



## MPX Series

### Test & Calibration

The following steps are given to evaluate the JBL MPX Series amplifiers. These steps are given in sequence and should be followed in order to achieve the best test results.

#### A.) Test Equipment Set-up

1. Connect an 8 ohm test load capable of handling the following power for the product under evaluation:

	<u>MPX300</u>	<u>MPX600</u>	<u>MPX1200</u>
8 $\Omega$	200 W	400 W	800 W
4 $\Omega$	300 W	600 W	1200 W

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

3. Connect the output of the signal generator to the input terminals of the amplifier and select an output of 1.0 VRMS (0dBV), 2KHz.

4. Connect a dual-channel oscilloscope to the following test points:

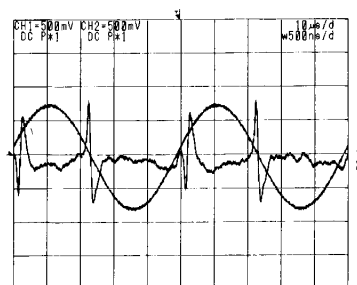
- 10X (vertical sensitivity - 2V/cm) scope probe to the channel speaker output.
- 1X scope probe (vertical sensitivity - .1V/cm) to the distortion analyzer output.

#### B.) Power Up

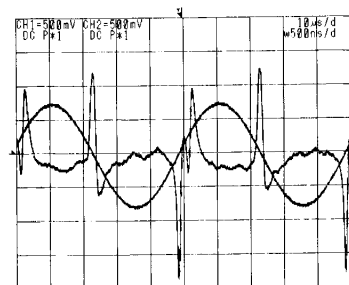
- Set the amplifier's gain controls at full clockwise.
- Slowly raise the AC variac voltage and watch for excessive line current draw.
- Observe that the fan is on.
- Cycle the power switch a few times to check the 1.5 - 3.0 second power-up delay and switch. Let the power lights go off between cycles and check power switch for arcing.
- Check both channels for normal output signal by setting the gain control just before the onset of clipping.

#### C.) Bias Adjustment

- While maintaining 120VAC, verify 8 ohm midband (2kHz) power specification.
- Verify step switching on both channels by adjusting the gain controls to observe the scope's distortion trace step spikes coming together and separating for both polarities toward the peak of the signal. There is no step on the MPX300.
- Keep the 8 ohm load on each channel and set the signal generator to a 15kHz sine wave.
- With the signal generator set to about 1.0 Vrms, adjust the gain controls for the channel under calibration to about -20dB from the maximum position.
- Observe that the output power is approximately -20dB from the maximum power of the amplifier.
- Turn the bias trim pot (VR901 -MPX1200, VR501 -MPX300 & MPX600) until a THD+N reading of 0.1% is observed on the distortion analyzer. This must be set with the amplifier operating at room temperature. The figure on the next page shows the correct crossover distortion waveform at the 0.1% THD+N level. An incorrect setting of 0.2% THD+N is also shown for reference purposes. Attention to the scale on the oscilloscope and the waveforms in the graphs will be necessary.



Correct Bias Setting



Incorrect Bias Setting

7. After this THD+N setting is made, confirm that the a.c. line current is not above 1.0A a.c. with the input signal removed from the amplifier. An 8 ohm load should still be attached to the amplifier and the 80kHz filter on the distortion analyzer should not be enabled at this time.

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 amplifier operating at its normal operating temperature, and no input signal, adjust the bias trimpot to obtain the following DC voltages on one of the emitter resistors of the driver transistors:

Model	Trim Ref.	Voltage adjust	Resistor Ref.
MPX300	VR501, VR601	55mV +/-15%	R501, R502, R601, R602
MPX600	VR501, VR601	55mV +/-15%	R501, R502, R601, R602
MPX1200	VR901, VR901	105mV +/-15%	R937, R938

### D.) Short Circuit Current Limit

1. Apply a 2 ohm load to one channel to show substantial clipping.
2. Bring the gain control down to adjust the channel under test up to the threshold of clipping.
3. Adjust current limit trimpots (VR502, VR503 & VR602, VR603 on the MPX300 and MPX600, and VR902 & VR903 on the MPX1200) for a small amount of current limiting at the peaks of the output waveform.
4. Apply a short to the output of the channel.
5. Observe the AC line current draw for the following:

Model	Trim Ref.	Shorted AC Current
MPX300	VR502-, VR503+	3.0 A +/-10%
MPX600	VR502-, VR503+	3.0 A +/-10%
MPX1200	VR902-, VR903+	4.0 A +/-10%

6. If the shorted AC current reading from the AC line source is excessive, adjust the negative and positive current limit trimpots to reduce the amount of current draw. If the current draw is too low, increase the shorted AC current by adjusting the trim pots. When adjusting, try to adjust both trim pots to achieve short circuit current balance. In doing this, be careful not to adjust the output waveform such that uneven clipping exists. A negative trim corresponds to



a negative clipping adjustment and a positive trim corresponds to a positive clipping adjustment.

7. Remove the short from the channel.
8. Observe even clipping on both channels. If an unbalanced adjustment is made, uneven clipping will be observed. Repeat step 6 to achieve the proper current limit setting.
9. Repeat this current limit procedure on the next channel for the amplifier under calibration.

#### ***E.) Frequency Response***

1. Select an 8 ohm load on channel 1 & channel 2.
2. Note the output level -10dB below full power.
3. Note the exact 2KHz level and compare it to the 20Hz and 20KHz output (20Hz - 20KHz , +/- 0.15dB). The output level should not be above or below the 0.15dB margin at these frequencies.

#### ***F.) Thermal Response***

1. Set the oscillator frequency to 2KHz and apply a short to the output of both channels and block the fan intake. The AC line current draw should be 4.5 - 5.5 amps a.c. initially and increases to about 7.0 - 7.5A at thermal shutdown (one channel will normally shutdown earlier than the other).

Do not allow the test to continue if the AC current rises above 9A. See the Troubleshooting, Protection / Limiting Circuit Problems section in this manual if this happens.

2. When thermal shutdown occurs, wait a couple of minutes and verify an AC idle current of 1.0 - 1.5A ac. Recheck the bias setting if the current is excessive. Remove blockage from fan intake.
3. Allow the amplifier to cool and recover from the thermal cycle. The amplifier must be able to recover into a 2 ohm load. Return the output load to 8 ohms.

#### ***G.) Output Noise***

1. Set the amplifier gain control to 0dB, with a 2kHz 1.00Vrms input signal. Note the output level.
2. With the input signal level off, measure the residual noise level. The signal level must be less than 100dB down from the full output noted. This is a wideband measurement (no filtering).

#### ***H.) General Inspection***

This completes the electronic test procedure. 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.

## **MPX Series**

### ***Troubleshooting***

Please refer to the MPX schematics for the component identification numbers in this troubleshooting guide. This section can be used in principal to troubleshoot all models in the MPX amplifier line. Notice that reference is primarily given to channel 1. For channel two, cross-reference parts as necessary by using the schematics and the physical layout of the board.