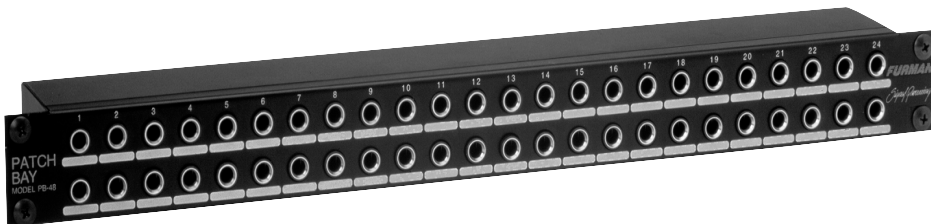# FURMAN

Patch Bay System

MODELS PB-48, PB-48D

Owner's Manual

Introduction

Thank you for your purchase of a Furman PB-48 or PB-48D Patch Bay. You now own a versatile, rugged, high quality accessory that will make your entire audio system easier to operate. Your new PB-48 is ready to use right out of the box. But please take a few moments now to read these instructions to be sure of getting the best results. You'll learn about the PB-48's capabilities, you will understand patch bay terminology and you'll have the answers to questions that arise when you are using a patch bay for the first time.

Your PB-48 patch bay is designed to serve as a hub where all audio lines in your audio system come physically close together. The PB-48 makes it possible for you to quickly and easily set up any system configuration from one convenient central location. Of course, you could wire a system without a patch bay. But the great advantage of a patch bay comes when you want the flexibility to configure your audio system differently from the way you originally set it up.

To reconfigure your system without a patch bay, you would have to reach around to the back of various pieces of equipment to unplug and replug a number of cables, all the while trying to remember how it was before so you can put it back together when you are done with the special setup. After going through this a few times, you would almost certainly find that the cables in back of your equipment are tangled up in knots. A patch bay eliminates this problem while making your system much more flexible and easier to use.

For example, in a studio, a tape recorder's outputs may normally be connected to the mixing board for playback. But at the end of a session, you may want them to be connected directly to another recorder to make dupes. You don't want to find yourself replugging cables on your hands and knees. A well-designed patch bay system eliminates this frustration, since it will allow you to make easily traceable patch changes, then return the system to your original setup in a flash.

Patch Bay Terminology

Model PB-48 has forty-eight 1/4" jacks both in front and rear. Each vertical pair of patch points is mounted on its own circuit board, which holds two front panel and two rear panel jacks. The upper rear row of jacks always connects to outputs of equipment, while the lower rear row always connects to inputs of equipment. The basic signal flow is in the upper rear jack and out the lower rear jack. Along the way the signal passes through the front panel jacks of your PB-48. The jacks used are high quality TRS (tip-ring-sleeve) jacks with self-cleaning contacts. Because TRS jacks have three, not two, conductors, they allow for the use of either balanced or unbalanced circuits.

Model PB-48D, which substitutes six 25-pin D-Sub connectors on the rear for phone jacks to make interconnection with recording devices quicker and neater, is constructed slightly differently. It uses a single horizontal circuit board with all components mounted on it. This construction is better suited to the use of multi-pin connectors.

A patch bay's jacks can be configured in four ways: Full-Normalled, Half-Normalled, Non-Normalled and Multed.

Both the PB-48 and PB-48D are shipped as half-normalled patch bays. That means each of their 24 vertical jack pairs are factory-set so the upper rear jack is "normally" connected to the lower rear jack. The signal flow through the jacks on the front panel is such that inserting a plug in the top jack on the front does not break the normal connection between the rear panel jacks, but provides a tap on its circuit to send a signal to two devices simultaneously. However, inserting a plug into the lower front jack does break the signal flow, allowing the insertion of a device, such as a signal processor, into the loop.

Half Normalled

As mentioned above, each vertical pair of upper and lower jacks on the PB-48's rear panel is connected internally, and the signal flows through both of them. The original setup of your equipment is retained, in that two devices are connected without the use of any front panel patch cords. As shown in Figure 1, you can connect one tape output to one of the PB-48's rear panel upper jacks, and connect an input channel on a mixing board to the lower rear panel jack. The signal will flow from the tape output to the mixer input without requiring a patch cord. All of the rear panel jacks will function in this manner when there is no patch cord plugged into the corresponding lower front panel jack. *Note: For simplicity, these diagrams show mono plugs and jacks with only one "normal link" connecting a vertical pair, but the jacks are actually TRS types with two links. Two are needed to connect both the tip and ring contacts, to allow the use of balanced lines. The switch in the bottom front jack is a double-pole type which switches both links simultaneously.*
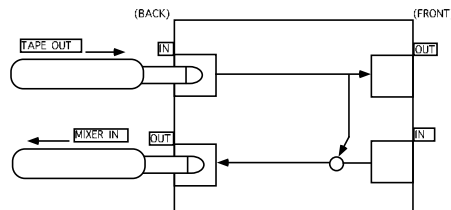

Figure 1

In a half-normalled patch bay such as the PB-48, each lower front panel jack has an internal switch. When one end of a patch cord is inserted into the upper front panel jack, the switch on the lower front panel jack remains closed, as shown in Figure 2. The signal from the upper rear panel jack continues to flow to the lower rear panel jack as it does in Figure 1, but it can also be simultaneously routed to
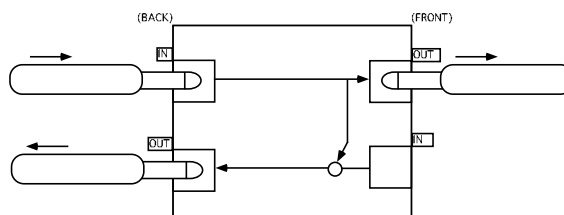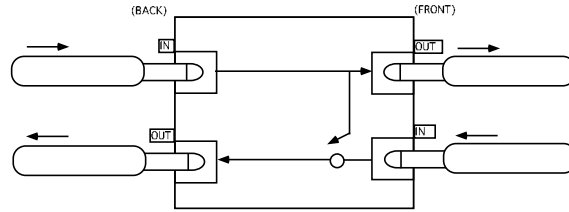

Figure 2

Figure 3

another device via the upper front panel jack. The upper front jack allows a signal split, or "mult", just as a Y-cord would do.

When one end of a patch cord is inserted into the lower front panel jack, the switch breaks the connection between the corresponding rear panel jacks, as shown in Figure 3. This means that you can interrupt the signal that flows between the upper and lower rear jacks, and re-route it to another destination with a patch cord. Using our earlier example of a mixer output connected via the rear panel to a recorder input, with two patch cords you can insert a device, such as an equalizer, between the mixer output and the recorder input.

Non-Normalled

"Non-normalling" is the most common customization you may wish to make to one or more of your PB-48's vertical pairs. For example, if you have an equalizer that is not part of the normal setup, it may be convenient to connect its input and output to the same vertical pair (as shown in Examples 1 and 3 on page 6), *but without the input and output being connected together by the normal link*. (If such a connection were allowed to exist in equipment that is idling, it could cause harmful feedback or oscillation.)

In a non-normalled pair, as shown in Figure 4 below, a front panel upper jack is connected only to its corresponding rear panel upper jack, and the front panel lower jack only to its corresponding rear panel lower jack, with no link between the two. To configure one or more jack pairs this way, please see "Customizing" on page 7.
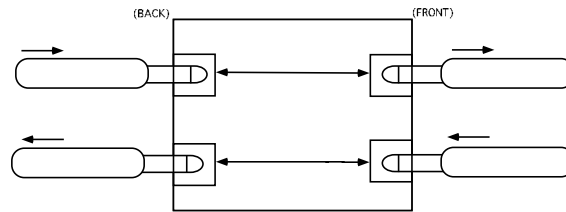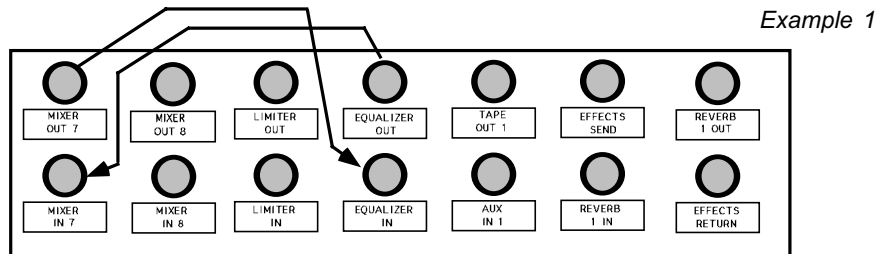

Figure 4

Full-Normalled

In a Full-Normalled pair, both front panel jacks would have a switch, and plugging a patch cord into either the upper or lower front panel jacks would interrupt the signal between the corresponding rear panel jacks. Full-normalled patch bays are a relic of the past, and are rarely implemented nowadays because the "mult" feature of the top front jack is lost, and no particular advantage is gained. In any case, because PB-48 modules do not have switching jacks in the top front positions, the full-normalled configuration is not possible.

Examples of Patches

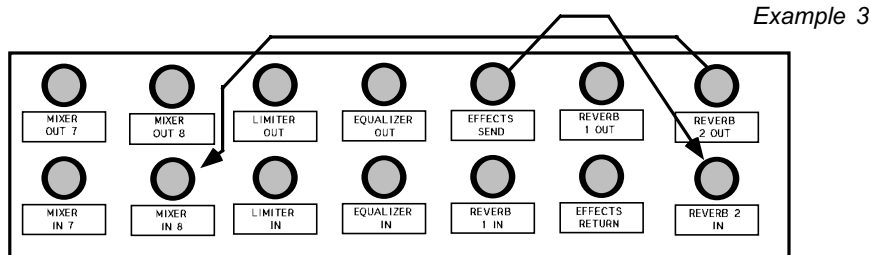Example 1 below illustrates a typical patch—say, inserting an outboard equalizer into track 7. Two patch cords are required. Each connects an output jack on the front panel upper row to an input jack on the front panel lower row. (You never have to plug both ends of a patch cord into the same vertical pair to connect them, because the PB-48's "normal" internal wiring already does that for you.)

Example 1

MIXER OUT 7	MIXER OUT 8	LIMITER OUT	EQUALIZER OUT	TAPE OUT 1	EFFECTS SEND	REVERB 1 OUT
MIXER IN 7	MIXER IN 8	LIMITER IN	EQUALIZER IN	AUX IN 1	REVERB 1 IN	EFFECTS RETURN

Example 2 is a slightly different kind of patch. Instead of inserting additional equipment, it shows four tape outs routed to a different set of inputs than usual. This might be convenient for a mixdown, for example, to take advantage of better EQ facilities in the main section of the board. Of course, Aux 1-4 should be turned down or muted to avoid confusion during mixing.

Example 2

MIXER OUT 5	MIXER OUT 6	MIXER OUT 7	MIXER OUT 8	TAPE OUT 1	TAPE OUT 2	TAPE OUT 3	TAPE OUT 4
MIXER IN 5	MIXER IN 6	MIXER IN 7	MIXER IN 8	AUX IN 1	AUX IN 2	AUX IN 3	AUX IN 4
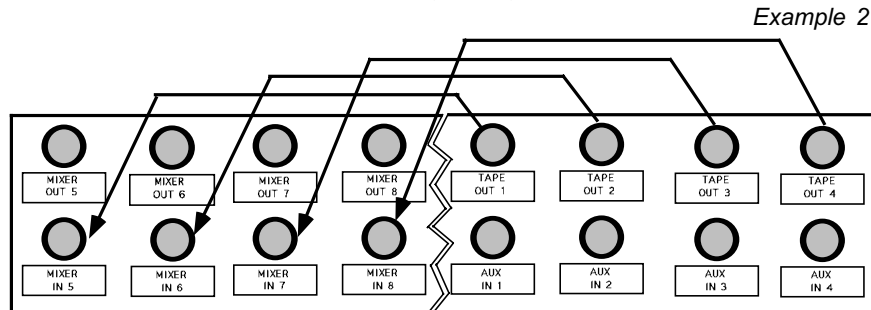
In Example 3, one Effects Send channel on the board is split to take advantage of two kinds of reverbs. This illustrates that the PB-48 lets you split an output two ways: one via the internal "normal" link, and the other via a patch cord. This is the characteristic that makes the PB-48 "half-normalled".

Example 3

| MIXER OUT 7	MIXER OUT 8	LIMITER OUT	EQUALIZER OUT	EFFECTS SEND	REVERB 1 OUT	REVERB 2 OUT
MIXER IN 7	MIXER IN 8	LIMITER IN	EQUALIZER IN	REVERB 1 IN	EFFECTS RETURN	REVERB 2 IN

Customizing

Non-Normalling

As mentioned earlier, the most common customization you might want to make is to defeat the normal links on one or more vertical pairs. For example, it may be convenient to connect the input and output of an equalizer that is not part of your regular set-up to the same vertical pair, as shown in Examples 1 and 3. Without customization, the effect of doing this would be that the input and output of the equalizer would be shorted together via the normal link (except when the equalizer was in use, in which case the plug in the bottom, input jack would break the link.)

But some equipment may oscillate when the input and output are connected together. This could possibly lead to damage or interfering crosstalk. There are two ways to eliminate this problem. The easiest way is to offset the input and output of the equalizer, or other device. Another method is to convert the vertical pair to the non-normalled configuration, which eliminates the normal link. Both methods are explained here.

Offsetting simply means that the device's front panel jacks are not part of the same vertical pair, as shown in Example 4 below.
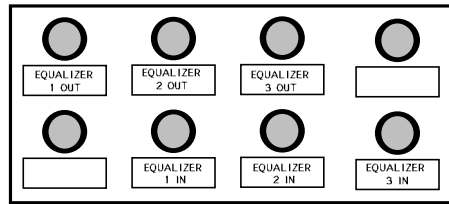
Example 4

Converting a pair to non-normalled is easy to do, but due to the different construction of the PB-48 and the PB-48D, the method is different for each model.

PB-48: Remove the front cover from the patch bay by pulling it forward. If the unit is installed in a rack, the cover may be removed without needing to dismount the unit from the rack simply by removing only two of the four screws that secure it in the rack. Just remove the lower left and upper right screws, and the cover can be pulled off. To defeat the normal links on a particular module, flip it over, so that the larger switching jack that was in the bottom front before, becomes top rear. The circuit board remains on the left side as viewed from the front. Replace the cover and re-install the two rack screws.

PB-48D: If it is installed in a rack, the PB-48D must be removed to allow access to the top surface. However, it is not necessary to disassemble the unit. The normal linking is accomplished by means of "suitcase" jumper plugs. When they are in place, the links are intact. When they are removed, a pair becomes non-normalled. You can reach the suitcase jumpers with a pair of long-nose pliers inserted through the rectangular openings on top of the unit. There are two for each vertical pair, located directly behind the jacks. Both must be pulled straight up and off to convert the pair to non-normalled.

After a pair of jumpers is removed, we recommend saving them for possible later re-installation by storing them in place, but positioned so that each contacts only one of the two pins. *Note:* The proper positioning of the jumpers for standard, half-normal operation is with the long dimension left-to-right. Do not install them in the front-to-back orientation.

Example 5
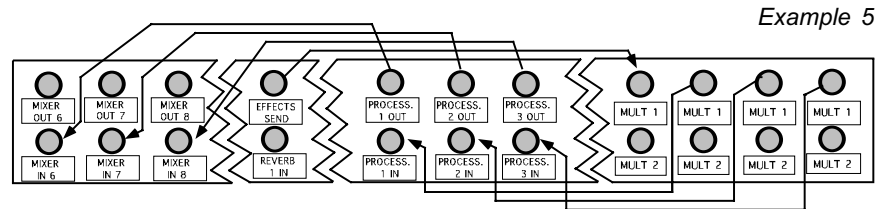
Multing

A group of jacks connected together is called a "mult." One of the PB-48's unique features is that you can choose any number of jacks and wire them together to form a mult of any size, up to the entire 48 jacks of the patch bay. (*Note:* Multing is not possible with the PB-48D.) For example, as in Example 5, you could connect four of the top front panel jacks together, and four of the lower front panel jacks together to make two mults. In this case the two sets of multed jacks are not connected to each other top-to-bottom.

Example 5 illustrates the use of a mult. A patch cord connects Effects Send to one of the group of four Mult 1 jacks. This signal will now also be present at the other three Mult 1 jacks. These three are then patched to three different effects processors. The outputs of the three processors are patched to three input channels of the mixer, so you can creatively mix and pan them to achieve a unique sound.

To create mults of three or more jacks, remove the front cover as described under "Non-Normalling" above and remove the modules that will comprise it. Look for unsoldered connection points on each module's circuit board labeled "**T**" for tip, "**R**" for ring, and "**G**" for ground (sleeve). There are **T** and **R** points for both the top and bottom jacks. (The bottom **T** and **R** may or may not be labeled. They are located in a line directly under the **G** point.) The connection points are positioned to allow easy wiring from one circuit board to adjacent boards. Pass a bare, 22 gauge solid wire through each hole and solder it to the corresponding holes on adjacent boards. Note that the signal ground on each circuit board is isolated from the chassis and from other circuit boards (to prevent ground loops), so the ground must be wired along with the signal lines. Therefore, five wires are used to link together a group of modules intended to be a mult. If these modules are turned around (as described under "Non-Normalling" above) and nothing is plugged into the rear jacks, there will result a single mult as wide as the number of modules tied together, and encompassing both the top and bottom rows. If you wish to create separate mults in the top row and the bottom row (as in Example 5), it is not necessary to turn the modules around, but you must cut the two traces comprising the normal link between the top and bottom jacks on each module making up the mults. The proper places to cut can be identified as two very narrow traces just below the upper **T** and **R** points. Cut them cleanly with a sharp implement and curl the cut ends back to make sure there is no chance of shorting.

Installing the PB-48

The PB-48 is intended for mounting in a standard 19" equipment rack. A logical spot to install it would be near the majority of the equipment to which it connects, to minimize cable lengths. Standard racks come equipped with mounting rails with holes tapped for 10-32 machine screws. Be sure to use only 10-32 screws (in particular, avoid 10-24 screws, which will fit if forced but will strip the threads). To avoid marring the panel when tightening the screws, use nylon washers under the screw heads.

Patch Cords

Furman supplies its Patch Bay users better quality, highly flexible patch cords in six styles at extremely low prices. They may be used for either front panel patching or rear panel interconnections. *The prices quoted below are for sets of ten cords.* Prices include UPS shipping to locations in the USA other than Alaska and Hawaii. You can order them directly from Furman by mail, or by phone or fax using your Visa or MasterCard. Our numbers are listed on the back cover of this booklet. Please call between 8:00 a.m. and 5:00 p.m. Pacific Time.

PATCH-P	10 Patch Cords, 1/4" phone to 1/4" phone, 30 inch (75 cm)	$15.95
PATCH-R	10 Patch Cords, RCA to RCA, 30 inch (75 cm)	$15.95
PATCH-T	10 Patch Cords, TRS (stereo phone) to TRS, 30 inch (75 cm)	$19.95
PATCH-PP	10 Patch Cords, 1/4" phone to 1/4" phone, 72 inch (183 cm)	$17.95
PATCH-PR	10 Patch Cords, 1/4" phone to RCA, 72 inch (183 cm)	$17.95
PATCH-RR	10 Patch Cords, RCA to RCA, 72 inch (183 cm)	$17.95

California residents must add 7.5% sales tax. Add shipping charges (if Alaska, Hawaii, or outside USA)—allow 1 lb. per set of 10.

Limited Warranty

The Furman PB-48 and PB-48D are warranted against failures due to defective parts or faulty workmanship for a period of three years after delivery to the original owner. During this period, Furman will make any necessary repairs without charge for parts or labor. Shipping charges to the factory or repair station must be prepaid by the owner; return shipping charges (via UPS Ground) will be paid by Furman.

This warranty applies only to the original owner and is not transferable. Also, it does not apply to repairs done other than by the Furman factory or Authorized Repair Stations.

This warranty shall be cancelable by Furman at its sole discretion if the PB-48 or PB-48D unit has been subjected to physical abuse or has been modified in any way without written authorization from Furman. Furman's liability under this warranty is limited to repair or replacement of the defective unit.

Furman will not be responsible for incidental or consequential damages resulting from the use or misuse of its products. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Warranty claims should be accompanied by a copy of the original purchase invoice showing the purchase date (if a Warranty Registration Card was mailed in at the time of purchase, this is not necessary). Before returning any equipment for repair, please read the important information on service below.
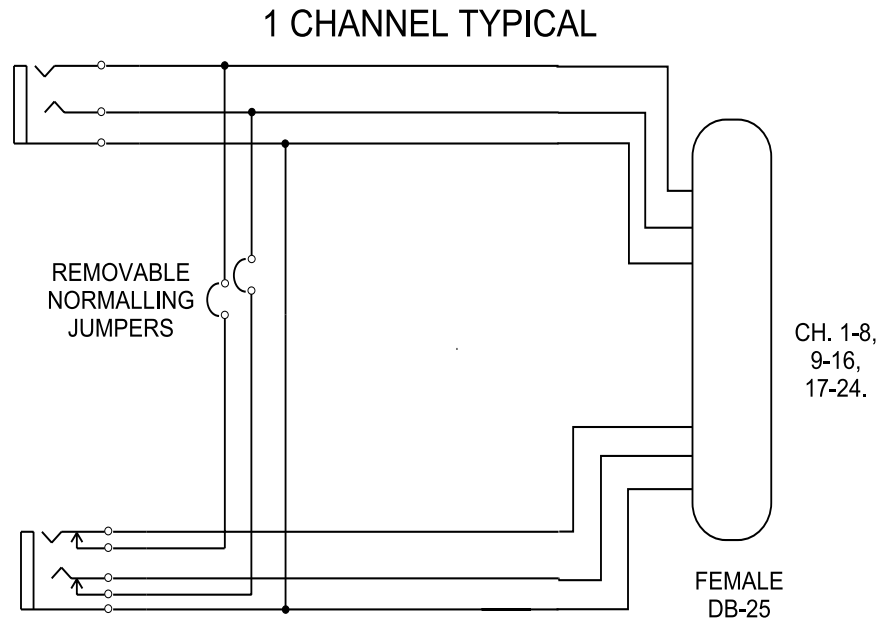
Service

Before returning any equipment for repair, please be sure that it is adequately packed and cushioned against damage in shipment, and that it is insured. We suggest that you save the original packaging and use it to ship the product for servicing. Also, please enclose a note giving your name, address, phone number and a description of the problem.

NOTE: All equipment being returned for repair must have a Return Authorization (RA) Number. To get an RA Number, please call the Furman Service Department, (707) 763-1010, Ext. 40, between 8 am and 5 pm U.S. Pacific Time. Please display your RA Number prominently on the front of all packages.

PB-48D Schematic Diagram
1 vertical pair shown, typical of all 24

1 CHANNEL TYPICAL

REMOVABLE
NORMALLING
JUMPERS

CH. 1-8,
9-16,
17-24.

FEMALE
DB-25

FURMAN