

T e s t & C a l i b r a t i o n

NOTE: This test procedure will refer to the amplifier's channels as Ch1 (Channel 1) & Ch2 (Channel 2). Component designation will have the prefix "5" for Ch1 and "6" for Ch2.

MPC200 / MPC200T Test Procedure

- **SETUP**
 1. Connect a test load to the output terminals of the amplifier.
 2. Make sure the Stereo / Bridge switch is set to the Stereo position.
 3. Connect a distortion analyzer with a resolution of 0.05%, 2020kHz (or better) to the output terminals of the amplifier. Enable the 80kHz low pass filter.
 4. Connect a dualchannel oscilloscope to the following test points:
 - Ch1 a 10X (vertical sensitivity 2V/cm) scope probe to the channel speaker output.
 - Ch2 a 1X scope probe (vertical sensitivity 0.1V/cm) to the distortion analyzer output.
 5. Set amp gain pots fully clockwise and turn on power switch.
 6. Connect the output of the signal generator to the input terminals of the amplifier and select an output of 0.96 (0.98 for MPC200T) VRMS, 1KHz sine wave.
 7. Plug the amplifier in to a variac and set up an AC line current monitor.

- **POWER UP & MUTE DELAY TEST**
 1. Slowly raise the variac voltage and watch for excessive current draw (Line current greater than 0.5A a.c. at 60 Volts). *This is slightly less for 240V.* Pause at 90VAC (200VAC European) for three seconds until the mute / protect circuit disengages. Continue to 120VAC (240V European).
 2. Turn the power switch off and on a few times to verify the 1 3 second powerup muting delay. Check both channels.

- **CHANNEL OUTPUT**
 1. Look for amplified signal on the scope for channel 1. Switch the input signal and scope to channel 2 and repeat output test. Check for noisy / contaminated gain pots by observing general instability on the distortion waveform while adjusting the gain control levels.
 2. Select an 8 ohm load and confirm with the gain controls that this amplifier is producing a minimum of 170 watts at 1kHz just beyond the point of clipping (1.0% THD+N). Check both channels.

- **BIAS ADJUSTMENT**
 1. Let the amplifier cool down to room temperature.
 2. With an input amplitude of 1Vrms, increase the input frequency to 15kHz. Reduce the input signal 20dB (80%) from full output. For the first channel to be calibrated, adjust the crossover trimpot R512 for about a 400mVpkpk crossover spike protruding from the

noise trace on the oscilloscope. It will be necessary to have the oscilloscope measure unfiltered distortion from the amplifier in order to see the crossover spike. It is necessary to disable the 80kHz lowpass filter on the analyzer for this test. Further trim R512 so that the total distortion for that channel is at about 0.1% THD+N. If bias is not adjustable, see the bias description and troubleshooting section of this manual.

3. If a distortion analyzer is not available, a less accurate crossover distortion and bias adjustment can be made by monitoring the driver transistor (Q503 & Q504) bias current. With the amplifier at room temperature, and with no input signal plugged into the amplifier, measure the DC voltage across the emitter resistors of Q502 or Q504 (R516, R517). Adjust R512 to obtain about 80mV d.c. across one of these resistors.
 4. With no signal plugged into the amplifier and with an 8 ohm load, verify that the AC idle current from the AC service is no more than 1.0 amps a.c.
 5. Let the amplifier cool down and check / adjust channel 2.
- **SHORT CIRCUIT CURRENT**
 1. Select a 4 ohm load and apply a 1Vrms sinewave (1kHz) input signal to both channels of the amplifier. Ensure that power is on and that the gain controls are fully up.
 2. While the amplifier is producing power into the loads, apply a short to the output binding posts of each channel. In other words, apply a jumper between the red and black binding posts of each channel. Once this is done, the combined AC line current draw for both channels should be no greater than **7.5A** ac. This is with a 120 volt AC service to the amplifier. Current may be lower as AC line voltage is lower. As the amplifier heats up, current draw may increase to about 9 amperes until thermal protect shutdown.
 3. While the amplifier is driving a short, observe the main supply rail voltages. Ideally, they will be no more than 3 volts from each other.
 4. Remove the short from each channel and verify that the channels recover in to 4 ohm loads. The output should not experience any hang up and a full sinewave should be present just as it was before a short was applied for this test.
 5. If the amplifier does not pass any of the above steps, follow the proceeding steps. If steps 2, 3, and 4 above pass, continue to the next test **FREQUENCY RESPONSE**.

Setting Short Circuit Current Limits

- a. Select a 4 ohm load and apply a 1.2Vrms sinewave (1kHz) input signal to both channels of the amplifier. Ensure that power is on and that the gain controls are fully up.
- b. Turn gain controls on CH2 fully down. CH1 should be producing max power in the 4 ohm load.
- c. While CH1 is delivering power into the load, apply a short across channel 1's binding posts.
- d. Observe that the A.C. current draw is between **2.5 to 3.5** amps A.C.. Adjust R514 and R515 to get this current reading if your initial reading is off. R514 is the positive current limit adjust and R515 is the negative current limit adjust. Adjust both channels the same for a change in current limiting. Both wipers need to adjust evenly to achieve a balanced setting.
- e. Once the correct AC current draw is set, remove the short from the output. When this is done, the output power should spring back into the 4 ohm load. If it does not, the current limits are set too low.
- f. Once the output recovers into the 4 ohm load, verify that both polarities of the output sinewave are clipping at the same time. If one polarity clips before the other, adjust the current limit for that polarity (I + or I -) until both polarities clip at the same time.

- g. After the short circuit current is set and even clipping is achieved, reapply the short to the output to reconfirm AC line current. If the current draw is not within the range specified, again balance the current limit trimpots until even clipping and the correct AC current draw is met.
 - h. Remove the input signal from CH1 and calibrate CH2. It is important to calibrate only one channel at a time.
- FREQUENCY RESPONSE
 - MPC**
 1. Set load to 8 ohms and scale the input generator to gain 1 watt of power from the amplifier on each channel. Gain controls on the amplifier should be fully up.
 2. Check frequency response from 20Hz to 20kHz (+/-0.2dB) by sweeping random frequencies between these extremes. This is done by verifying the same voltage amplitude at each of the frequencies selected (within 20Hz to 20kHz). Check both channels.
 - MPC T**
 1. Set load to 8 ohms and scale the input generator to gain 1 watt of power from the amplifier on each channel. Gain controls on the amplifier should be fully up.
 2. Check frequency response from 45Hz to 16kHz (+/-0.2dB) by sweeping random frequencies between these extremes. This is done by verifying the same voltage amplitude at each of the frequencies selected (within 45Hz to 16kHz). Check both channels.
- POWER vs. DISTORTION TEST
 - MPC**
 1. Check to ensure that both channels will produce rated power at 20Hz, 2KHz, and 20kHz. into an 8 ohm load.
 2. While verifying rated power, check that at all frequencies the distortion measurement is less than or equal to 0.1%. To obtain this measurement, check to ensure that the 80kHz low pass filter is engaged on the analyzer.
 - MPC T**
 1. Check to ensure that both channels will produce rated power at 45Hz, 2KHz, and 16kHz. into an 8 ohm load.
 2. While verifying rated power, check that at all frequencies the distortion measurement is less than or equal to 0.1%. To obtain this measurement, check to ensure that the 80kHz low pass filter is engaged on the analyzer. Check distributed lines (70V, 100V) with 40 ohm, 20 ohm, or 10 ohm loads to ensure that both channels will produce rated power at 45Hz, 2kHz, and 16kHz.
- THERMAL TEST
 1. Set input frequency to 1KHz and short both channels while they are producing power into a load.
 2. AC line current draw should be about **7.0 8.0** amps for both channels. As the amplifier gets hot, there will be some current drift upwards. This is not a problem as long as the case temperature on the output transistors does not exceed 105 degrees C.
 3. Verify that the PTC circuit causes thermal shutdown after an extended period of time.
 4. While the amplifier is progressing towards thermal shutdown, look for the fan to cut in to high speed.
 5. When thermal shutdown occurs on both channels, verify AC idle current of less than 2.5 amperes.
 6. Remove short to verify thermal protect recovery.
- OUTPUT NOISE
 1. Set the amplifier gain controls all the way up, with a 1kHz 1.00Vrms sinewave input signal. Note the output level.

2. Remove the input signal connector from the amplifier and measure the residual noise level produced into the load by the amplifier. The noise signal should be 100 dB down from the full output power point measured. A signal to noise ratio should be better than or equal to 100dB. Check both channels.
- FINAL CHECK

This completes the amplifier test procedure for this model. Inspect the amplifier for mechanical defects. Inspect the solder connections. Reassemble the amplifier and verify the amplifier's operation before returning the product to service.

MPC300 /MPC300T Test Procedure

- SETUP
 1. Connect a test load to the output terminals of the amplifier.
 2. Make sure the Stereo / Bridge switch is set to the Stereo position.
 3. Connect a distortion analyzer with a resolution of 0.05%, 2020kHz (or better) to the output terminals of the amplifier. Enable the 80kHz low pass filter.
 4. Connect a dualchannel oscilloscope to the following test points:
 - Ch1 a 10X (vertical sensitivity 2V/cm) scope probe to the channel speaker output.
 - Ch2 a 1X scope probe (vertical sensitivity 0.1V/cm) to the distortion analyzer output.
 5. Set amp gain pots fully clockwise and turn on power switch.
 6. Connect the output of the signal generator to the input terminals of the amplifier and select an output of 1.15 VRMS, 1KHz sine wave.
 7. Plug the amplifier in to a variac and set up an AC line current monitor.
- POWER UP & MUTE DELAY TEST
 1. Slowly raise the variac voltage and watch for excessive current draw (Line current greater than 0.5A a.c. at 60 Volts). *This is slightly less for 240V.* Pause at 90VAC (200VAC *European*) for three seconds until the mute / protect circuit disengages. Continue to 120VAC (240V *European*).
 2. Turn the power switch off and on a few times to verify the 1 3 second powerup muting delay. Check both channels.
- CHANNEL OUTPUT
 1. Look for amplified signal on the scope for channel 1. Switch the input signal and scope to channel 2 and repeat output test. Check for noisy / contaminated gain pots by looking for general instability on the distortion waveform while adjusting the gain control levels.
 2. Select an 8 ohm load and confirm with the gain controls that this amplifier is producing a minimum of 220 watts at 1kHz just beyond the point of clipping (1.0% THD+N). Check both channels.
- BRIDGE MODE
 1. Turn the power switch off and the gain controls down.
 2. Move the bridge switch on the amp from the Stereo to Bridge position.
 3. Set an 8 ohm load to both red output binding posts (CH1 positive and CH2 negative).
 4. Apply a 1VRMS, 1kHz sinewave input to channel 1 of the amplifier. Check for 600 watts at 0.1% THD+N and verify that the output does not collapse. The position of CH2's gain control does not affect the output level.