



Installing a DI-10 Digital I/O Board in an ASR-10 Keyboard or Rack

**Operating instructions for the DI-10 kit are included in the Version 3 Operating System Musicians Manual. If your customer doesn't have the Version 3 Operating System Musicians Manual order the version 3 update kit now!*

Check the Operating System EPROM version FIRST. The unit must have O.S. EPROMs version 1.50B or higher for Digital I/O to work. If the O.S. EPROMs are lower than 1.50B, order the EPROM upgrade kit from ENSONIQ before continuing.

The DI-10 Digital I/O Interface board (S/PDIF) allows the customer to move sound data directly into or out of the ASR-10 without going through additional A/D or D/A conversion. It provides direct Digital Input and Output connection to and from the ASR-10 using RCA-type connectors. It also can provide direct 44.1 kHz digital audio output of the Main Output mix when the current effect uses a 44.1 kHz sample rate. The Digital Input can be used for direct digital sampling from an external digital audio source at 44.1 or 48 kHz. The Digital Input and Output conforms to the S/PDIF standard.

Note: If you wish to record the 44.1 kHz digital output of the ASR-10 to a DAT recorder, the DAT recorder must be able to record from its digital input at 44.1 kHz. Some older/consumer DAT recorders do not record at 44.1 kHz as a copy protection scheme: these DAT recorders will not record the ASR-10's 44.1 kHz digital output (see Section E).

Tools Needed: Phillips-head screwdriver, Scribe, Needlenose pliers

Section Title

- A Parts Included in the Kit
- B Keyboard Installation
- C Rack Installation
- D Check to make sure the unit sees the DI-10 board
- E Using and Troubleshooting the Digital Output

A. Parts Included in the Kit

<u>Quantity</u>	<u>Description</u>	<u>ENSONIQ Part number</u>
4	plastic standoffs	1702000301
1	DI-10 PCB Insulator	4500003601
1	20-pin ribbon cable for Keyboard unit (no folds in cable)	2050203401

1	20-pin ribbon cable for Rack unit (folded cable)	2050203501
1	dual shielded cable	2060005801
1	PCB Assembly, DI-10 option board	4090020901

B. Keyboard Installation (For ASR-10 Racks, go to section C.)

1. Remove all cables connected to the ASR-10, including the power cord.
2. Turn the unit upside down on a soft surface and remove all the screws from the base and rear panel. **Note** that you will have at least two different types of screws. Remove the bottom cover.
3. Make sure that the EPROMs are version 1.50B or higher. The two Operating System EPROMs, LOWER (U19) and UPPER (U22), are located in the center of the digital board (409001700X) near the OTTO chip.
4. With the jacks closest to you, find the four (4) holes in the keyboard bracket to the left of the digital board. The disk drive ribbon cable runs through this area and it is the area behind the SCSI board (see **Figure 1**).

NOTE: On some units, one of the two disk drive ribbon cable clamps may have been put on the keyboard bracket in this DI-10 mounting area. If the unit you are working on is like this, the ribbon cable clamp must be removed. A screwdriver will do the job, as the cable clamp is attached with double-sided foam tape. There is no need to replace the ribbon cable clamp. The DI-10 board will mount on top of the disk drive ribbon cable and hold it in place.

5. Place the DI-10 board assembly over the holes in the position shown in **Figure 1**. Snap the DI-10 board standoffs into the keyboard bracket. Make sure that the plastic standoffs are fully seated in the holes.

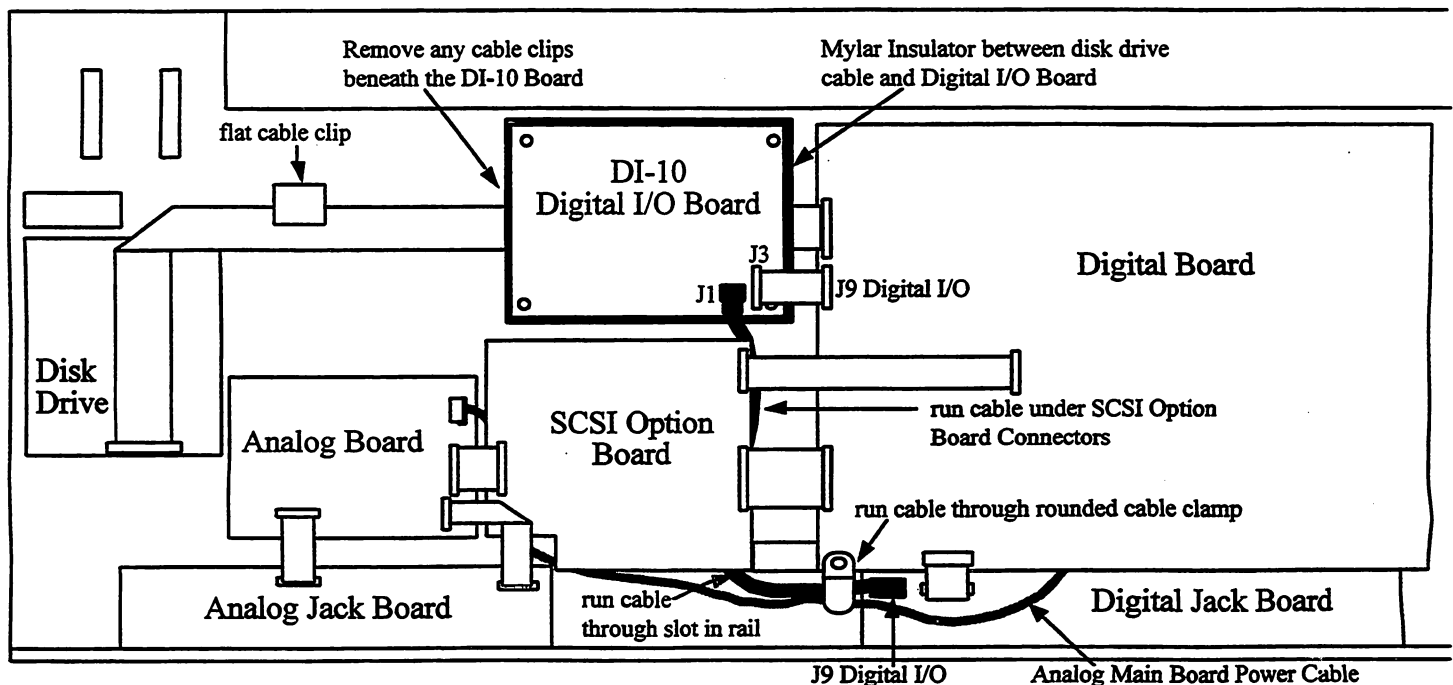


Figure 1 – Installing a DI-10 Board into an ASR-10 Keyboard Unit

NOTE: If you accidentally put the board on in the wrong way, it may be removed by pushing in the center tab of each plastic standoff. Do each corner one at a time, lifting the board just high enough to keep the plastic tab from relocking. When all four are done, the board can be lifted off and reseated in the proper direction.

6. Two 20-pin ribbon cables are shipped with this kit. The short one (no folds) is for ASR-10 keyboard units. The long one (with folds) is for ASR-10 Rack units. Connect one end of the short one to the DI-10 board at J3 and other end to the digital board at J9.
7. Feed the dual shielded cable through the slot in the metal work under the back (toward you) of the SCSI board mounting area.
8. Plug the dual shielded cable into J1 of the DI-10 board and J9 of the digital jack board. Note that the connectors are keyed.
9. Remove the mounting screw from the lower left hand corner of the digital board. This screw also holds in place a rounded cable clamp with a multi-conductor power cable going through it. Place the dual shielded cable into the cable clamp with the power cable. Reattach the cable clamp and digital board to the frame as it originally was.
10. **Go to Section D** to make sure that the unit is working properly.
11. Turn the unit off and turn it upside down and replace all the screws on the bottom plate and rear panel (**use no more than 8 in/lbs of torque**).

C. RACK INSTALLATION (For ASR-10 Keyboard, go to section B.)

1. Remove the twenty-five (25) screws that fasten the lid.
 - a) Remove the four (4) #8-32 machine screws and star washers from *each* side panel of the unit (the ones that could attach the mounting ears):
 - 1) four (4) #8-32 x 1/2" screws closest to front panel;
 - 2) four (4) #8-32 x 3/8" screws.
 - b) Remove the thirteen (13) #6-32 SEMS machine screws from:
 - 1) two (2) on each side panel of the unit;
 - 2) five (5) across the rear panel;
 - 3) with front panel closest to you, on the left side, three (3) from heat sink bracket to chassis;
 - 4) one (1) above the disk drive (about an inch back from the front panel) that attaches the cover to the disk drive bracket.
 - c) Remove the four (4) #6 x 3/16" self-tapping screws that attach the lid to the front panel.
 - d) Carefully remove the lid from the unit.

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2. Make sure that the EPROMs are version 1.50B or higher. The two Operating System EPROMs, LOWER (U19) and UPPER (U22), are located in the center of the digital board (409001700X) near the OTTO chip.
 3. You will be installing the DI-10 board onto the under side of the PCB Mounting Bracket. To remove the PCB Mounting Bracket (see **Figure 2**):
 - a) Disconnect the 20-pin ribbon cable from J1 of the digital board.
 - b) Disconnect the 34-pin ribbon cable from J10 of the digital board.
 - c) Disconnect the 20-pin ribbon cable from the J7 location of the digital board. Use caution as this connector is beneath the cable going to J4 at the center of digital board.
 - d) Turn the unit around so that the jacks are closest to you and remove the six (6) #6-32 x 1/4 SEM (screw with a star washer attached) screws from the back panel of the bottom housing.
 - e) Turn the unit around so that the front panel is closest to you. Carefully, so that it doesn't drop, slide the PCB mounting bracket toward the front panel.
 - f) Tilt the front of the PCB Mounting Bracket up and disconnect the 7-pin power cable from J2 of the digital board.
 - g) Lift up the front end (side closest to the front panel) of the PCB Mounting Bracket to remove the keyed 6-pin power cable from J3 on the analog board. It is on the underside of the PCB Mounting Bracket in the same area and the 7-pin power cable to the digital board.
 - h) Now you will be able to tilt the PCB Mounting Bracket to an upright position, so that it is sitting on the jacks. It helps to slightly lift the jack end of the PCB Mounting Bracket first, then the front end.
 4. Find the four holes in the center of the underside of the PCB Mounting Bracket.
 5. Snap the DI-10 board assembly (board with insulator and four plastic standoffs attached) into the four holes, see **Figure 3**. Make sure it is oriented such that both connectors on the DI-10 board are toward the SCSI board. Support the other side of the PCB Mounting Bracket while installing the DI-10 board.

NOTE: If you accidentally put the board on in the wrong way, it may be removed by pushing in the center tab of each plastic standoff. Do each corner one at a time, lifting the board just high enough to keep the plastic tab from relocking. When all four are done, the board can be lifted off and reseated in the proper direction.

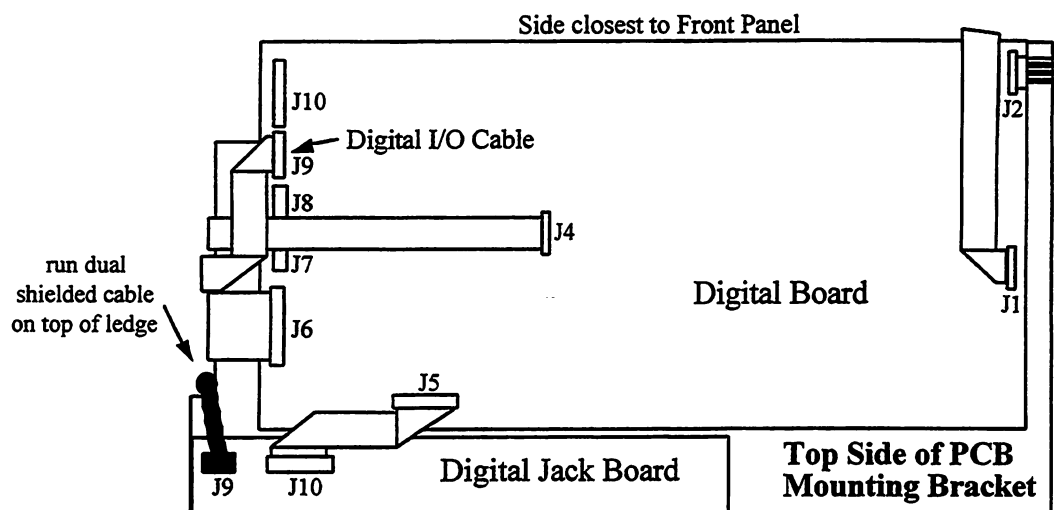


Figure 2 – Top Side of the ASR-10 Rack PCB Mounting Bracket

6. Plug one end of the dual shielded cable onto J1 on the DI-10 board. This connector is keyed so it will only go on one way.
7. Two 20-pin ribbon cables are shipped with this kit. The short one (no folds) is for the keyboard unit. The long one (with folds) is for the rack unit. Connect the long one onto J3 of the DI-10 board (single bend end) and the other side to J9 on the digital board (double bend end).
8. Run the cable down between the DI-10 and SCSI boards. Then turn the cable so that it runs between the SCSI and analog jack board. Bring the cable up over the cutout on the PCB Mounting Bracket to the top side of said bracket.
9. Plug the free end of the dual shielded cable onto J6 of the digital jack board located on the top side of the PCB Mounting Bracket. This connector is keyed so it will only go on one way.

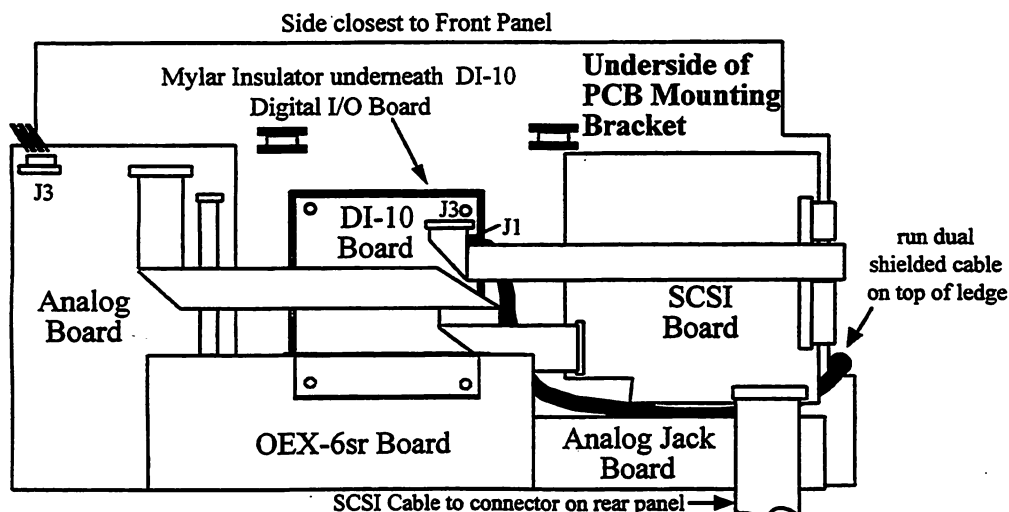


Figure 3 – Installing a DI-10 Board into an ASR-10 Rack Unit

10. Install the PCB Mounting Bracket:

- a) Tilt the PCB Mounting Bracket forward so that the power cables disconnected in steps 3f and 3g can be reattached. Connect the 6-pin power cable to J3 on the analog board (underside of PCB Mounting Bracket). Connect the 7-pin power cable to J2 on the digital board (top of PCB Mounting Bracket). Note that these connectors are keyed.
- b) Slide entire assembly toward the back of the unit. NOTE: Make sure the tabs on the power supply heat sink bracket slide into the slots on the bottom of the PCB Mounting Bracket.
- c) Set the PCB Mounting Bracket flat and slide it back such that the slots on the underside of the bracket lock in and the jacks go through the holes in the back of the unit. You can check to see if the slots are locked in by trying to lift the front of the PCB Mounting Bracket. It shouldn't lift up. Slide all jacks into the holes in the rear panel.

NOTE: If the jacks don't align properly, use a small screwdriver to partially insert into the jack and wiggle them into the rear panel holes.

11. Install the six (6) #6-32 x 1/4 SEMs into the rear panel of the unit to hold the PCB Mounting Bracket in place.

12. Reconnect all cables (see **Figure 2**):

- a) Connect the 34-pin disk drive ribbon cable to J10 of the digital board;
- b) Connect the display cable to J1 of the digital board;
- c) Connect the KPC simulator cable to J7 of the digital board. Use caution as this connector is beneath the cable going to J4 (center of board).

13. Go to **Section D** to verify that the unit is working properly.

IMPORTANT! Be sure to install all screws into the control panel with a hand screw driver to avoid stripping the holes.

14. Replace the lid

- a) Install the thirteen (13) #6-32 SEMS (screws with star washers attached) machine screws:
 - 1) nine (9) lid to chassis;
 - 2) one (1) above the disk drive (about an inch back from the front panel) that attaches the cover to the disk drive bracket;
 - 3) three (3) from heat sink bracket to chassis (with front panel closest to you, on the left side).
- b) Install the four (4) #6 x 3/16" self-tapping screws on the top of the unit closest to the control panel.
- c) Install the four (4) machine screws and star washers into *each* side of the unit (the ones that could attach the mounting ears):

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- 1) four (4) #8-32 x 1/2" screws closest to front panel;
 - 2) four (4) #8-32 x 3/8" screws.

D. Check to make sure the unit sees the DI-10 board

1. Position the unit so that you can see the display, and turn it on.
2. Insert an ASR-10 O.S. disk into the disk drive.
3. After the unit boots up, press **Sample**. The display should show REC SRC=INPUTDRY
LEFT
4. Press the **left arrow** button to move the cursor under INPUTDRY.
5. Use the **up arrow button** to make sure that the display shows REC SRC=DIGITAL LEFT.
If it doesn't, turn the unit off and check your cable connections.
6. Go back to the section for the unit that you are working on.

E. Using and Troubleshooting the Digital Output

When the current system sample rate (as determined by the current effect algorithm) is 44.1 kHz, the Digital Output jack will provide direct 44.1 kHz digital audio output of the MAIN-OUT mix (voices routed to BUS1, 2, or 3). Any voices routed to the AUX 1, 2, or 3 busses will not be sent to the Digital Output. Note that when the current effect algorithm uses a 30 kHz sample rate, the Digital Output is disabled.

To find the sample rate of the currently selected effect algorithm, press the **FX Select•FX Bypass** button, followed by the **Left Arrow** button. The display will read either 23 VOICES AT 44 KHZ or 31 VOICES AT 30 KHZ.

A common use for the Digital Output is to mix-down sequences/songs to a DAT recorder equipped with a "coaxial" RCA-type S/PDIF digital input jack. Here's how:

- Connect the ASR-10 Digital I/O Output jack to the S/PDIF digital input jack of a DAT recorder, using a single RCA-type cable.
- Press the **FX Select•FX Bypass** button. Using the data entry controls, set the current effect to one that uses a 44.1 kHz sample rate.
- Set up the DAT recorder (using the instructions that came with the DAT machine) to record the sequence/song. The DAT recorder must be set to SP (standard play) 44.1 kHz.
- Press Record on the DAT recorder, then press the **Play** button on the ASR-10.
- When the sequence/song is finished playing, press the **Stop** buttons on both the ASR-10 and the DAT recorder.

Problem: The DAT machine will not record. There are two possible causes:

1. Some older/consumer DAT recorders, such as the Sony PCM 2500, do not record at 44.1 kHz as a copy protection scheme; these DAT recorders will not record the ASR-10's 44.1 kHz digital output.
2. The way the DAT recorder handles "bit 15" (now called the "L" bit) is non-standard.

If the customer is using an old DAT recorder that will not record at 44.1 kHz, nothing can be done. It is the fault of the DAT recorder. If you know that the customer's DAT recorder can record digitally at 44.1 kHz but it will not record the output of the ASR-10, try moving the J2 jumper to the 3 and 4 position (the DI-10 board is shipped with the J2 jumper in position 1 and 2). Ignore the "IEC-958/SPDIF" labelling on the PC board.

Note: In position 1 and 2 the "L" bit = 1.

In position 3 and 4 the "L" bit = 0.