Configuring PBX Series Preamplifiers

This guide applies to Plexon PBX-series preamplifiers. PBX-series preamplifiers (preamp) consist of a chassis with a power and control board (PRP), and depending on the type of preamp, up to four amplifier boards with corresponding jumper cables and input headers. Plexon PBX preamps can be configured to work in conjunction with Plexon Ref2 software to enable differential recording (referencing).

These instructions include the steps you need to disassemble the PBX preamp, identify the various type of circuit boards, locate and set jumpers, and reassemble the PBX. You can also use these instructions to expand, exchange, or upgrade circuit boards in a PBX.

Before you begin

You need approximately one square meter of work space and the following tools:

- One wrist ground strap
- One Phillips Number 1 screwdriver
- One Phillips Number 2 screwdriver

Circuit Board Removal

The following procedure includes the steps required to remove the circuit boards from the PBX preamp chassis. To change jumper settings, or to repair or upgrade a board, you must remove all the boards from the preamp chassis.

To remove the preamp circuit boards

1. On the front panel of the preamp, turn off the power switch.
2  Remove all headset connectors.

3  Remove all data-cable connectors.
4. Remove the power-supply connector.

**CAUTION**

**Electrostatic Discharge**

The preamp circuit board components can be damaged by improper handling. Use appropriate electrostatic discharge procedures to handle the preamp circuit boards and components. See [http://www.esda.org](http://www.esda.org) for information on ESD procedures.

5. Move the preamp to a clean static-free work area. Put on the ground strap.
6 Remove and set aside the inter-board connectors.

**Note:** This illustration and the remaining ones show a preamp with four boards. Depending on the number of channels, preamps can have less than four boards.

7 At the rear panel, with a Number 1 Phillips screwdriver, remove and set aside the four (4) retaining screws.
8 At the front panel, with a Number 2 Phillips screwdriver, remove and set aside the power and control (PRP-type) board retaining screw.

9 As shown in the following illustration, gently pull the rear panel away from the chassis to a distance of about 1 inch (2.5 cm).

If you have a preamp chassis with four circuit boards, the bottom board can be restrained by the bottom edge of the front panel opening. As shown in the following illustration, continue
to remove the boards from the chassis while gently lifting the end the bottom board to clear the opening.

10 Slide the boards out of the preamp chassis.
11 Hold the circuit boards vertically with the rear panel resting on the work surface. As shown in the following illustration, gently separate the center connectors between the preamp power (PRP-type) board and the topmost signal (PRA-type) board.
As shown in the following illustration, lift the ends of the PRA-type boards out of the rear panel opening. Set aside the PRP-type board. Do not remove the PRP-type board from the rear panel assembly.
The PRA-type signal boards are held together near the center by either one connector (PRA-F type board) or four connectors (PRA-E type board), and at the rear-panel end by two more connectors. Disassemble the circuit boards as shown in the following illustrations. First, separate the top center connectors...
...then separate the end connectors. Set aside the topmost PRA-type board.

13 Separate the remaining PRA-type boards as indicated in Step 12. As the following illustration shows, set them aside in the order you removed them. You have completed the disassembly.
Setting Jumpers for Programmable Referencing With Plexon Ref2 Software

With Plexon Ref2 software, you can assign references to spike (sp) and field potential (fp) channels, and control the programmable referencing in up to four PBX preamps. To use Ref2, your PBX must be equipped with the correct type of boards, and the boards must be assembled in the correct order.

To enable programmable referencing with Ref2, each board must have an address. To correctly set the address, you must set jumpers on the PRP-type (power) board and on each PRA-type (signal) board. Follow the instructions in this section to identify the boards and to set the jumpers for use with Ref2 software.

Board Identification and Jumper Locations

Refer to the illustrations that follow to identify each type of circuit board and the jumper locations on each board. PBX preamps can be equipped with two different types of PRP-type boards and various types of PRA boards.

Identifying PRP Boards

The PRP-type board in a PBX preamp is the top board, which is attached to the rear panel by the power supply connector. PBXs use two different types of PRP boards: “PRP-D” or “PRP-F”. Determine the type of PRP board from the product code printed directly on the circuit board. For programmable referencing with Ref2 software, PRP-D boards use jumper W1, and PRP-F boards use jumper J10. The jumpers appear in different locations on the PRP-D and PRP-F boards. Refer to the illustrations that follow to identify the type of PRP board and the jumper locations on each type.
PRP-D Board: If your preamp uses a PRP-D type board, use the following illustration to locate jumper W1.
PRP-F Board: If your preamp has a PRP-F type board, use the following illustration to locate jumper J10.
Identifying PRA Signal Boards

PRA-type boards are stacked below the PRP top board. PBXs use various types of PRA boards. There are two types of PRA printed circuit boards, which can be labelled as follows:

- **PRA-F type boards:** PRA2/16sp (spike), PRA2/16fp (field potential), PRA2/16wb (wide band)

- **PRA-E type boards:** PRA/16sp-r (spike with referencing), PRA/16fp-r (field potential with referencing), PRA/16wb-r (wide band with referencing)

The PRA-E type boards can be used with Ref2 software. Identify the type of PRA board from the product code printed directly on the circuit board. If you do not have PRA-E type boards with cross-point switches, you cannot use Ref2 for programmable referencing.

**PRA-F Boards:** The illustration that follows shows a PRA-F type board. In this case, the PRA-F identifier on the board is obscured by the label. If your preamp includes PRA-F type boards, you cannot use these boards for programmable referencing. There are no programmable cross-point switches on PRA-F type boards. To upgrade the boards in your preamp for programmable referencing, contact Plexon customer support.
**PRA-E Boards:** If your preamp includes PRA-E type boards with cross-point switches, use the following illustration to locate the W1 and W2 jumpers.
Setting PRP Boards

To enable referencing for one or more PBX preamps, set the PRP (power) board jumpers according to the following table.

### Table 1: PRP Board Jumper Settings

<table>
<thead>
<tr>
<th>PBX Order</th>
<th>PRP-F</th>
<th>PRP-D</th>
</tr>
</thead>
<tbody>
<tr>
<td>First preamp</td>
<td>J10 &lt;open&gt;</td>
<td>W1 &lt;open all positions&gt;</td>
</tr>
<tr>
<td>Second preamp</td>
<td>J10 &lt;closed&gt;</td>
<td>W1 &lt;closed position 1&gt;</td>
</tr>
<tr>
<td>Third preamp</td>
<td>Not an available configuration for PRP-F</td>
<td>W1 &lt;open 1, closed 2&gt;</td>
</tr>
<tr>
<td>Fourth preamp</td>
<td>Not an available configuration for PRP-F</td>
<td>W1 &lt;closed 1, closed 2&gt;</td>
</tr>
</tbody>
</table>
Setting PRA-E Type Boards

To enable referencing for the PRA-E type boards in each preamp, set jumpers W1 and W2 in the order shown in the following table.

Table 2: PRA-E Board Settings

<table>
<thead>
<tr>
<th>Board Order (below PRP)</th>
<th>Jumper Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;On each board, W1 must = W2&gt;</td>
</tr>
<tr>
<td>Board 1 &lt;top&gt;</td>
<td>![Image of board 1]</td>
</tr>
<tr>
<td>Board 2</td>
<td>![Image of board 2]</td>
</tr>
<tr>
<td>Board 3</td>
<td>![Image of board 3]</td>
</tr>
<tr>
<td>Board 4 &lt;bottom&gt;</td>
<td>![Image of board 4]</td>
</tr>
</tbody>
</table>

Note: PRA-F type boards must be installed below PRA-E type boards. Boards without reference selection cannot be addressed by control software and they do not affect the addressing of...
PRA-E type boards. However, if PRA-F boards are placed in the wrong order, they can affect the address chain. For more information, see the following note.

**CAUTION**  
**Breaking the address chain**  
Boards without programmable reference selection, like the PRA-F type boards, do not have the necessary connectors to transmit address information. If you place these boards between boards with reference settings, the addresses of the boards below them cannot be read by the Ref2 software.

**Example Configuration**

The following example lists a configuration with:

- two PBX preamps equipped with PRP-D type boards (Box 1 and Box 2)
- two spike (sp) PRA-E type boards in each preamp (total of 4 x 16 = 64 sp channels)
- one field potential (fp) PRA-F type board in each preamp (total of 2 x 16 = 32 fp channels)

<table>
<thead>
<tr>
<th>PBX</th>
<th>Board Type</th>
<th>Use</th>
<th>Jumper Setting</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>First preamp</td>
<td>PRP-D</td>
<td>power</td>
<td>W1 &lt;open&gt;</td>
<td>Box 1</td>
</tr>
<tr>
<td></td>
<td>PRA-E</td>
<td>sp 1-16</td>
<td>W1 = 1, W2 = 1</td>
<td>Box 1 Board 1 (1-1)</td>
</tr>
<tr>
<td></td>
<td>PRA-E</td>
<td>sp 17-32</td>
<td>W1 = 2, W2 = 2</td>
<td>Box 1 Board 2 (1-2)</td>
</tr>
<tr>
<td></td>
<td>PRA-F</td>
<td>fp 1-16</td>
<td>not addressable</td>
<td>no address (---)</td>
</tr>
<tr>
<td>Second preamp</td>
<td>PRP-D</td>
<td>power</td>
<td>W1 &lt;closed 1&gt;</td>
<td>Box 2</td>
</tr>
<tr>
<td></td>
<td>PRA-E</td>
<td>sp 33-48</td>
<td>W1 = 1, W2 =1</td>
<td>Box 2 Board 1 (2-1)</td>
</tr>
<tr>
<td></td>
<td>PRA-E</td>
<td>sp 49-64</td>
<td>W1 = 2, W2 =2</td>
<td>Box 2 Board 2 (2-2)</td>
</tr>
<tr>
<td></td>
<td>PRA-F</td>
<td>fp 17-32</td>
<td>not addressable</td>
<td>no address (---)</td>
</tr>
</tbody>
</table>

Typically, most installations follow a matching address and assembly order similar to the preceding example. However, due to inter-board connections (see the illustration at Step 6 on page 4), the PRA-E type boards in a first preamp with two spike (sp) and two field potential (fp) boards must be assembled in the following order:

1. PRP: power and control (top board)
2. Box 1 Board 1 (1-1): sp 1-16
3. Box 1 Board 2 (1-2): sp 17-32
4. Box 1 Board 4 (1-4): fp 17-32
5. Box 1 Board 3 (1-3): fp 1-16 (bottom board)
To replace preamp circuit boards

1 Prior to reassembly, examine all the boards carefully. Make sure there are no missing jumpers, loose connectors, bent pins, loose components, or other damage. Repair or replace components as required before proceeding with the reassembly.

2 Assemble the circuit boards in order from bottom to top. Seat the center connectors as shown in the following illustration and check the alignment as shown in Step 3.
3 From the opposite side of the circuit board, check to make sure that both rows of pins are correctly inserted in each center-connector socket. The following illustration shows an incorrect pin alignment.
4 Seat the connectors at end of the board.
5 Connect the top circuit board to the preamp PRP board. As shown in the following illustration, press firmly to seat all the center connectors.

6 The two LEDs at the front of the PRP board must be seated on the surface of the board before you insert the board into the chassis. The following illustration shows incorrectly seated LEDs. To correctly seat the LEDs, see Step 7.
7 As shown in the following illustration, press firmly on the top of the LEDs to seat them on the surface of the PRP board.

8 Align the circuit boards with the slots in the chassis. As the following illustration shows, you must align the top (PRP) circuit board with slot three in the chassis. Press gently on the rear panel and align the non-connector side of each board with the correct slot. Gently slide the boards into the chassis until the front edge of the bottom board contacts the front panel.
9 As shown in following illustration, push the boards into the chassis while gently lifting the front connector on the bottom board to ensure it clears the edge of the front panel. Push the boards into the chassis until the switch handle reaches the front panel.

10 Check to make sure the LEDs are correctly aligned as shown in the following illustration. If necessary, gently move the switch handle to align the LEDs with the holes in the front panel. Push the boards into the slots until the back panel contacts the chassis.
11 At the front panel, with a Number 2 Phillips screwdriver replace the PRP board retaining screw.

12 At the rear panel, with a Number 1 Phillips screwdriver replace the four (4) retaining screws.
13 If your setup includes replacement PRA-E signal boards, insert Cable Adapter CA-11.

14 Replace the inter-board connectors.

15 Return the preamp to the experimental environment. Replace the preamp power connector, data-cable connectors, and headset connectors in the reverse order of removal. You have completed this procedure.