%
Group Delay	< ±40 nS
Video Group Delay Pre-emphasis	Conforms to IC/FCC specifications
K-Factor	1.9% for 2T Pulse
Hum and Noise	> 60 dB below rated power

Aural Characteristics

Input Level for 25 kHz Deviation	0.3 V _{PP}
Frequency Response (Standard Pre-emphasis)	±1 dB
Harmonic Distortion (25 kHz Deviation)	< 1% 50 Hz to 15 kHz
Amplitude Modulation Noise	> 50 dB
Frequency Modulation Noise	> 60 dB
Intercarrier Stability	±250 Hz

Physical Characteristics

Power Requirements	
Power Supply	230 V _{AC} , 30 A _{AC}
Combiner / Filter	115 V _{AC} , 2 A _{AC}
Operating Temperature Range	0°C to 50°C
Dimensions	
TAV-500 Power Amplifier (each)	W-19" flange (17" encl.) , D-25", H-8 3/4" (5U)
Combiner / Filter	W-19" flange (17" encl.) , D-25", H-8 3/4" (5U)