

REV B1 OBSOLETE PER ECO 1913
REV A PER ECO 38
REV B PER ECO 305
QSC OCTAL ACCESSORIES

MODEL PL-1 POWER LIMITER

OWNER'S MANUAL

The QSC PL-1 Octal Power Limiter is designed to protect your loudspeaker system by allowing you to limit the output of your QSC Power Amplifier to a pre-selected power level. This accessory plugs into the octal socket provided on all QSC Series Three and Series One power amplifiers. No attempt should be made to use this octal accessory on other amps, or to use non-QSC octal accessories in our amps, due to the possibility of voltage mismatch which could damage the octal accessory or power amp.

INSTALLATION

Before installing, remove the cover from the octal base and carefully set the internal switches in accordance with the instructions below. It is difficult to open the can and set the switches with the accessory installed, so it is not intended for applications where frequent and convenient access is required.

BE SURE TO TURN AMPLIFIER OFF and wait 60 seconds for internal power to discharge. NEVER PLUG OR UNPLUG AN OCTAL ACCESSORY WITH THE POWER ON. Select the octal socket desired (for Ch. 1 or Ch. 2) and remove the blue label, which is applied at the factory to protect the empty socket from corrosion. Align the center post of the octal plug and insert carefully.

You will now need to switch off the Octal Bypass switches on the back panel of the amplifier. For Series Three amplifiers, 3200, 3350, 3500, 3800, etc., switch off positions (1,2) on whichever channel is used. For Series One amplifiers 1080, 1200, and 1400, switch off (7,8) for Ch. 1 and (1,2) for Ch. 2. (On the monaural amplifier 1151, switch off the only two positions used, 1,2) It is possible to set the amplifier input switches to feed both channels with a single octal module; please consult the amplifier Owner's Manual, your dealer, or the QSC factory for further assistance.

Finally, connect the red wire emerging from the octal module to the red Speaker Binding Post of the channel into which you have installed the module.

POWER LIMIT ADJUSTMENT

To establish a safe setting, you must first determine the impedance of your speaker system and its RMS rated power (long term power rating). The speaker manufacturer's rated power may be a safe guide, but remember that rating methods vary and speakers can fail from a number of causes including wear-out. "Music Power" ratings

should be cut in half. In case of doubt, be safe and derate the power a little, especially if you hear distortion or anything that resembles strain in the system. The speaker manufacturer can give you the most reliable information. QSC cannot be held responsible for speaker failures even though the octal limiter is set in accordance with advertised power ratings.

The decal on the PL-1 cover has most of the information you probably need to set the internal switches of the Limiter. Switch positions (1-5) set the power limit, or threshold, of the limiter. The table below shows the complete range of settings.

Power Limit in Watts (8 ohm load)	Switch position				
	1	2	3	4	5
10	ON	ON	ON	ON	ON
15	-	ON	ON	ON	ON
20	ON	-	ON	ON	ON
30	-	-	ON	ON	ON
40	ON	ON	-	ON	ON
50	-	ON	-	ON	ON
60	ON	-	-	ON	ON
70	-	-	-	ON	ON
80	ON	ON	ON	-	ON
90	-	ON	ON	-	ON
100	ON	-	ON	-	ON
120	-	-	ON	-	ON
135	ON	ON	-	-	ON
150	-	ON	-	-	ON
170	ON	-	-	-	ON
175	ON	ON	ON	ON	-
185	-	-	-	-	ON
200	-	ON	ON	ON	-
210	ON	-	ON	ON	-
230	-	-	ON	ON	-
250	ON	ON	-	ON	-
275	-	ON	-	ON	-
300	ON	-	-	ON	-
325	-	-	-	ON	-
340	ON	ON	ON	-	-
360	-	ON	ON	-	-
400	ON	-	ON	-	-
420	-	-	ON	-	-
450	ON	ON	-	-	-
480	-	ON	-	-	-
500	ON	-	-	-	-
520	-	-	-	-	-

NOTE: These settings will produce exactly twice (2x) the power shown into four-ohm loads, and four times (4x) the power into two-ohm loads.

COMPRESSION RATIO

The sixth (6) switch position determines the compression or limiting ratio. The ON position is for a 10:1 ratio (hard limiting). This will give the most protection but will also squash the dynamic range of the program most severely. This position is best suited for applications where severe peaks can occur and protection is more important than the sound of the program.

The OFF position gives a 4:1 slope for somewhat reduced compression. This gives a more natural sound, but less protection against extreme peaks. This position would be suitable for high-quality music programs where dynamics are important and some attempt is made to maintain headroom and avoid severe overloads before applying limiting.

The PL-1 is designed so that the rated power is reached when you are 10dB into compression on either Slope setting. This means that compression will begin to occur earlier, and more gradually, on the 4:1 setting. This also means that the rated power will begin to be exceeded more quickly above this point on the 4:1 setting, which is why it is not recommended for extremely vulnerable systems or for program material which has peaks more than 10-15 dB above the nominal level.

ATTACK AND RELEASE TIMES

The last two switch positions (7-8) determine the attack and release time of the unit. The fastest attack/release is obtained with both switches (7,8) OFF, giving about 2 milliseconds attack, 200 ms release, and is useful for limiting high frequency signals (such as the high frequency output of a crossover feeding a compression driver). However, some bass distortion may be noted on full-range material, due to excessively quick response.

For normal full-range limiting, leave switch (8) OFF and set switch seven (7) ON. This gives an attack time of about 10ms, and a release of about 300 ms. This is still fairly quick but will not track individual cycles of bass notes, thus avoiding bass distortion.

By setting switch eight (8) ON, you will get a very slow attack and release time of about one second, which means there will be a noticeable lag before the limiter responds to peaks. This would be annoying on full-range material, but will give long-term overload protection for large speakers such as sub-woofers which can absorb momentary overloads, and where you do not want limiting to occur on each individual drum beat or bass note.

TYPICAL SETTINGS

1. Full-range PA speakers. Use Medium Attack/Release and 4:1 Slope setting, and set the Power to match your speaker ratings. This will have a minimum effect on the sound of the music while providing considerable protection against overload and distortion. If the distortion LED on the amplifier still triggers too much, accompanied by unacceptable distortion, try the 10:1 slope setting, or a lower Power setting. The 10:1 Slope may cause excessive "ducking" of the program during peaks, so only you can judge which sounds worse. Ideally, your system would have enough undistorted "headroom" to get by with the more gentle 4:1 Slope.
2. Horn drivers (in bi-amped system). Use Fast Attack/Release setting, and probably the 10:1 slope for maximum protection. Don't hesitate to use a somewhat lower Power setting than the rated power of the driver, because these are the most delicate type of speaker.
3. Sub-Woofers (in bi-or-tri-amped systems). In many cases limiting is not required because large woofers are usually the most capable of handling short term peaks without damage. However, if audible clipping is a problem, try the 4:1 Slope, the "medium" Attack and Release setting, and progressively reduced Power settings until clipping is just eliminated. Excessive limiting will, however, detract from the impact of bass beats. An alternative approach, which will not limit clipping of individual beats, but will limit against prolonged overload such as feedback, can be obtained by using the "Slow" Attack/Release setting.

When the amplifier is used as part of a music instrument amplification system, you may want to experiment with the threshold switches (1-5) to limit the dynamic range of your instrument. This is especially effective when used with electric guitar and bass. You will probably find the 4:1 slope, and the Fast or Medium attack and release times to be most useful.

PRODUCT WARRANTY

QSC Audio Products guarantees the PL-1 to be free from defective material and/or workmanship for a period of three years from date of sale, and will replace defective parts and repair malfunctioning products under this warranty when the defect occurs under normal installation and use- provided the unit is returned to our factory via prepaid transportation with proof of purchase (sales receipt). This warranty provides that examination of the returned product must disclose, in our judgment, a manufacturing defect. This warranty does not extend to any product which has been subject to misuse, neglect, accident, improper installation, or where the date code has been removed or defaced.

WARRANTY AND SERVICE REPAIR INSTRUCTIONS:

1. Pack the product safely making sure to include a copy of the sales receipt, your name, return address, and phone number. Mark the package - **Attention Service Dept.**
2. Ship the product prepaid to QSC Audio Products. We recommend UPS.
3. We will determine if the product is under warranty:
 - A. If it is we will repair and ship it back to you at no charge.
 - B. If it is not we will contact you and inform you of the charges. Upon your approval, we will repair the product and ship it back freight and service charges collect (COD).

