

MPA Series Power Amplifiers

General Test Procedures

Test Procedure

Test Equipment Requirements & Set-Up

Connect a test load to the output terminals of the amplifier. Test loads must handle at least 200W-8 Ω , 300W - 4 Ω , and 400W - 2 Ω .

Connect a distortion analyzer with a resolution of 0.05%, 20-20kHz or better to the output terminals of the amplifier.

Connect the output of a signal generator to the input terminals of the amplifier, and select an output voltage of 1 Vrms @ 2kHz.

Connect a dual channel oscilloscope to the following test points:

- - a 10x scope probe to the channel speaker output - sensitivity 2V/cm
- - a 1x scope probe to the distortion analyzer output - sensitivity 0.1V/cm

Ground the oscilloscope and distortion analyzer to the amplifier's input ground.

Power Up

Set the amplifier's gain controls to full clockwise.

Slowly increase the variac voltage and watch for excessive current draw (Line current greater than 0.75 amps at 120V.) NOTE: MPA 750 & 1100 - make sure the fan is ON by the time line voltage reaches 120VAC. MPA 275, 400, & 600 - fan will remain off until unit heats up.

Turn the unit on and off several times to verify the 1.5 second power-up delay-

Check both channels for normal output signal.

Bias Adjustment

Apply a 20kHz input signal and select an 8 Ω output load.

Adjust the input signal or CH1 gain control for an output level of 20dB below full output.

Using the analyzer's distortion output, set the crossover trimpot TR3 (a&b) for a crossover spike barely

protruding from the noise signal. (distortion must be less than 0.08% THD.) Repeat for channel two.

Set the output loads to 4 Ω and verify that the output distortion is less than 0.1%.

NOTE: If a distortion analyzer is not available, a less accurate distortion setting can be made by monitoring the driver transistor bias current. With the unit at operating temperature and no input signal, adjust TR3 (a&b) to obtain a voltage of 90mVDC across the emitter resistors of the drivers.

2 Ω Short Circuit

Select a 4 Ω load and verify even clipping on both channels. Select a 2 Ω load, which will show substantial clipping. Adjust the GAIN control to the threshold of clipping. Adjust trimpots TR1 (a&b) and TR2 (a&b) for a small amount of current limiting at the peaks of the output waveform.

Apply a short circuit to the output of the channel. The AC line current draw should be approximately 3 - 4.5 amps (rms) per channel.

Frequency Response

Select an 8 Ω load on both channels. Note the output level just before clipping.

Note the exact 2kHz level, and compare it to the 20Hz and 20kHz output (20Hz -0.4dB max, 20 kHz -0.5dB typical, 1dB max.)

Thermal Shutdown

Set the oscillator frequency to 2kHz and short the output of both channels. The AC current draw should be between 5 and 6.5 amps. Do not allow the test to continue if the AC current rises above 9 amps. Recheck the bias setting if this occurs.

When the thermal shutdown occurs, verify an AC idle current of 0.75 - 1A. Allow the amplifier to cool down and recover from the thermal cycle. The amplifier must be able to recover into a 4 Ω load.

Return the output load impedance to 8 Ω .

crossover distortion (both often show some ringing,) and overall distortion.

•Signal distorted, with some high frequency oscillation on the waveform, usually worse at some particular point on the waveform:

This is often created by a change in the output impedance. Look for: open/short C914-916, 951 bad U901-902, or contaminated sockets

•Excessive crossover spike or oscillation at zero crossing:

Look for:

- shorted bias diodes D903-904
- defective trimpot VR901
- open pull up resistors on the output, R927 & R955

If the distortion is present with no output/no load, check the feedback components. The amplifier will not provide full power into a load. Look for:

- current limiting (VR902 & 903) set too low
- open output transistors (base-emitter or emitter-collector)
NOTE: check the driver transistor gain. Check voltage dropped across the output transistor emitter resistors, R927-928, with an input signal and an output load. Any resistor that has a significantly different voltage drop indicates a defect in the corresponding output transistor or the emitter resistor.
- shorted D951,965
- shorted FETs
- Bad step SMT board

•No output signal from a single channel with all power supplies balanced:

Often caused by a failure in the input circuitry.

- defective U901 - It is not practical to test the IC, but it is possible to check for signal presence at the input and output terminals of the IC
- damaged or defective resistor network RN909
- defective input connector or input wiring multi-conductor cable

Protection/Limiting Circuit Problems

NOTE: the output of these amplifiers is AC coupled through the filter capacitors. This eliminates the need for DC load protection. A PTC (Positive Temperature Coefficient) sensing resistor is mounted on the main heatsink. This component's resistance increases with increasing temperature. When the resistance of these temperature dependent resistors increases to approximately 10k Ω , the protection circuit will disable both channels. Look for:

- bad U901 -902, U101 (on display board)
- bad U910
- shorted Q934

U910 is an SMT board that houses most of the parts of the protection circuitry. If there is a problem with the board, the proper solution is to replace the board. This can be done, but extreme care must be given to this operation. There are delicate traces and eyelets that will be permanently damaged if this board is not removed properly, with the right desoldering equipment.

The protection circuit functions performed within this board are muting, thermal shutdown, DC, and high frequency shutdown. Refer to the schematic for the connect/sense pins on U910.

These pins have signals that monitor and control the status of the amplifier's protect and limit features. Pin T1 is powered by an unregulated power supply through B901. If one channel does not come out of mute, T1 may not be receiving the voltage necessary to bias the transistors in U910, leaving the channel disengaged via the output relay.