Replacing the 40 Pin Head Ribbon Cable

To remove and replace the LCD Cable you will need the following tools:

- #2 Phillips screwdriver (magnetic tip preferred)
- Socket wrench with 10mm socket

Removing the Side Panel

1. **Ready the machine.** Unplug it from the power outlet and place it on a stable work platform. Raise the head up nearly to the top (do not over-raise) and move the Z-truck to the center of the machine for best access.

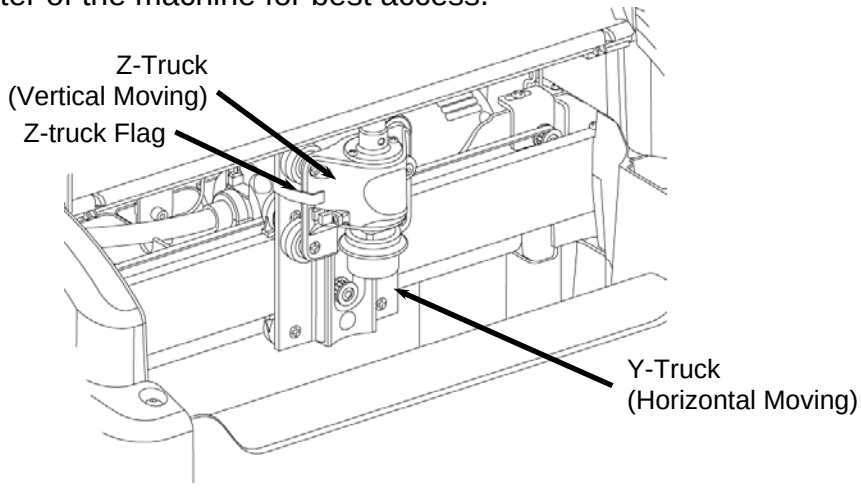


FIGURE 1: VIEW OF THE Z-TRUCK

2. **Ready the flexshaft for removal from the Z-truck.** Move the Z-truck to the very top of its travel (until it reaches the hard stop) so that the flexshaft support tube protrudes from the head cover (See Figure 2).

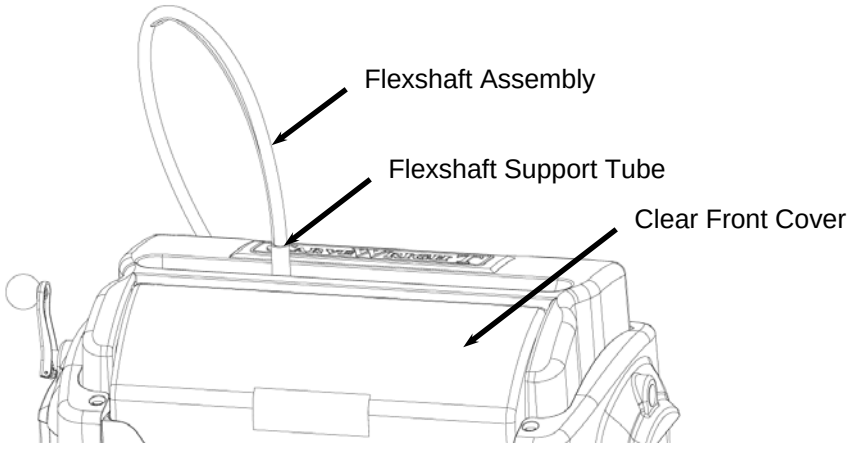


FIGURE 2: EXTERIOR VIEW OF THE FLEXSHAFT AND HEAD COVERS

3. **Detach the flexshaft from the top of the Z-truck.** The flexshaft assembly is retained by a ball detent located in the flexshaft receptacle (See Figure 3). Firmly grasp the flexshaft support tube while reaching under the clear front cover with your other hand to grab the Z-truck. Pull up firmly on the flexshaft support tube and twist slightly while bracing the Z-truck. **DO NOT PULL ON THE SHEATH.** The flexshaft will pop out of the detent. Wrap the end of the flexshaft in tape so that the core will not fall out and lay the detached flexshaft end to the side.

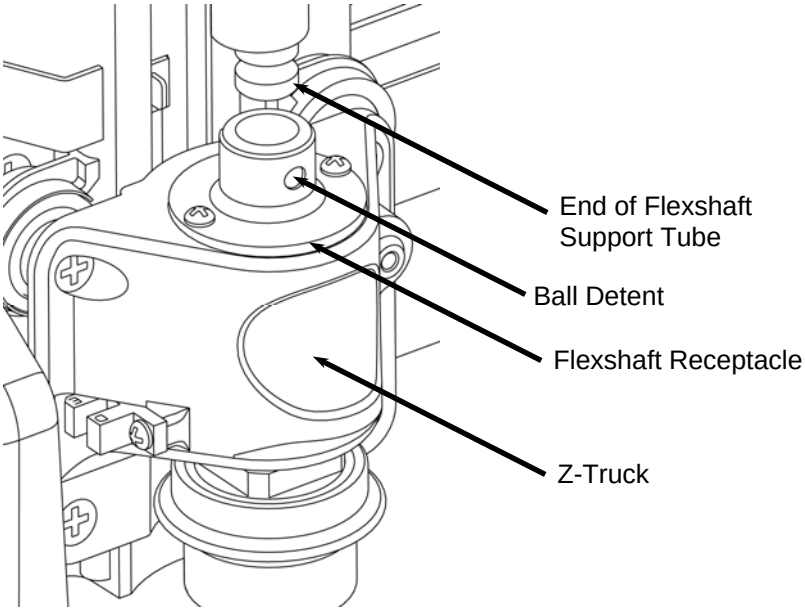


FIGURE 3: VIEW OF THE FLEXSHAFT CONNECTION TO THE Z-TRUCK

4. **Remove the machine cover screws.** Remove the four cover screws as shown in Figure 4 with the #2 Phillips drive screwdriver. Use a magnetic tipped screwdriver if possible to avoid dropping the screws into the machine. Also remove the vacuum bag if it is installed.

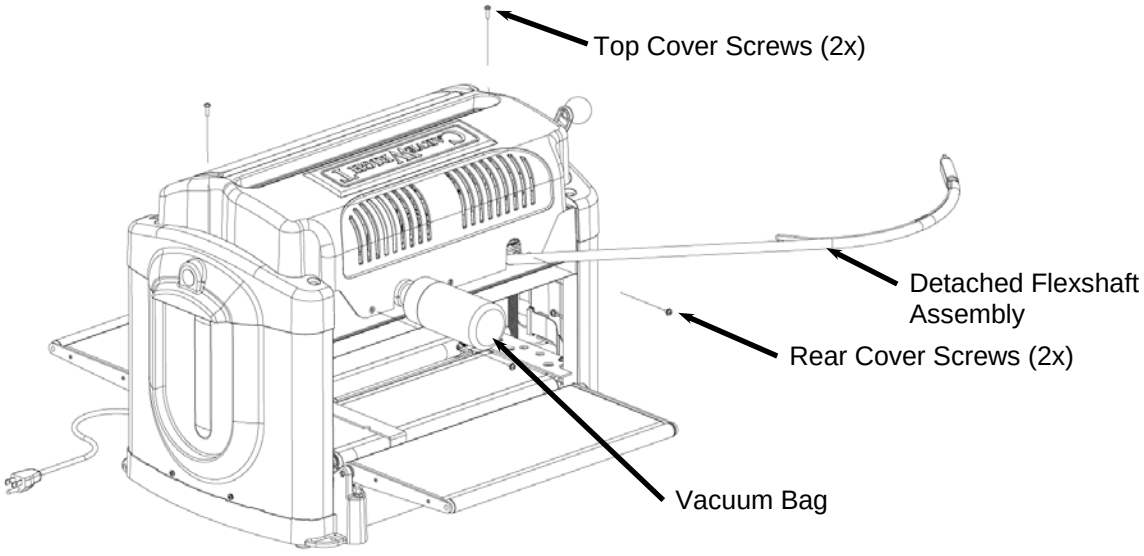


FIGURE 4: EXPLODED VIEW OF THE COVER SCREWS

5. **Detach the AC interrupt switch cable.** Lift the cover straight up and locate the two cables still connecting it to the head. On the side nearest the AC cut motor you will see the cable that connects the cover interrupt switch. Disconnect the two bullet connectors at the back of the AC motor. In most machines you will need to remove the screw in the small plastic enclosure to access the two bullet connectors.

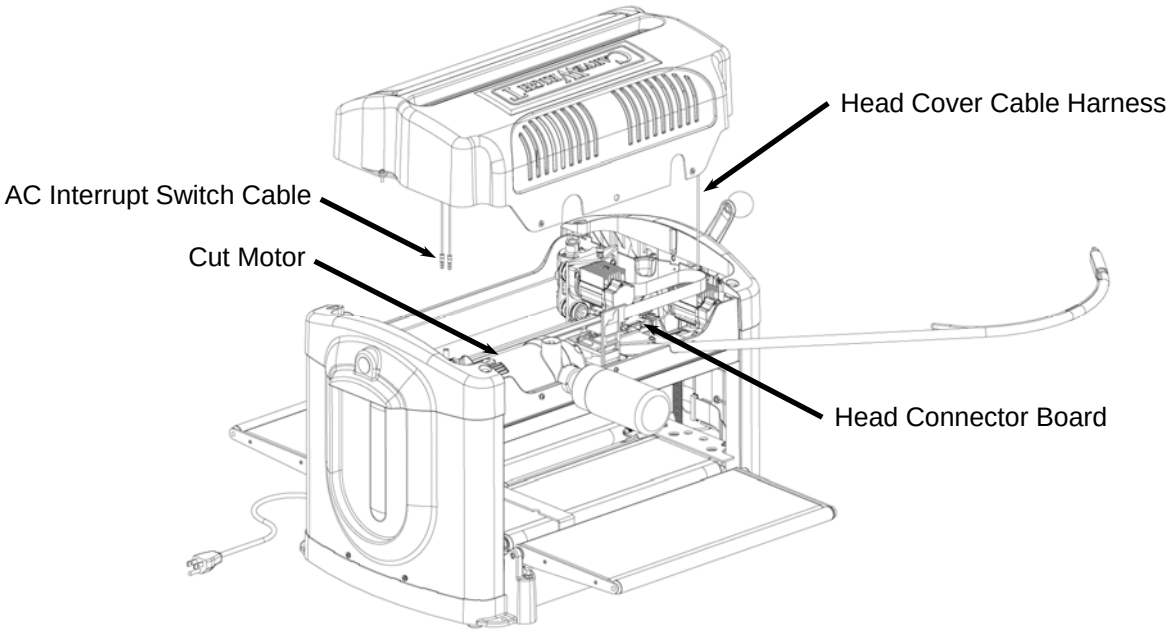


FIGURE 5: EXPLODED VIEW OF THE LIFTED COVER

6. **Unplug the head cover cable.** The head cover cable is located on the head connector board attached just to the left of the Y-drive motor (side opposite the AC motor). This cable has 8 wires and is terminated with a 10-pin connector. The location of this connector on the head connector board will vary depending on the machine's production date (See Figure 7). You may have to reach underneath the head to unplug the cable. Notice how the cable is routed alongside and under the Y-truck motor pack. This routing is important to remember when re-assembling the cover.

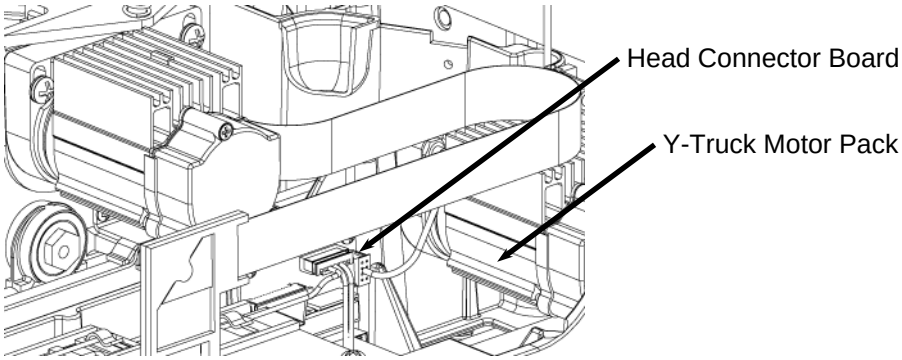


FIGURE 6: LOCATING THE HEAD CONNECTOR BOARD

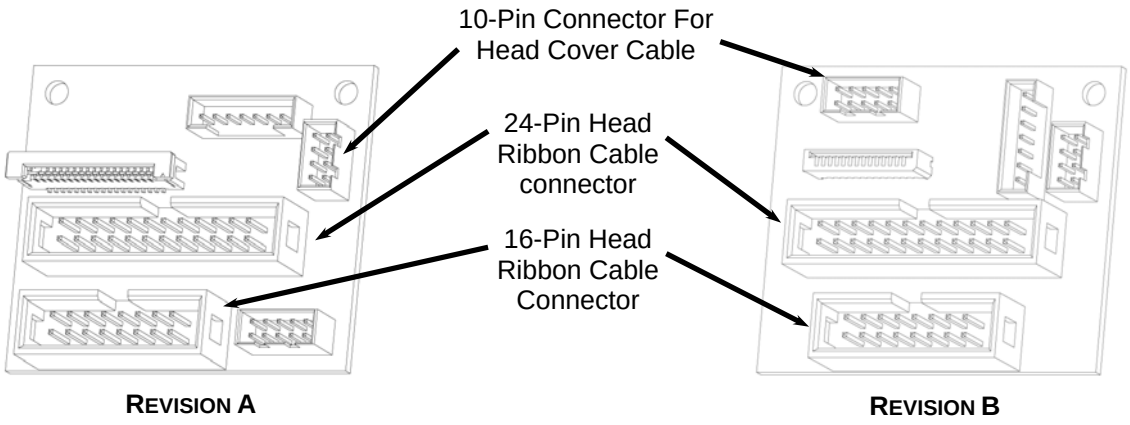


FIGURE 7: LOCATION OF CONNECTOR FOR HEAD COVER CABLE FOR THE EARLIER REVISION A AND LATER REVISION B MACHINES

7. **Unplug the head ribbon cables.** Locate (see Figure 7) and unplug the 24-pin and 16-pin ribbon cables from the head connector board.

8. **Remove the cover:** Once all connectors are unplugged, lift the head cover straight up and off. Make sure that the attached connectors do not become tangled in any other parts as you remove the cover. Observe how the cables are routed and folded to aid in re-assembly.

9. **Remove the ribbon cable protector for the cables routed from the base to the movable head along the inside of the left side panel assembly.** Remove the single screw as shown in Figure 8 with the #2 Phillips drive screwdriver. Use a magnetic tipped screwdriver if possible to avoid dropping the screws into the machine. Remove plastic cable protector from the machine.

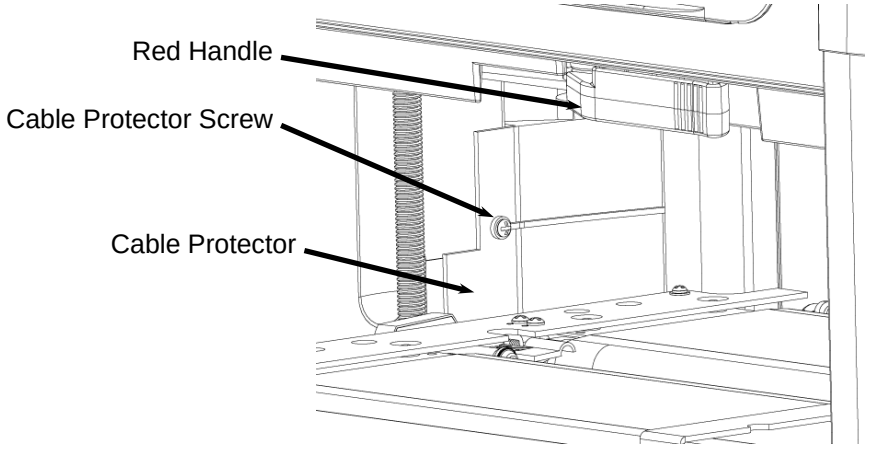


FIGURE 8: LOCATION OF THE HEAD CABLE PROTECTOR (LOOKING INTO THE MACHINE FROM THE FRONT)

10. **Unplug the LCD cable.** Grasp and pull the LCD cable connector straight out. Lay the cable end to the side of the panel.

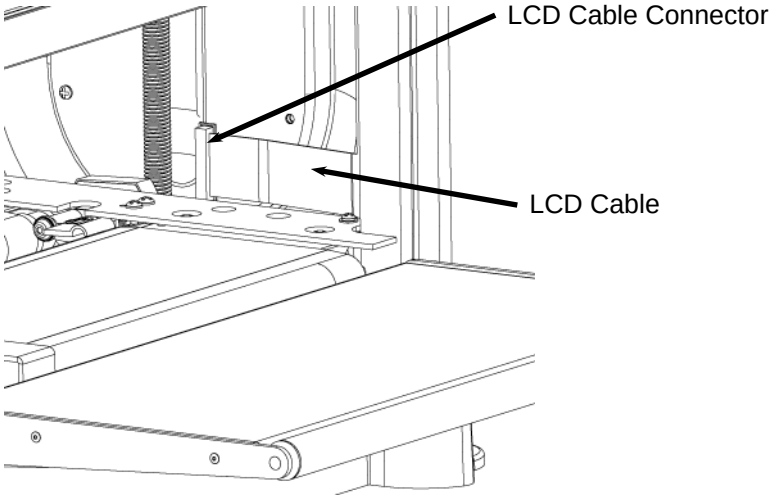


FIGURE 9: LOCATION OF THE LCD CABLE
(LOOKING INTO THE MACHINE FROM THE BACK)

11. **Remove the left side panel assembly.** Using the 10mm socket remove the two hex head bolts (and washers) from the top of the assembly. Remove the two Phillips head screws from the base of the side panel with the screwdriver. Lift off the side panel.

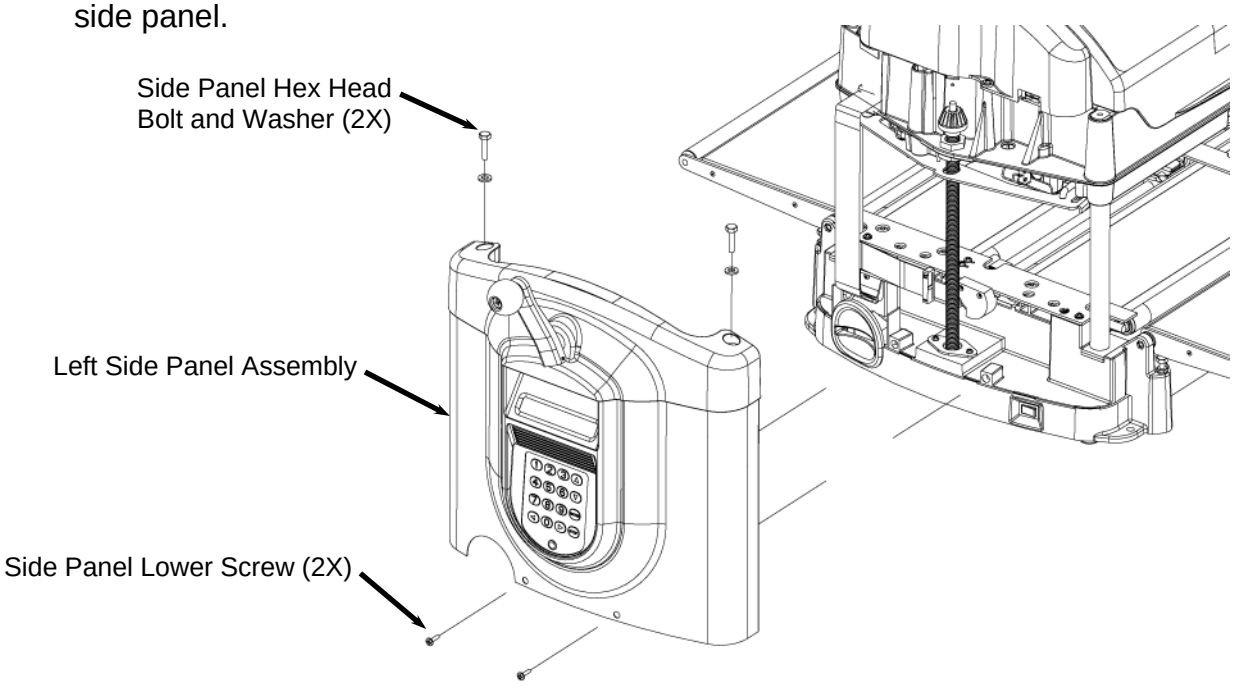


FIGURE 10: EXPLODED VIEW OF THE LEFT SIDE PANEL FASTENERS

12. **Clean the machine.** Make sure to remove all dust behind and around the base of the panel. This will assure a smooth reassembly, and that no dust will get into the open connectors.

13. **Remove the bottom ribbon cable bend guard.** There are three ribbon cables that are threaded through a small slot in machine base (two going to the head of the machine and one going to the LCD screen). There is a plastic bend guard on the outside edge of the opening that protects the ribbon cable and assures that they cable are not folded. Remove the guard screw and pull off the guard.

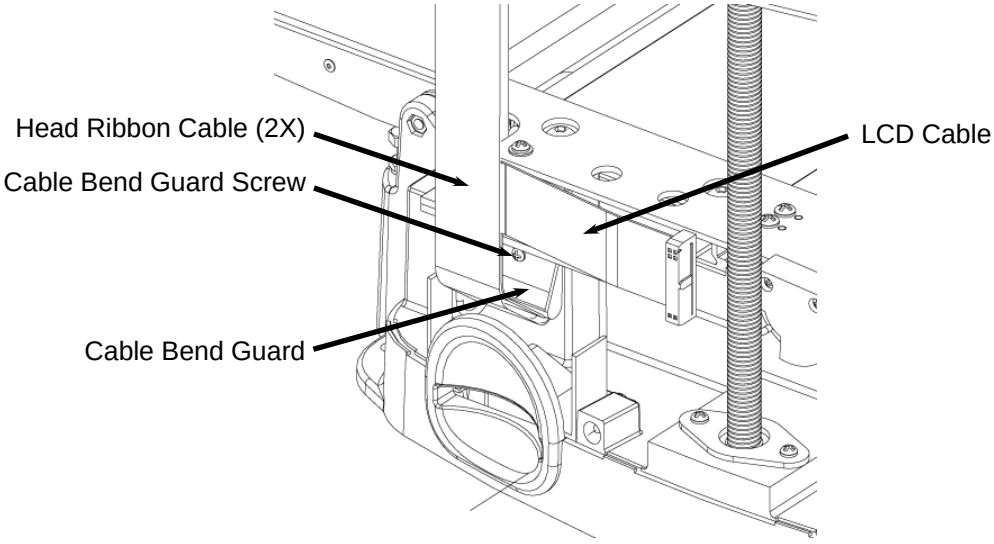


FIGURE 11: REMOVING THE BOTTOM RIBBON CABLE BEND GUARD

14. **Remove the top ribbon cable bend guard.** The same two head ribbon cables enter the head through a small slot and are retained by a plastic bend guard. The plastic bend guard is on the outside edge of the opening and protects the ribbon cables and assures that they are not folded. Remove the guard screw and pull off the guard.

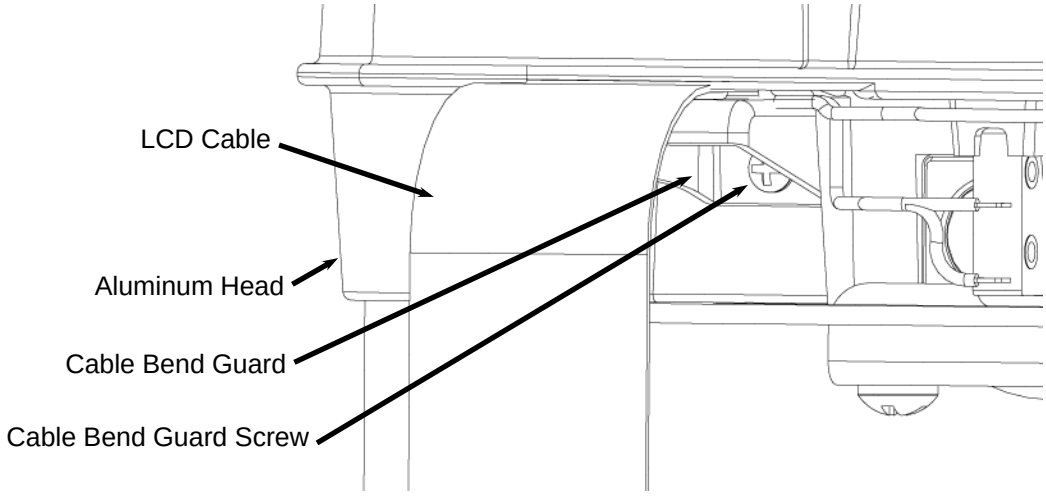


FIGURE 12: REMOVING THE TOP RIBBON CABLE BEND GUARD

15. **Remove the bottom cover.** Carefully lay the machine on its back with the dust collection port facing down. Remove the 12 screws securing the black sheet metal cover onto the base (four of which are located in the rubber feet) and remove.

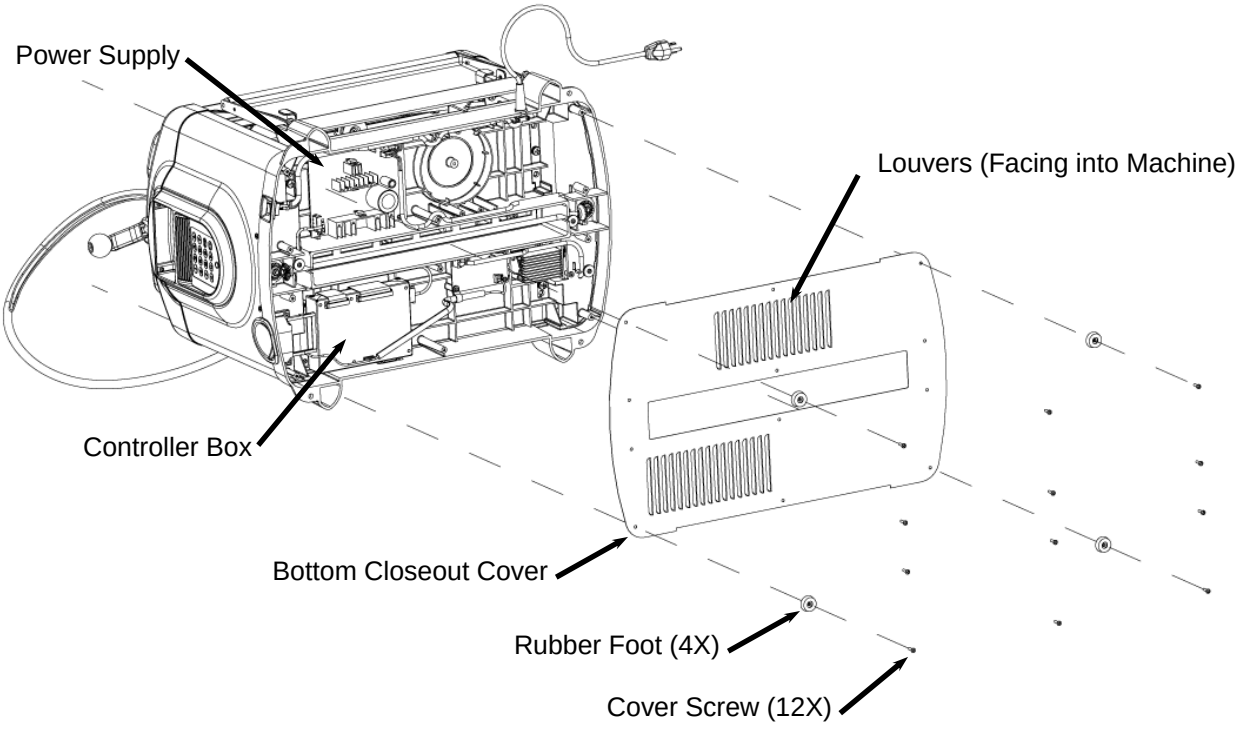


FIGURE 13: REMOVAL OF THE BOTTOM COVER

16. **Unplug the four cables connected to the controller.** Locate the controller box and unplug the DC power cable, the 40-pin ribbon connector, the 16-pin ribbon connector, and the AC motor control cable.

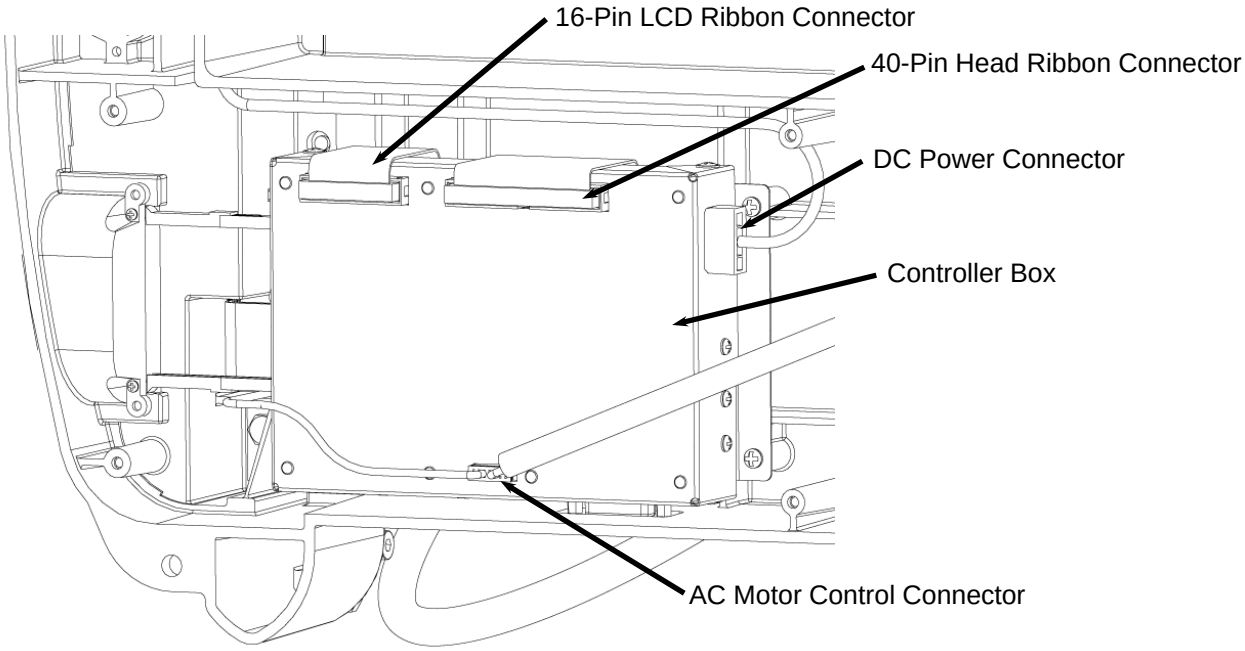


FIGURE 14: LOCATION OF THE CONTROLLER CONNECTORS

17. **Release the memory card guide arms.** These arms guide the memory card into the controller box and insure that the card connects properly. Remove the two screws securing these arms to the base casting.

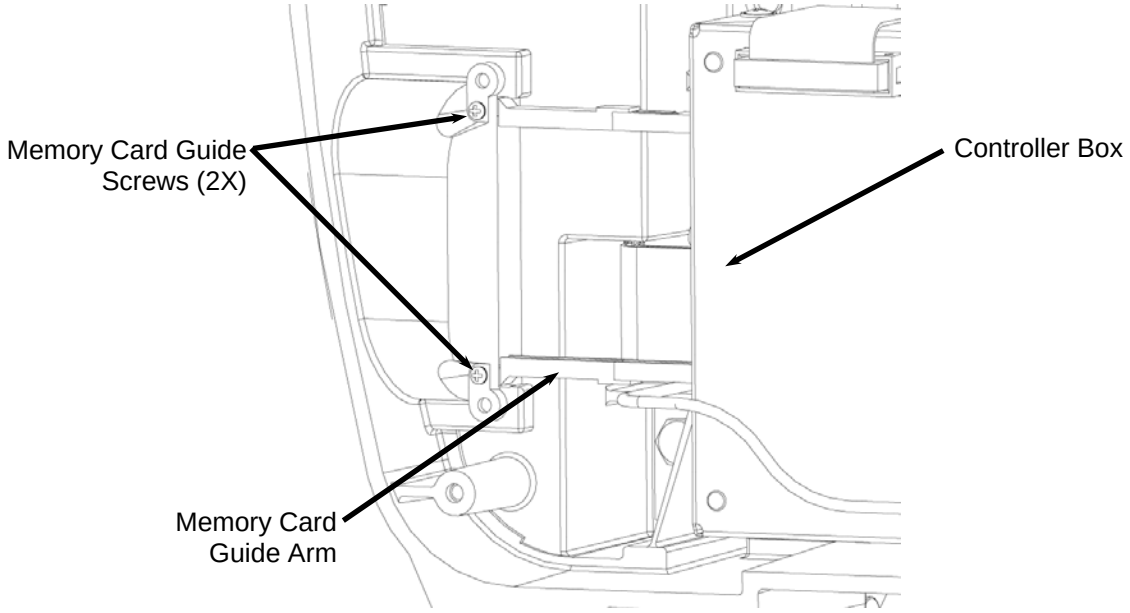


FIGURE 15: REMOVAL OF SCREWS SECURING THE MEMORY CARD GUIDE ARMS

18. **Remove the controller box.** Use the #2 Philips head screw-driver to remove the four screws that attach the controller box to the base casting. Gently slide the box toward the center of the machine to clear the memory card guide arms and lift the box free. Caution: these arms are delicate and can be broken if they are bent.

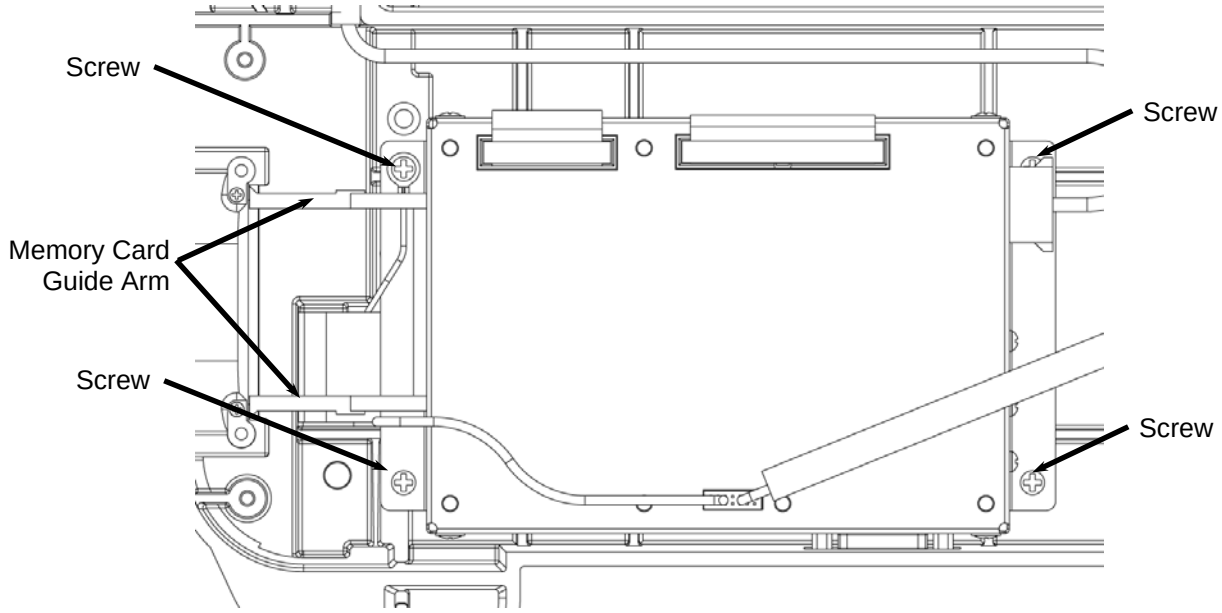


FIGURE 16: CONTROLLER BOX ATTACHMENT

19. **Remove the LCD ribbon cable.** Before removing the LCD cable, make sure to note how it is assembled into the machine. There are several bends that need to be made in the cable as well as a proper orientation. The LCD ribbon cable is threaded through a small slot in the base of the machine. Identify the correct cable by verifying that it is the 16-pin cable or by locating the unplugged connector on the other side. Gently feed the ribbon cable (and connector) through the slot. Be careful not to tear or pinch the head ribbon cables.

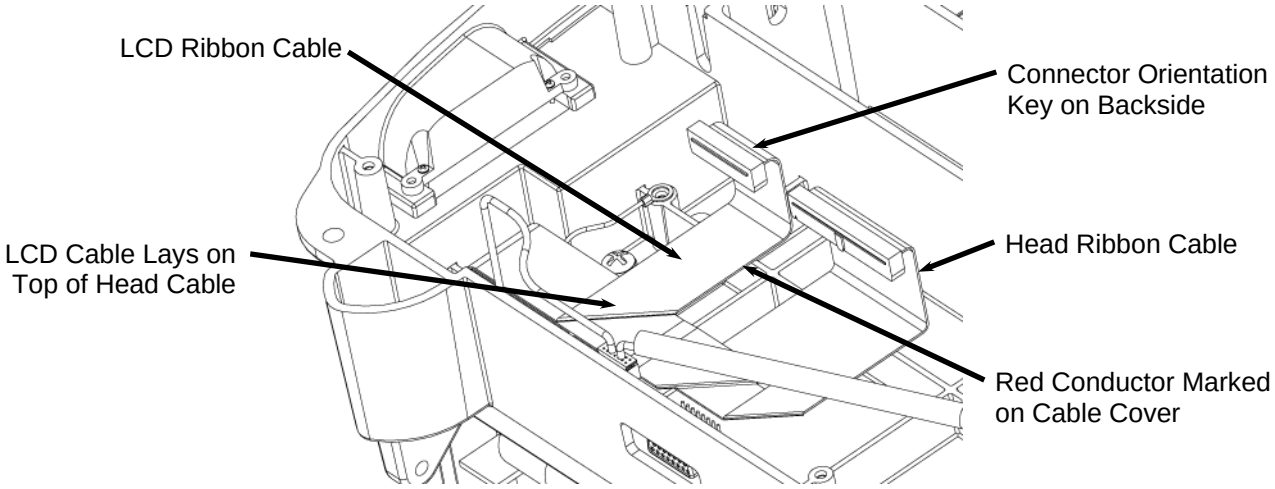


FIGURE 17: POSITION AND ORIENTATION OF THE LCD RIBBON CABLE

20. **Remove the head ribbon cable.** Before removing the Head ribbon cable, make sure to note how it is assembled into the machine. Also note that it terminates at the controller box as a 40-pin connector and then splits into two cables terminating in 16 and 24-pin connectors. There are several bends that need to be made in the cable as well as a proper orientation. The cable is threaded through a small slot in the base of the machine and a small slot in the head. Gently feed the ribbon cable (and connectors) through the slots in the head and the base. Be careful not to tear or pinch the cables.

Reassembling the Machine

1. **Replace the head ribbon cable.** Install the new head ribbon cable into the machine as shown in Figure 17. Use the old cable as needed to put the fold-overs in the correct position along the cable. Figure 18 shows the shape of the cable as it would appear in the machine (with the bottom of the machine pointing to the top of the page). Make sure that the red conductor is facing the correct direction.

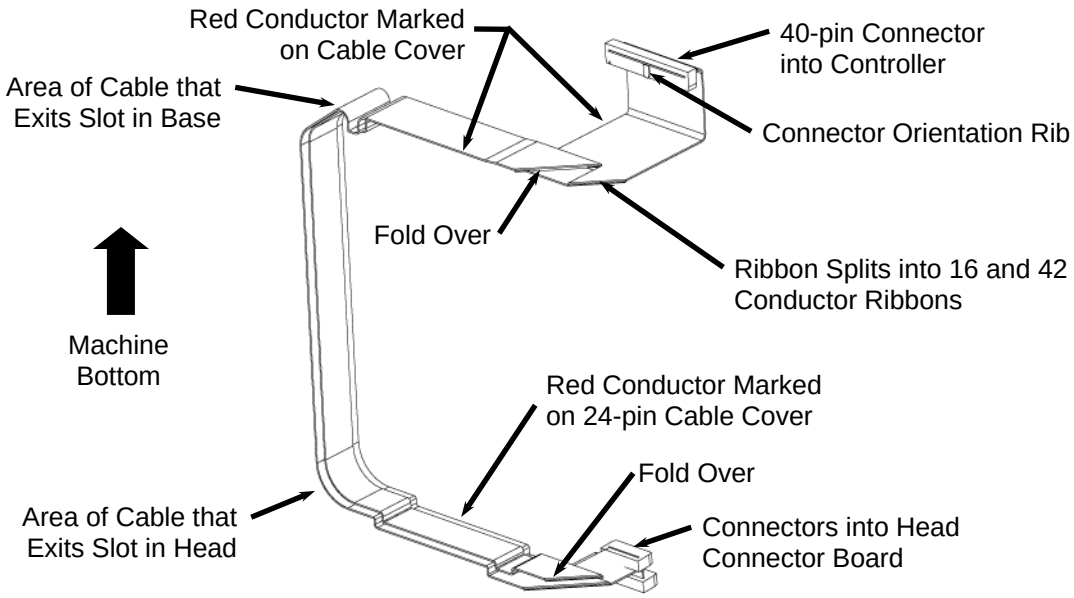


FIGURE 18: HEAD RIBBON CABLE ORIENTATION (AS SEEN IN THE MACHINE)

2. **Replace the LCD cable.** Install the LCD cable into the machine as shown in Figure 17. Use the old cable as needed to put the fold-overs in the correct position along the cable. Figure 19 shows the shape of the cable as it would appear in the machine (with the bottom of the machine pointing to the top of the page). Make sure that the red conductor is facing the correct direction and that the LCD ribbon cable sits on top of the head ribbon cable.

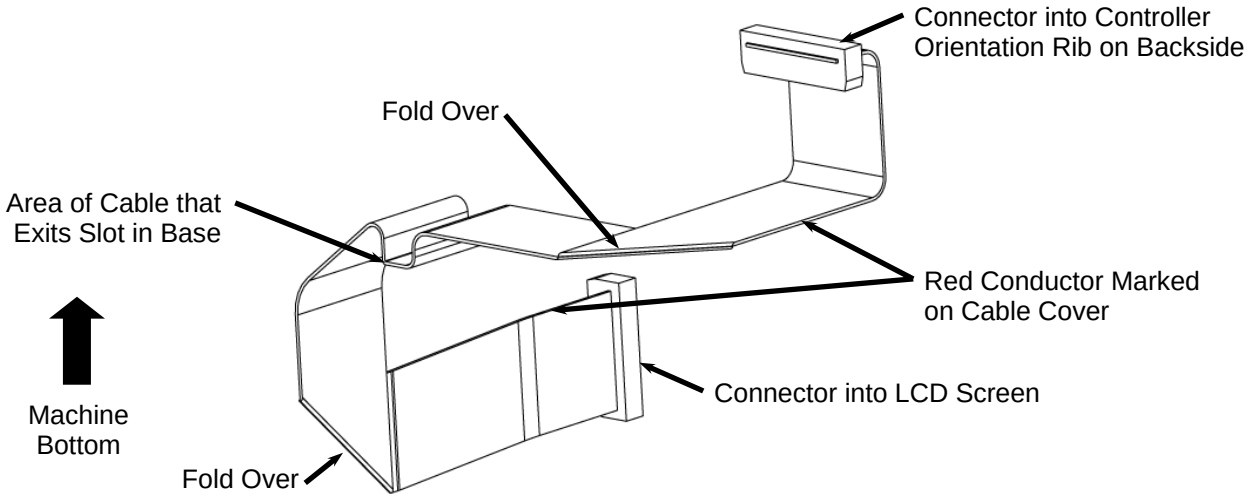


FIGURE 19: LCD CABLE ORIENTATION (AS SEEN IN THE MACHINE)

3. **Re-insert the controller box.** Slide the memory card guide arms into the slot in the side of the base and position the holes in the box over the holes in the base casting.

4. **Secure the controller box.** Replace and tighten the four screws that secure the controller box to the base casting. Next replace and tighten the two screws that secure the memory card guide arms to the base casting.

5. **Reconnect the controller cables.** Connect each of the four cables going to the controller box. Each cable connector has an orientation keying feature that restricts the connector from being plugged in backwards. **DO NOT FORCE A CONNECTOR**. If the connector does not seat easily please check the orientation and try again.

6. **Replace the bottom cover.** Replace the metal cover with the louvers pointing into the machine (see Figure 13). Insert and tighten the 12 screws. The four rubber feet are placed at the corners of the machine.

7. **Replace the ribbon cable bottom bend guard.** Place the ribbon cable bend guard back into position and insert the screw. Make sure that the three ribbon cables are looped underneath the guard as shown in Figure 6 and that they cables are not folded.

8. **Replace the ribbon cable top bend guard.** Place the ribbon cable top bend guard back into position and insert the screw. Make sure that the two head ribbon cables are looped underneath the guard as shown in Figure 12 and that they are not folded.

9. **Re-plug the head ribbon cables.** Re-connect the 16-pin ribbon and 24-pin ribbon connectors to the head termination board. Make sure that cables are routed under the Y-motor pack and that the alignment ribs on each connector are properly orientated.

10. **Replace the right side panel assembly.** Place the side panel assembly back onto the machine making sure that the bottom of the panel sits into the grooves and tabs located on the base casting. Insert the two bottom screws and tighten with a #2 Phillips drive screwdriver. Insert the top hex head bolts (with washers) and tighten with the 10mm socket.

11. **Plug in the LCD ribbon cable.** Plug the LCD ribbon cable into its connector located in a cutout on the back of the side panel assembly (see Figure 9).

12. **Re-assemble the ribbon cable protector.** While holding the three ribbon cables up against the side panel, slide the plastic cable protector into position over the screw hole in the side panel. Insert and tighten the screw. Verify that the cables are well secured behind the cable protector and that none are bent or pinched.

13. **Replace the head cover.** There are several important steps and checks needed as you replace the head cover.

    a. Move the Y-truck all the way to the left side of the machine and make sure that the FFC cable does not drag on the Y-truck heatsink (See Figure 20). If the FFC cable is dragging bend it upwards so that it consistently clears the heatsink.

    b. Make sure that the blow deflector is correctly placed. If it is out of place the board sensor can quickly become covered in dust and inoperable and/or the Z-truck will hit the blow deflector and stall. The deflector sits over the edge of the head casting and lines up with the air tube in the cover when assembled. Also see **Picture1** in Appendix A.

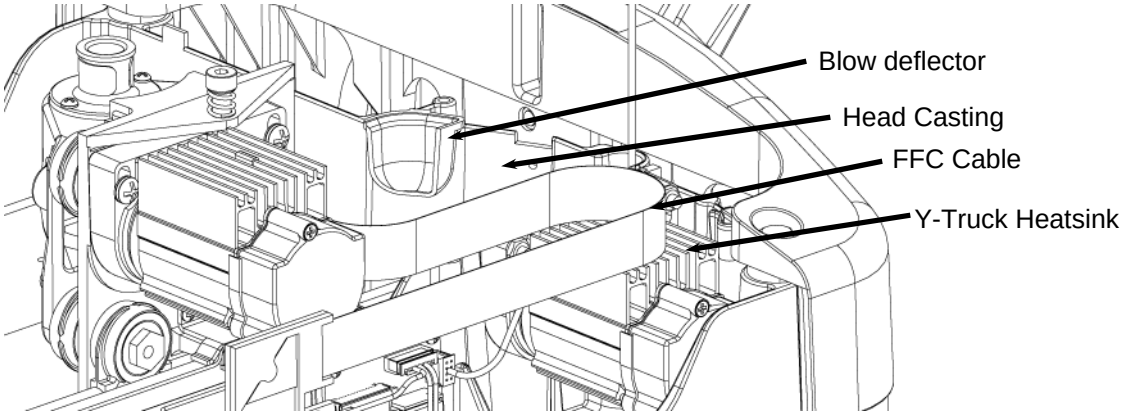


FIGURE 20: PLACEMENT OF THE BLOW DEFLECTOR - ISO

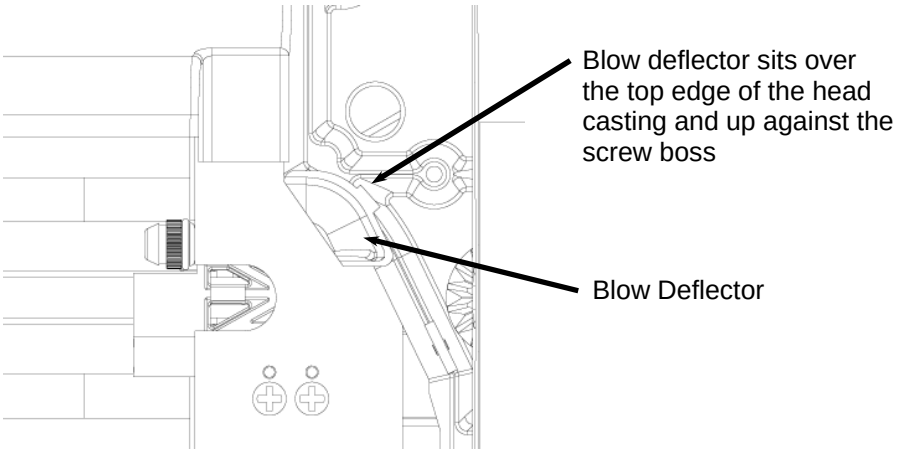


FIGURE 21: PLACEMENT OF THE BLOW DEFLECTOR - TOP

Route the Head Cable Harness down between the wall of the head casting and the side of the Y-motor pack, under the Y-motor pack and plug it into the connector board as shown in Figure 22. Make sure that the connector is oriented correctly using the keying ribs and slots before plugging it in. Note that the white wire will be oriented toward the non-keypad side of the machine.

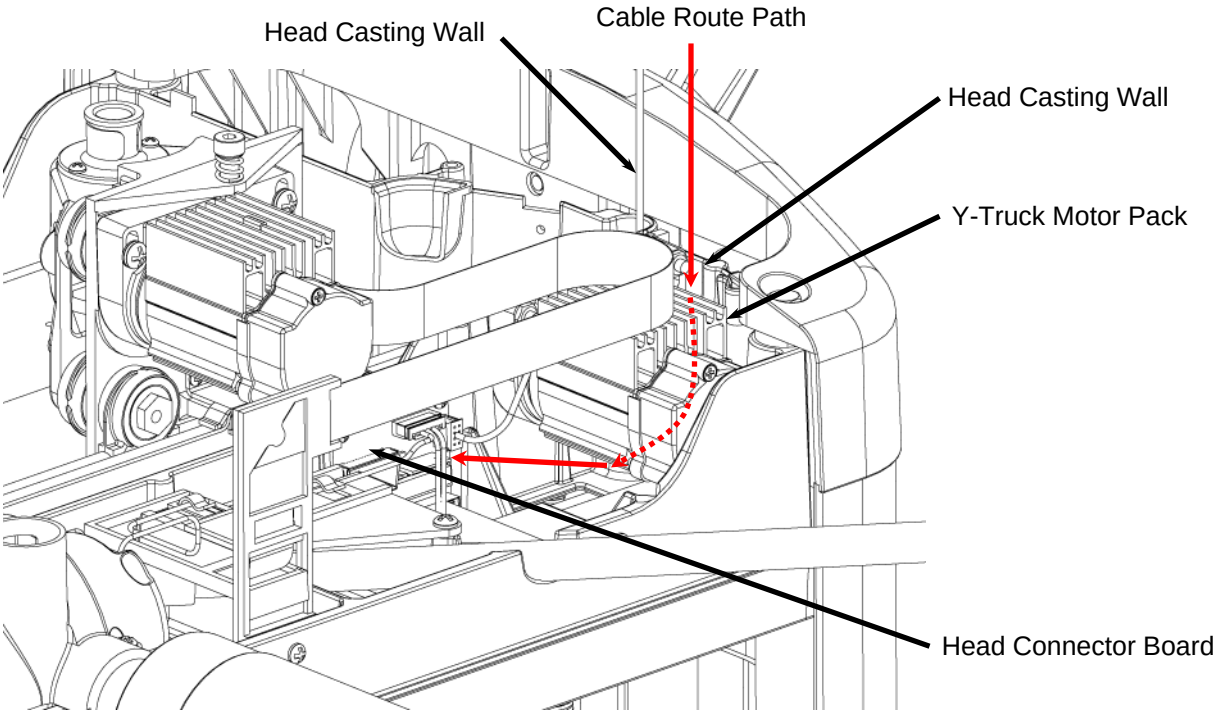


FIGURE 22: ROUTING THE HEAD CABLE HARNESS

c. Gently lift and replace the head cover onto the head making sure that the FFC cable, the AC Interrupt Switch Cable, and the Head Cable Harness are not pinched.

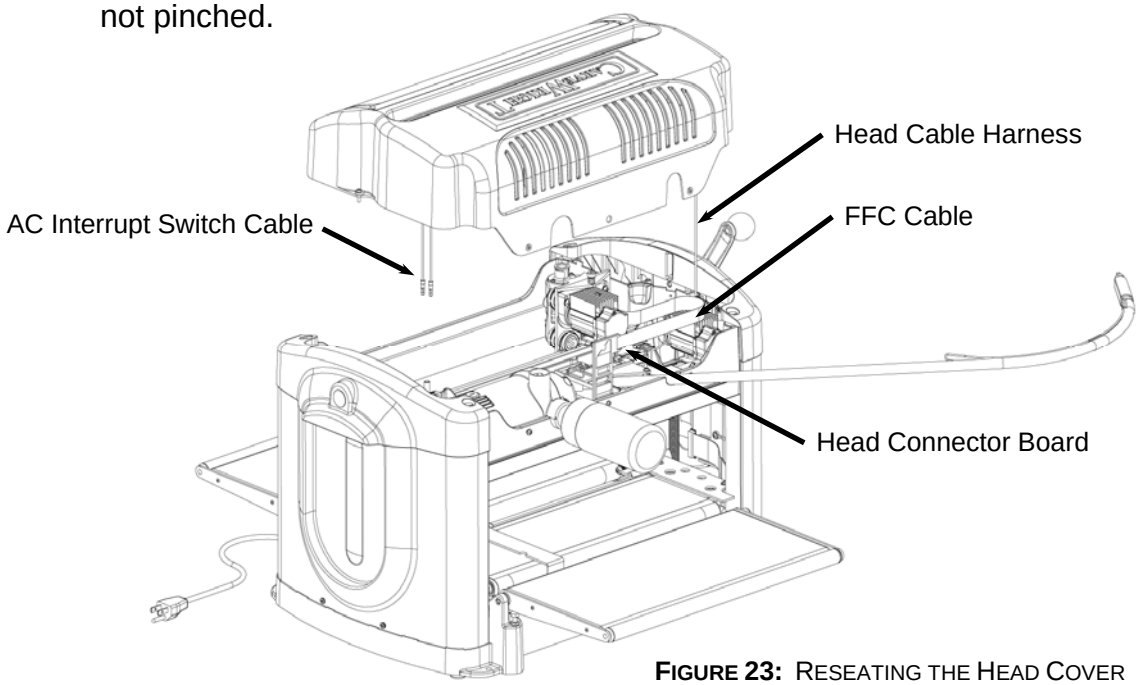


FIGURE 23: RESEATING THE HEAD COVER

d. Once the head cover is placed back onto the head you will need to reseat the wire harness retainers in the correct locations before replacing the screws. These retainers should be attached to the cables themselves and keep the cables confined to certain areas. In some machines there will be one on both cables, but on most machines you will only find one on the Head Cable Harness. You will have to reach in from the front of the machine to access them. Make sure that the retainers are placed over the edge of the head casting and under the edge of the cover. Make sure that they do not prevent the head cover from setting flat. See **Picture 2** and **Picture 3** in Appendix A for further clarification.

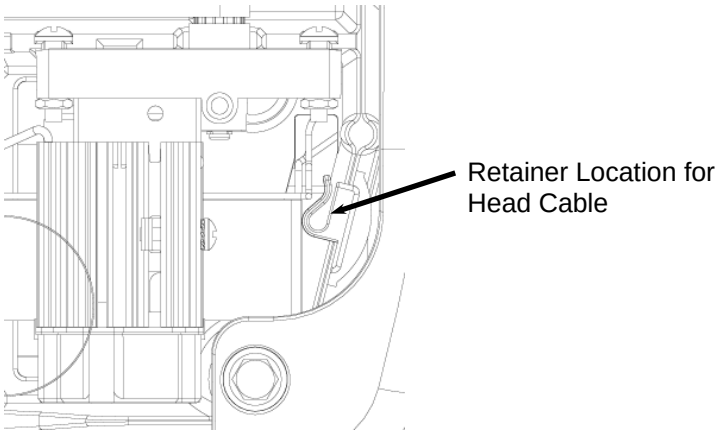


FIGURE 24: LOCATING THE HEAD CABLE HARNESS RETAINER

e. Replace the four screws as shown in Figure 5. The two long screws go in the vertical locations.

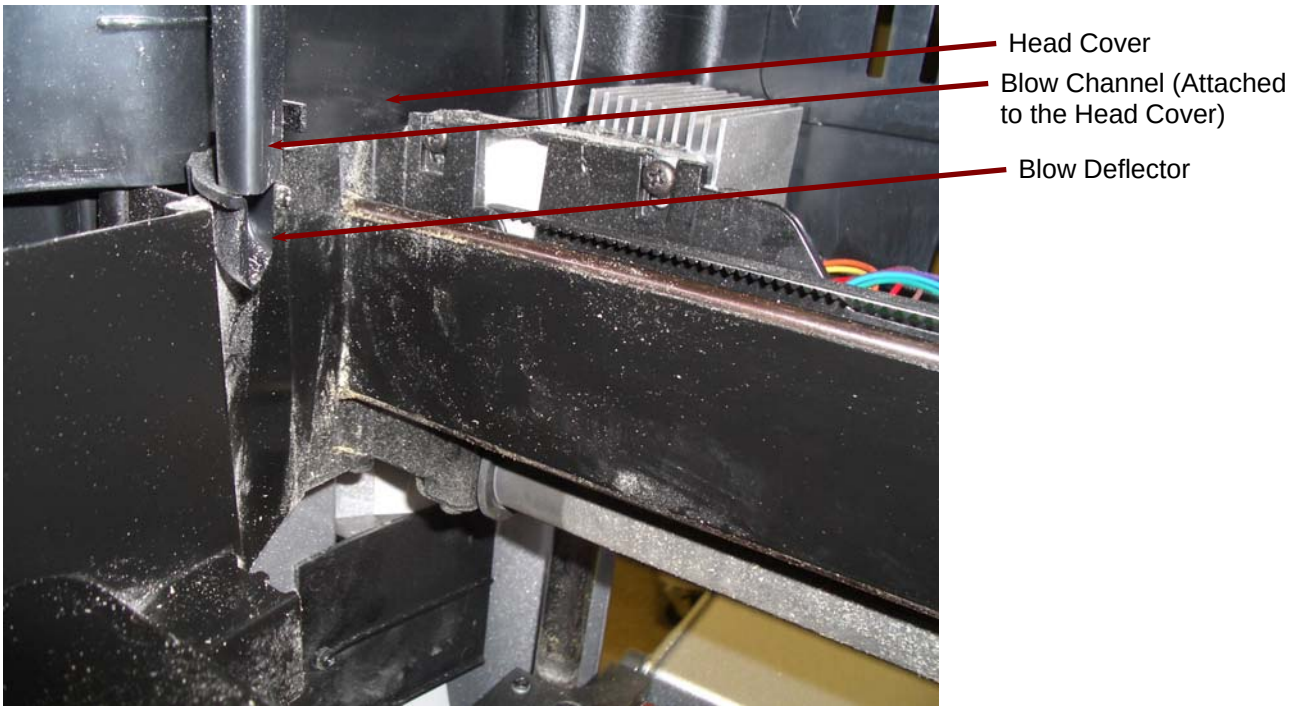
f. Verify that the head cover is laying flat on the head. Verify that the blow deflector is lined up with the vertical blow port located in the head. Verify that the FFC cable does not drag on the Y-motor heatsink when the Z-truck is pushed all the way to the left hand side.

14. **Prepare the flexshaft assembly for re-insertion into the machine.** Gently pull the protruding flexshaft core (with squared end) out of the sheath several inches. Push the core back into the sheath and make sure that it slips into, and engages, the cutting motor. It will drop into the receptacle on the motor side about 5/8ths of an inch. Turn the core by hand and feel for resistance of the motor. If the shaft spins without resistance, push the core inward while rotating until it drops into the slot and engages the motor.

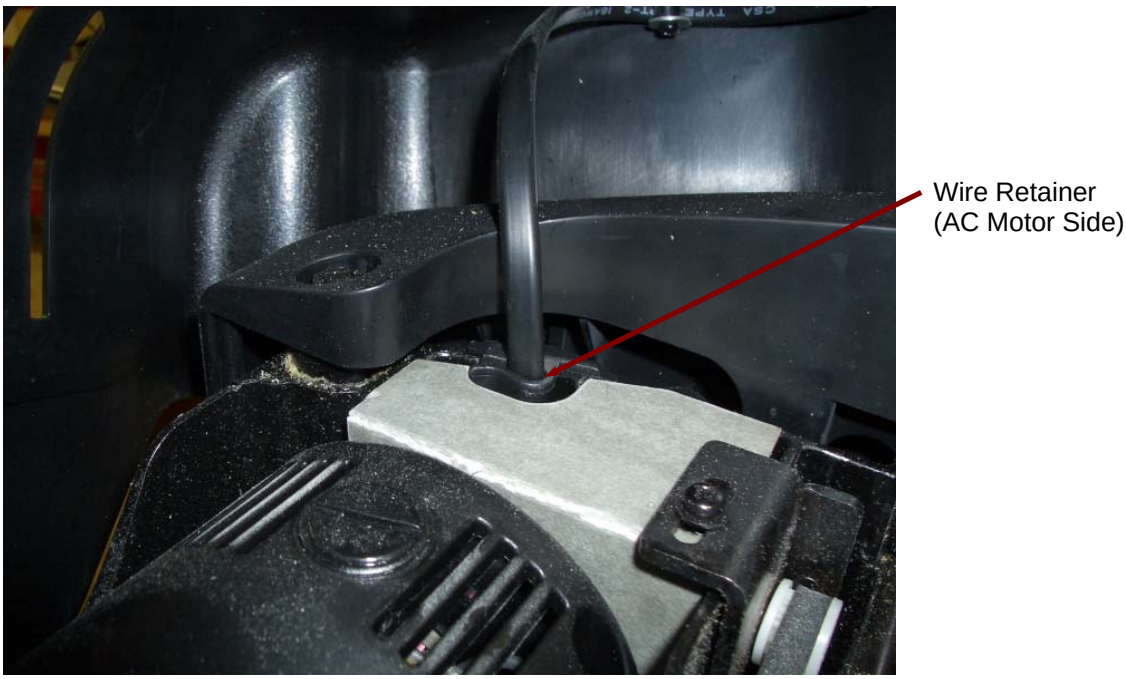
15. **Insert the flexshaft into cutting head.** Looking through the slot in the top cover, locate the flexshaft receptacle on the top of the Z-truck. Inside the receptacle there is a square recess that mates with the exposed square end of the flexshaft core. Turn the chuck on the bottom of the cutting head (open the safety cover for access) until the square core end can be inserted into the recess. Press the flex shaft all the way down into its receptacle. A click will be heard and felt as the shaft snaps into place.

16. **Test the machine functions.** Make sure that everything is put back together correctly by turning the machine on and doing several checks. Plug in the machine, insert the memory card, and turn on the machine. Try several different keypad functions to make sure that the new cable is connected correctly.

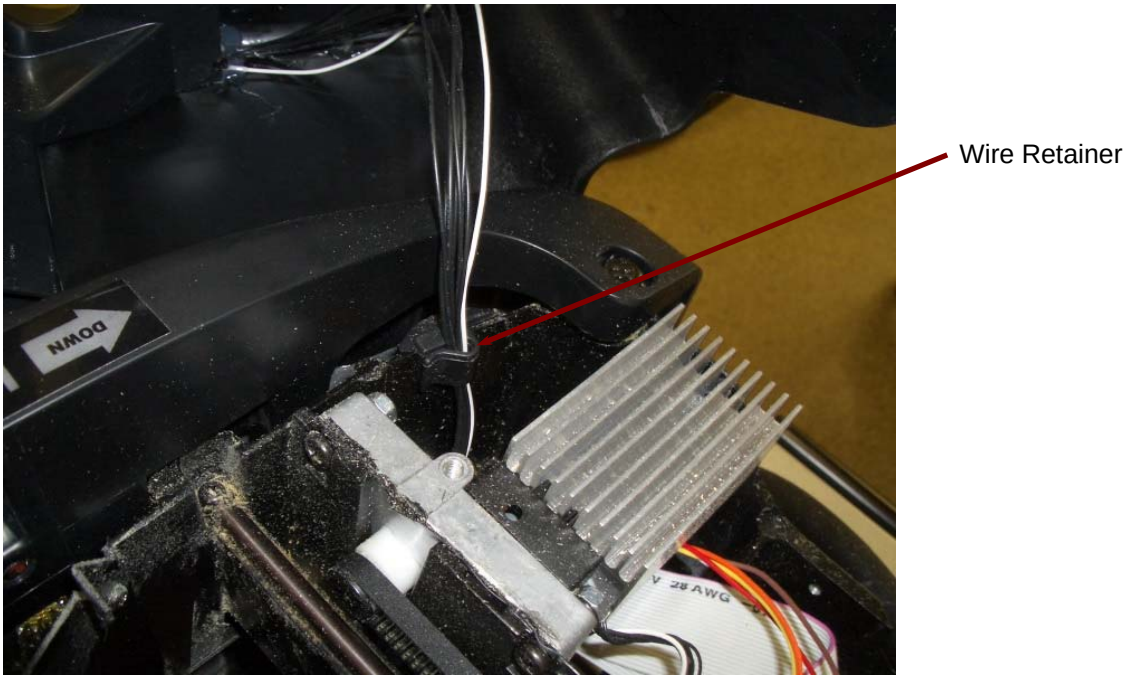
Appendix A



PICTURE 1: LOCATION OF THE BLOW DEFLECTOR



PICTURE 2: LOCATION OF AC INTERRUPT SWITCH CABLE WIRE RETAINER



PICTURE 3: LOCATION OF HEAD CABLE HARNESS WIRE RETAINER