



MPC-X100 100 Hz Subwoofer Crossover

For JBL MPC and MPA amplifiers

Owner's Manual and Installation Guide

I. Description

The MPC-X100 is a dual-channel 100 Hz crossover filter accessory for use with JBL MPC and MPA power amplifiers.

The MPC-X100 is user configurable to fulfill these functions:

- active crossover—Channel 1: 100 Hz low-pass; Channel 2: 100 Hz high-pass *or* full-range.
- subsonic filter—programmable; preset @ 20 Hz to protect against damage from infrasonic signals.
- ultrasonic filter—programmable; preset @ 20 kHz to protect against damage from ultrasonic signals.
- CD horn EQ—for use in systems with uncompensated constant-directivity horns.

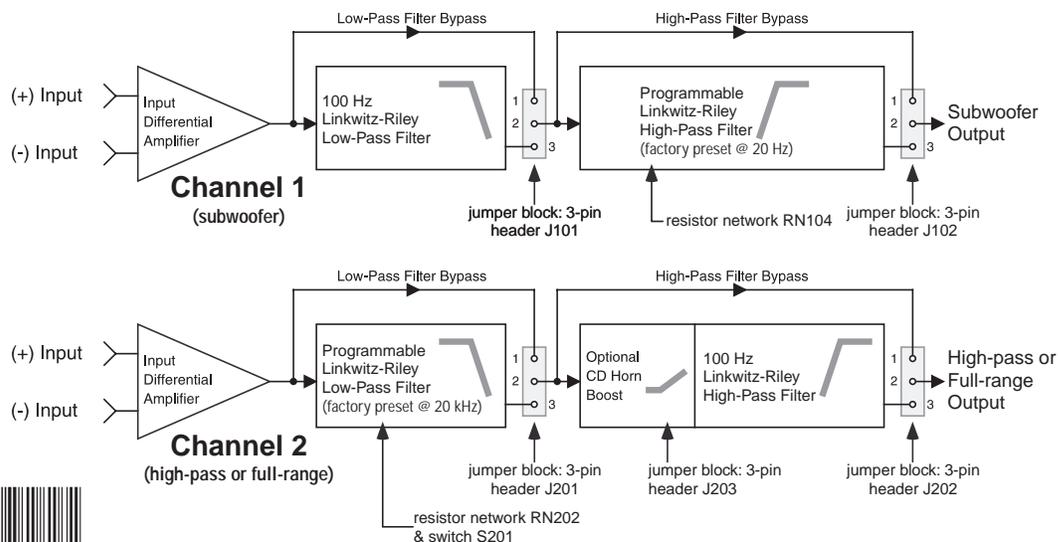
Each channel has an electronically balanced input and bypassable low-pass and high-pass sections. Each filter circuit uses a 4-pole (24 dB/oct) Linkwitz-Riley alignment.

An alternative to the MPC-X100, the MPC-XU is a universal crossover with selectable crossover frequency.

The MPC-X100 installs onto the amplifier's input card, where its settings are not easily accessible to the user. This makes the MPC-X100 ideal for installed or rental sound systems, since it practically eliminates the danger of unauthorized tampering with crossover setting or incorrect crossover output connections, as well as the loudspeaker damage that may result from such user tampering.

Installing the MPC-X100 involves soldering a 10-pin and a 12-pin header into corresponding holes on the input card, a process that only qualified technical persons should attempt. We recommend that you enlist an authorized JBL service center to perform the task. See the installation section of this manual for more information.

Figure 1 shows a block diagram of both channels of the MPC-X100:



TD-000084-00
Rev. A

Figure 1. Block diagram of the MPC-X100

II. Installation



CAUTION: The MPC-X100 contains active components which can be damaged by electrostatic discharge (ESD). Be sure to practice standard ESD precautions, and always ground yourself and your workstation before handling exposed circuit cards.

Installing the MPC-X100 requires PC board soldering skills. Only qualified service technicians should attempt it. Any authorized JBL service center can perform the installation.

The MPC-X100 installs on the amplifier input board of any JBL MPA or MPC amplifier.

Tools needed:

Soldering iron

¼-inch (6.3 mm) nutdriver

Phillips screwdriver

Wire cutters

Rosin-core solder

Desoldering iron or other suitable desoldering equipment (*Do not use desoldering braid; it can damage the solder pads on the input board and might not remove solder adequately.*)



CAUTION: Preparing the input board for installation of the MPC-X100 involves removing solder from feed-through holes on a 2-sided circuit board. Excessive heat can damage the solder pads you will be working on. Proper equipment and experience with desoldering delicate PC board circuitry is essential to successfully perform the procedure. Damage caused by improper installation is not covered under warranty.

- 1 Turn off the amplifier and disconnect the AC power cord from the AC source. Disconnect all cables from the amplifier's input panel.
- 2 Position the amplifier so the rear of the chassis is facing you. The input panel is located on the left side of the rear panel. See Figure 2a.

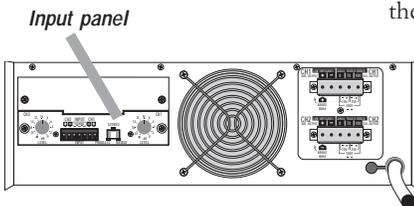


Figure 2a. The input panel's location on the rear panel of the amp

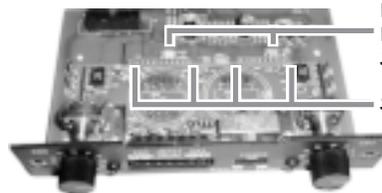


Figure 2b. The input panel (MPC)

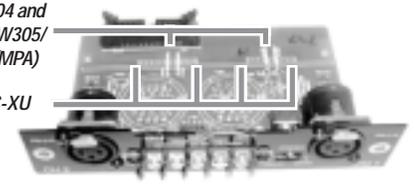


Figure 2c. The input panel (MPA)

- 3 Locate and remove the screws securing both the upper blank and the lower input panels to the rear side of the chassis (2 screws on each mini panel). The upper blank panel will simply drop off when its screws are removed.
- 4 Gently pull the lower input panel out from the amplifier. Once it is removed, you will notice a ribbon cable connecting the input PC board to the amplifier. Disengage the locking wing clamps on the ribbon header and carefully remove the ribbon head from the socket on the board. Now the input panel assembly is completely free from the amplifier.
- 5 Desolder and remove the wire jumper pairs indicated in Figure 2b or 2c.
- 6 Under where the jumpers were located, you'll find two rows of solder pad holes—one with 10 holes and another with 12 holes. Remove the solder from all 22 holes.
- 7 With the input panel facing you and the component side of the MPC-X100 board facing away from you, carefully insert the header pins of the MPC-X100 fully into the socket holes. Turn the assembly over and solder the MPC-X100 in place. Make sure all the header pins are well soldered. Visually inspect for cold solder joints and verify that you have sufficient clearance to re-install the ribbon connector on the top side of the assembly. Finish by trimming the MPC-X100 header pins as required.

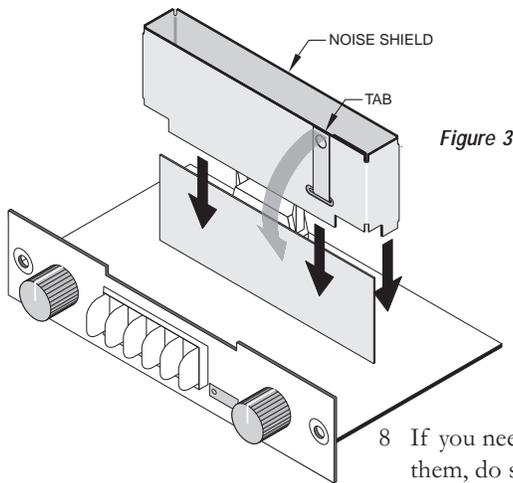


Figure 3

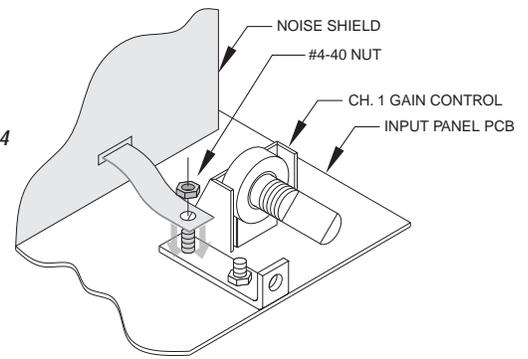


Figure 4

- 8 If you need to make any adjustments to the MPC-X100 settings or if you need to record them, do so now, because the MPC-X100 will be inaccessible once the noise shield is installed and the input panel is re-installed into the amplifier chassis. See Section III, “Programming the MPC-X100,” below.
- 9 Using a 1/4-inch (6.3 mm) nutdriver, remove the outer 4-40 nut from the stud in the panel mounting bracket, next to Channel 1’s gain control potentiometer. Place the noise shield over the circuit board of the MPC-X100 (Figure 3) and bend the grounding tab down so its hole goes over the stud. Re-install the nut, and tighten it securely (Figure 4).
- 10 Reconnect the ribbon cable to the input board connector. Press the locking clamp wings of the connector closed. You will feel them snap into place.
- 11 Carefully reposition the input board/MPC-X100 assembly into the amplifier chassis and secure it by fastening the two mounting screws. Make sure the screws are tightened snugly, but do not over-torque them. Re-install the upper blank panel.

Installation of the MPC-X100 is now complete, and the amplifier is now ready to be installed into the system.

III. Programming the MPC-X100

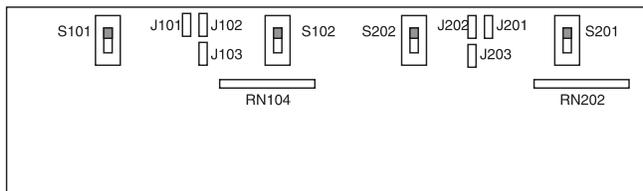


Figure 3. The MPC-X100’s switches, jumpers, and resistor networks.

The MPC-X100 is preset for a 100 Hz crossover point; this frequency cannot be changed. The circuit board has four switches, six 3-pin headers, and two SIP resistor network sockets, all used for programming the module (see Figure 3). The numerical designations identify which channel the switch, header, or socket is part of: those designated by a 3-digit number starting in a 1 (for example, headers J101) are for Channel 1, while those starting in a 2 are for Channel 2.

Setting input operating mode on amplifier or input card

The input board or accessory on which the MPC-X100 is installed has provisions—switches or headers—for setting the operating mode of the amplifier. In the signal flow, the MPC-X100 is located *after* these switches or headers, so its operation is affected by the mode setting.

Stereo or Parallel Mode Operation—With the amplifier in stereo or parallel mode, the MPC-X100 operates normally: Channel 1 provides a 100 Hz low-pass subwoofer signal to Channel 1 of the amplifier, while Channel 2 provides either a 100 Hz high-pass or a full-range signal. Most 2-way applications will require operating in parallel mode.

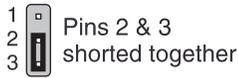


Figure 4

Bridged Mode Operation—With the amplifier in bridged mono mode and driving a high-power subwoofer system, the MPC-X100 can be used as a subwoofer filter, taking full-range audio from Channel 1’s input and sending on a 100 Hz low-pass signal to the amplifier circuitry. For correct operation, bypass Channel 2 on the MPC-X100 board and use only Channel 1’s input and processing.

Bypassing the filters

To completely bypass the filter circuitry of a channel, set the jumpers on both Jx01 and Jx02 across pins 1 and 2, which are the upper two pins on their headers (see Figure 4). **Note: If you neglect to place jumpers on either header, no signal will pass on that channel.** To bypass Channel 2 for bridged mode operation, set the jumpers on headers J201 and J202 across pins 1 and 2.

Channel 1 (subwoofer): Programming the subsonic (high-pass) filter

Switch S102 in "x1" position	Resistor network in RN104
20 Hz	120K
30 Hz	82K
40 Hz	56K
50 Hz	47K

Subsonic (high-pass) filter frequency table

Bypass/enable header—To use the subwoofer channel’s high-pass subsonic filter, set the jumper on header J102 across pins 2 and 3, which are the lower two pins. If you do not want any subsonic filtering, bypass the filter by setting the jumper across pins 1 and 2. **Note: Subwoofers tend to sound best when used with suitable filtering, which prevents the amplifier and speaker from wasting power trying to reproduce frequencies that are too low. For best performance it is recommended that you bypass the high-pass filter only if there is suitable filtering elsewhere in the audio signal path.**

Setting frequency—To set the corner frequency (at which the output is 6 dB down) of the high-pass filter, set switch S102 to $\times 1$ (down) and choose the appropriate resistor network value for RN104. Use the high-pass table to select the right combination. See the appendix of this manual for keys to identifying the correct resistor network. **Note: Switch S101 should also be set to $\times 1$ (down).**

Inserting the resistor network—The factory preset frequency is 20 Hz. If there is a resistor network already installed in the socket, carefully pull it straight out. Insert the pins of the new resistor network into the socket holes and carefully press the network into the socket. Be careful to avoid bending the pins of the resistor network. Orientation of the resistor network is unimportant, as long as all 8 pins are well seated in the socket.

Channel 2: Programming the ultrasonic (low-pass) filter and CD horn EQ

Switch S201 in "x1" position	Switch S201 in "x10" position	Resistor network in RN202
•	800 Hz	120K
•	1000 Hz	82K
•	1200 Hz	68K
•	1600 Hz	56K
•	2000 Hz	47K
250 Hz	2500 Hz	33K
500 Hz	5000 Hz	18K
800 Hz	8000 Hz	12K
1600 Hz	16000 Hz	5.6K
2000 Hz	20000 Hz	4.7K

Ultrasonic (low-pass) filter frequency table

Bypass/enable header—To use the low-pass ultrasonic filter, set the jumper on J201 across pins 2 and 3, which are the lower two pins. But if you do not wish to use the low-pass filter and want to bypass it instead, set the jumper across pins 1 and 2. **Note: Ultrasonic filtering is recommended to reduce susceptibility to RF and other types of interference.**

To engage the 100 Hz high-pass filter, place a jumper across pins 2 and 3 of header J202. To bypass the filter for full-range audio, place the jumper across pins 1 and 2. **Note: if you need CD horn equalization, you must engage the 100 Hz high-pass filter also.**

Setting frequency—To set the corner frequency (at which the output is 6 dB down) of the low-pass ultrasonic filter section, choose the appropriate resistor network value and switch setting for RN202 and S201, respectively. (Sx01 is a $\times 10$ range switch. In its upper position, the frequency range is $\times 10$; in the lower it is $\times 1$.) Use the low-pass table at left to select the right combination. See the appendix of this manual for keys to identifying the correct resistor network. **Note: Switch S202 should always be set to $\times 1$ (down).**

The high-pass frequency is fixed at 100 Hz and cannot be changed.

Inserting the resistor network—The factory preset frequency is 20 kHz. If there is a resistor network already installed in the socket, carefully pull it straight out. Insert the pins of the new resistor network into the socket holes and carefully press the network into the socket. Be careful to avoid bending the pins of the resistor network. Orientation of the resistor network is unimportant, as long as all 8 pins are well seated in the socket.

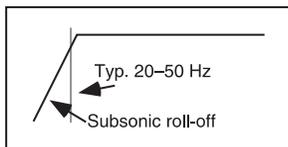
CD Horn Equalization (Boost)—In addition to enabling the 100 Hz high-pass filter at J202, if you opt for CD horn equalization you must place a jumper at J203 as well. The MPC-X100 offers two equalization curves for CD horn correction:

- For +6 dB of boost at 20 kHz, place the jumper across pins 1 and 2 of J203.
- For +10 dB of boost at 20 kHz, place the jumper across pins 2 and 3 of J203.
- To bypass the CD horn equalization, do not place a jumper across any pins on J203.

Function		Header	Pins		
			1 & 2	2 & 3	None
Channel 1: (Subwoofer)	All operation	J101		X	
	Bypass subsonic	J102	X		
	Enable subsonic	J102		X	
	All operation	J103			X
Channel 2:	Bypass ultrasonic	J201	X		
	Enable ultrasonic	J201		X	
	Bypass 100 Hz high-pass	J202	X		
	Enable 100 Hz high-pass	J202		X	
	Disable CD horn boost	J203			X
	CD horn boost, +6 dB @ 20 kHz	J203	X		
	CD horn boost, +10 dB @ 20 kHz	J203		X	
	Bridged mono	J201, J202	X		
	J203			X	

The table at left is a summary of the jumper settings for the MPC-X100.

IV. Typical configurations



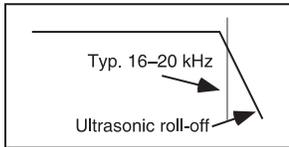
Subsonic Filter (Infrasonic Filter)

Applications: Subsonic filters are commonly used in sound installations to filter out rumbles and other inaudible or unwanted low frequency signals and to protect speaker tuned vented speakers from damage due to excessive energy below the tuning frequency.

For a subsonic filter, determine the lowest useable frequency that the speaker can safely handle and set the *high-pass* filter to that frequency. Typical subsonic filters are set at 50 Hz, 40 Hz, 30 Hz or 20 Hz.

Program settings:

- 1 Set J102 to enable the high-pass filter by placing jumper across pins 2 and 3.
- 2 No jumper on J103.
- 3 Insert proper resistor network in RN104 socket.



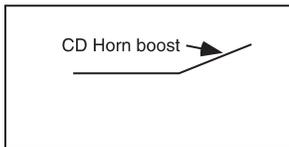
Ultrasonic Filter

Applications: An ultrasonic filter is useful for minimizing RF interference, oscillations, leakage or aliasing from digital devices, or other signals that are too high in pitch to hear but may wreak havoc in an amplifier system.

Typical ultrasonic filters are set at 16 kHz or 20 kHz.

Program settings:

- 1 Set J201 to enable the low-pass filter by placing jumper across pins 2 and 3.
- 2 No jumper on J203 unless you need CD horn equalization.
- 3 Insert proper resistor network in RN202 socket.

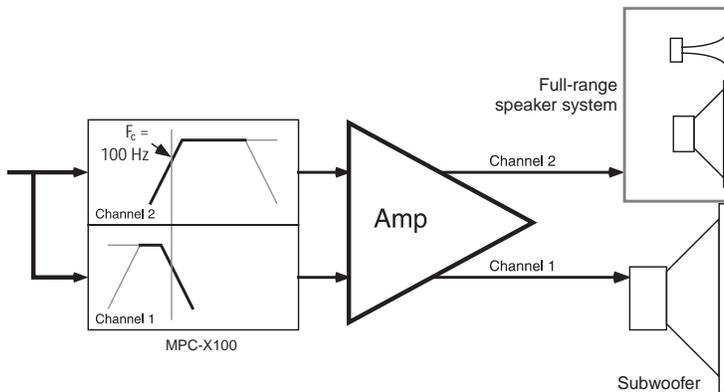


CD Horn Equalization Filter

Applications: A constant directivity horn requires a 6 dB per octave boost at high frequencies to provide a flat frequency response. On the MPC-X100 you must use the CD horn equalization in conjunction with the 100 Hz high-pass filter.

Program settings:

- 1 Set J202 to enable the 100 Hz high-pass filter by placing jumper across pins 2 and 3.
- 2 Set J203 to select the EQ curve you desire: across pins 1 and 2 to +6 dB at 20 kHz, or across pins 2 and 3 for +10 dB at 20 kHz.



2-Way Active Crossover

This configuration routes the frequencies below 100 Hz to amplifier Channel 1, which will driver the subwoofer(s), and the frequencies above to Channel 2, which will drive the full-range (typically, woofer + high frequency as passive 2-way, or woofer + midrange + high frequency as passive 3-way) speaker(s). Using the MPC-X100 as a crossover requires that you drive both amplifier inputs with the same full-band signal.

Program settings:

- 1 On the input module, set the amplifier mode to parallel. Alternately, you could use a Y-cable to provide the same signal to both channel inputs.

Channel 1:

- 2 Subsonic (infrasonic) filter—If you need subsonic (infrasonic) filtering, set J102 to enable the high-pass filter by placing jumper across pins 2 and 3, and insert a resistor network into RN104 corresponding to the roll-off frequency you desire. If you do not want subsonic (infrasonic) filtering, set J102 to disable the high-pass filter by placing jumper across pins 1 and 2.

Channel 2:

- 3 Set J202 to enable the Channel 2's 100 Hz high-pass filter by placing jumper across pins 2 and 3.
- 4 *CD horn EQ*—If you need equalization for a constant-directivity horn, set a jumper on J203 for the amount of boost you need. If you do not want CD horn equalization, do not place any jumper on J203.
- 5 *Ultrasonic filtering*—If you need ultrasonic filtering, set a jumper on J201 across pins 2 and 3 to enable Channel 2's Low-pass filter and insert a resistor network into RN202 that corresponds to the desired roll-off frequency. If you do not want any ultrasonic filtering, set the jumper on J201 across pins 1 and 2 to bypass the low-pass filter.

V. Warranty & Contacting JBL

These products are designed and backed by JBL Professional, the world leader in sound reinforcement. For complete JBL warranty information, to order replacement parts or to ask for clarifications to this manual, contact JBL Professional:

Within the United States: Contact the Applications Dept, JBL Professional, PO Box 2200, 8500 Balboa Blvd, Northridge CA 91329 USA. In the USA you may call Monday through Friday 8:00 a.m. to 5:00 p.m. Pacific Coast Time: (818) 894-8850.

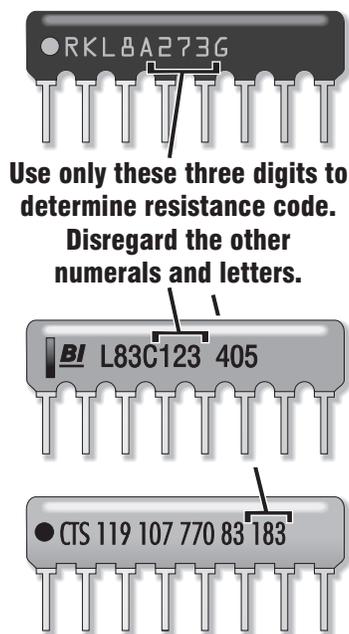
In other areas throughout the world: Contact the JBL Professional Distributor in your country.

A list of JBL Professional Distributors and U.S. Service Centers can be attained from the JBL Professional website: www.jblpro.com.

Appendix

Identifying resistor networks

Use this chart to identify the values of the resistor networks. See the tables on page 4 to find the correct values for the desired filter frequencies.



RESISTANCE	CODE
2.7K	272
3.9K	392
4.7K	472
5.6K	562
6.8K	682
8.2K	822
10K	103
12K	123
15K	153
18K	183
20K	203
22K	223
27K	273
33K	333
39K	393
47K	473
56K	563
68K	683



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