Replacing the Main Board

Equipment Required

- Phillips screwdriver
- Main board
  - part no. 2000243 (Model 171)
  - part no. 15269 (Model 172)
  - part no. 2000324 (Model 173)
  - part no. 2000973 (Model 174)

Procedure

1. Disconnect the AC adapter from the monitor to completely remove power.
2. Remove the monitor top cover, disconnecting the display board cable and membrane switch panel cable from J18 and J19, respectively.
3. Disconnect the sensor board cable from J3 on the main board.
4. Disconnect the printhead cable from J1 on the main board.
5. Disconnect the motor cable from J2 on the main board.
6. Disconnect the speaker cable from J4 on the main board.
7. Remove the nine mounting screws from the main board and carefully place the board on an anti-static surface.
8. For Models 173/174, you will need to transfer the FECG/IUP Board to the new Main Board. Remove the four mounting screws, then carefully detach the FECG/IUP Board from J15 and J16 on the Main Board. Carefully align the FECG/IUP Board onto J15 and J16 on the new Main Board and push into place. Secure to the stand-offs with the four screws removed earlier.
9. Position the new board in place and follow steps 1–7 in reverse.

Replacing the FECG/IUP Board

Follow the instructions for "Replacing the Main Board" on page 7-35 with the following exceptions:

- Retain the existing Main Board
- Mount a new FECG/IUP Board onto the existing Main Board

Replacing the Membrane Switch Panel

The membrane switch panel *cannot be removed from the top cover* without possible damage to the monitor. You must order a new top cover assembly in order to replace the membrane switch panel.

Equipment Required

- Phillips screwdriver
- Wrench
- Hand file
- Top cover
- Rear panel adhesive gasket
- Rear panel label
- Membrane switch panel
- Display overlay

Refer to Table 7-13 for order numbers.

Table 7-13. Top Cover Assembly Order Numbers

Item	Model 171	Model 172	Model 173	Model 174
Top Cover	2004993-003[a]	2004993-001[b]	2004993-002[c]	2004993-004[d]
Rear Panel Adhesive Gasket	14561AA			
Rear Panel Label	2003930-001			
Membrane Switch Panel	15323BA	15323AA		
Display Overlay	15324BA	15324AA	15324CA	15324DA

a *Replaces older 15453CA top covers.*
b *Replaces older 15453AA top covers.*
c *Replaces older 15453BA top covers.*
d *Replaces older 15453DA top covers.*

Procedure

1. Disconnect the AC adapter from the monitor to completely remove power.
2. Follow the instructions for "Removing the Monitor Top Cover" on page 7-19.
3. Unscrew the top cover standoff and set aside. You may need a wrench to loosen the standoff.
4. Remove the two display board bracket screws. Set aside the display board and screws.
5. Remove the screw fastening the membrane shield tongue. Set aside the screw.
6. Remove the rear panel plug in **J4** and set aside.
7. Newer monitors have top covers with tabs which fit into corresponding slots in the bottom enclosure. (Refer to Figure 7-12 and Figure 7-13.) If you are installing a newer tabbed top cover onto an older bottom enclosure (without slots), you must remove the tabs. Use a small hand file or other tool to remove the plastic tabs.
8. Apply the new membrane switch panel: peel off the adhesive backing and position on the new top cover making sure the shield tongue is threaded through the slot.

IMPORTANT
SHIELD TONGUE—If the shield tongue is caught between the top cover and the switch panel, the panel cannot be properly positioned.

9. Screw the shield tongue in place using the old screw.
10. Replace the display board and secure all four screws.
11. Replace the top cover standoff.
12. Install the rear panel gasket on the *inside* of the cover: remove the adhesive backing and align over the rear panel connectors.
13. Install the display overlay: remove the adhesive backing and align on the *outside* of the top cover.
14. Install the rear panel label on the *outside* of the cover: remove the adhesive backing and align over the rear panel connectors.
15. Re-connect the display board and membrane switch panel cables to J18 and J19 on the main board.
16. If you are installing a tabbed cover onto a bottom slotted enclosure, ensure that the tabs align with the slots.
17. Secure the top cover with the four bottom panel screws.
18. Discard previous top cover assembly.

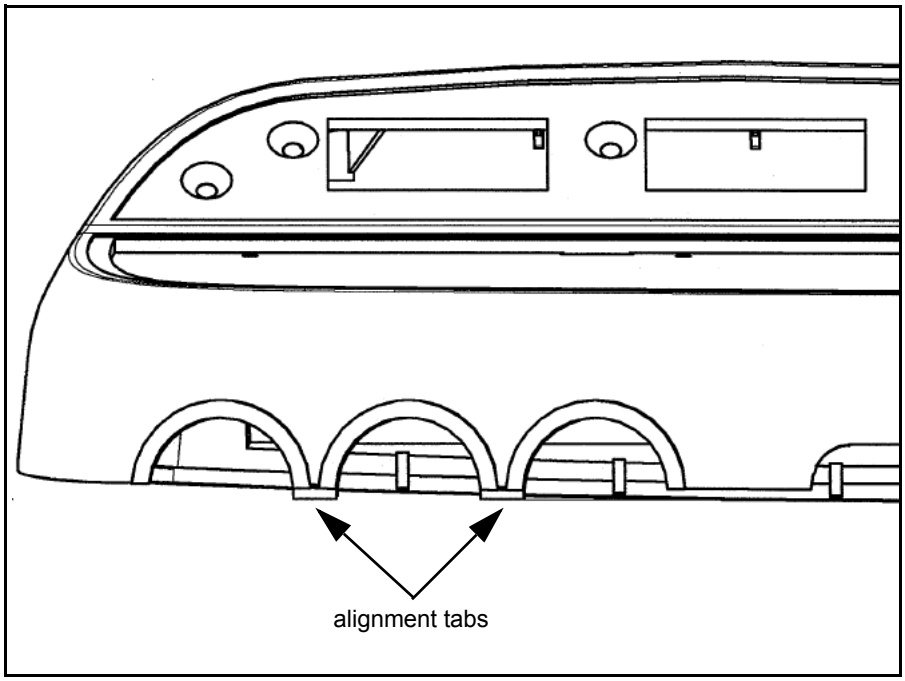

Figure 7-12. Top Cover Alignment Tabs

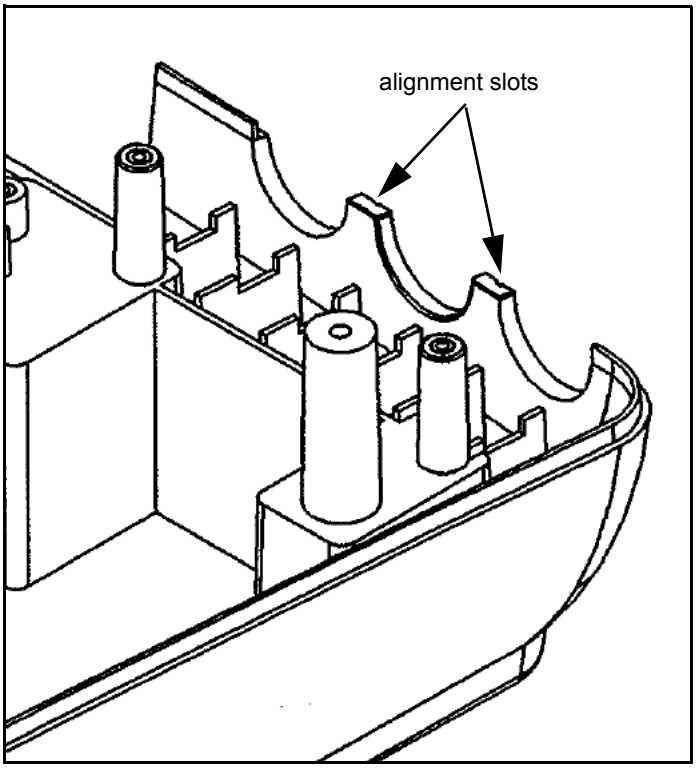

Figure 7-13. Bottom Enclosure Alignment Slots

Replacing a Front Panel Connector

Equipment Required

- Screwdriver
- Connector (see Table 7-14)
- De-soldering tool
- Soldering iron
- Solder

Table 7-14. Front Panel Connectors

Connector	Color	Part Number
US/US2	Blue	212174
UA (TOCO/IUP)	White	212173
FECG	Dark Grey	212175
COMBI (US/FECG)	Blue and Grey	2003692-001

Procedure

1. Disconnect the AC adapter from the monitor to completely remove power.
2. Follow the instructions for "Removing the Monitor Top Cover" on page 7-19. It is not necessary to disconnect the cables. You only need access to the front panel connectors.
3. Follow the instructions for "Replacing the Main Board" on page 7-35. (There is no need to remove the FECG/IUP Board.)
4. Remove the six screws from the front-end connector shield.
5. De-solder the damaged connector and discard.
6. Solder a new connector in place.
7. Replace the connector shield, main board, and top cover.

Servicing the Recorder

Replacing the Printhead

Equipment Required

- Phillips screwdriver
- Vernier caliper
- Printhead (part no. 2000133-001)

Procedure

1. Remove the AC line cord from the monitor to completely remove power.
2. Follow the instructions for "Removing the Monitor Top Cover" on page 7-19.
3. Pry the printhead cable connectors free from the back of the printhead.
4. Open the recorder drawer.
5. Remove the four screws (two per side) holding the printhead in place. The printhead will drop out.
6. Insert the new printhead, aligning the edges near the ends flush with the support plate. Secure with the four screws.
7. Slowly close the drawer observing the roller and printhead. Ensure that the roller is parallel to the printhead striking the printhead evenly as the drawer shuts.
8. Replace the printhead cable.
9. Verify that there is a slight gap (0.003 in minimum) between the shoulder nut standoff and the downstop plate (without paper installed). Adjust accordingly.
10. Follow the instructions for "Aligning the Printhead" on page 7-43.
11. Once the recorder prints satisfactorily, secure the monitor top cover in place.

Adjusting the Printhead Current

Equipment Required

- Phillips screwdriver
- Digital voltmeter
- 30 Ω, 20 W, 5% resistor

Procedure

CAUTION
RECORDER STATUS—Ensure the recorder remains off during this procedure.

1. Remove the AC line cord from the monitor to completely remove power.
2. Follow the instructions for "Removing the Monitor Top Cover" on page 7-19, including disconnection of the display board cable and the membrane switch panel cable from the main board.
3. Disconnect the printhead cable from J1 on the main board.
4. Locate resistor R562 and potentiometer R507 on the main board.
5. Attach the leads of the digital voltmeter across R562.
6. Re-connect the AC adapter cord to the monitor and turn on the monitor.
7. Measure the voltage across R562 and record the value.
8. Turn off the monitor.
9. Attach a 30 Ω (20 W, 5%) resistor across R562.
10. Turn on the monitor.
11. Adjust potentiometer R507 until the voltage across R562 is 0.5 V less than the voltage recorded in step 5.
12. Turn off the monitor and remove the voltmeter leads and the 30 Ω resistor.

Aligning the Printhead

- Equipment Required
- Phillips screwdriver
- Vernier caliper

Printing a Continuous Test Pattern

1. Re-connect the AC adapter cord to the monitor.
2. Access the service setup mode: press and hold the **Setup** button; press and hold the blue **Power** button; release both buttons.
3. Use the **Volume** buttons (△ or ▽) to change the number in the UA display to 100. (On Model 172 Monitors, use the left set of volume controls.)
4. Press the **UA Reference** button to activate the FHR display and start printing the test pattern. See Figure 7-14.
5. Follow the instructions under "Left/Right Alignment" and "Front/Back Alignment".
6. Press the **Setup** button to exit the service setup mode. The monitor automatically turns to standby.

Front/Back Alignment

1. Follow the instructions for "Adjusting the Printhead Current" on page 7-42.
2. Print the recorder test pattern. (See "Printing a Continuous Test Pattern" above.)
3. Load paper and close the recorder drawer.
4. Observe the printing quality under the following conditions:
   - Press and hold the door toward the rear of the monitor. If the printing darkens on either side: loosen the four mounting screws; move the printhead forward slightly on the affected side; then re-tighten the screws.
   - Pull and hold the drawer forward slightly. If the printing darkens on either side: loosen the fours mounting screws; move the printhead back slightly on the affected side; then re-tighten the screws.
5. Verify that the print quality is satisfactory when the drawer is latched in place.

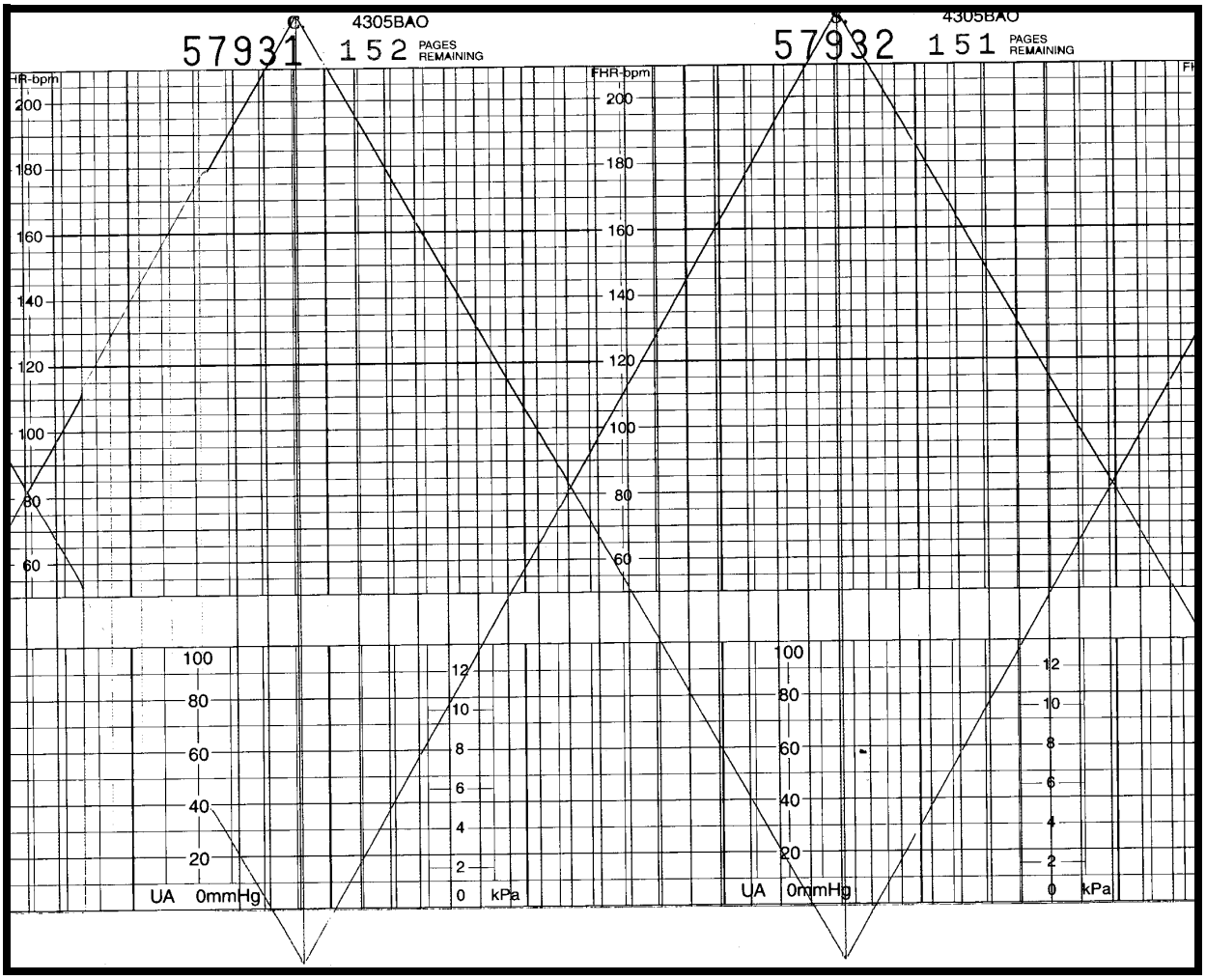

Figure 7-14. Recorder Test Pattern

Left/Right Alignment

1. Print the continuous recorder test pattern. (See "Printing a Continuous Test Pattern" above.)
2. Check the quality of the printed lines. Verify that the horizontal lines print evenly. Ideally the distance between the right paper guide at the roller and the first line printed by the test pattern should be 0.490 in which represents a nominal value. Use a vernier caliper to measure this distance.
3. Use the **Volume** buttons (△ or ▽) to align the printhead left or right, respectively. A number between 0 and 255 shows in the FHR display. The number increases or decreased as you make adjustments using the **Volume** buttons.

IMPORTANT

ACCURACY—A common mistake in the field is to adjust the printhead so that the first test pattern line prints at 0 mmHg on the paper, rather than by measuring the nominal distance. This method is often inaccurate as it does not account for paper variations.

For best results:

- Use only GE paper.
- Ensure paper is correctly loaded as instructed on page 4-2.
- Use a vernier caliper to adjust the printhead to its nominal position.

Replacing the Recorder Motor Assembly

Equipment Required

- Phillips screwdriver
- Motor assembly (part no. 15136A)

Procedure

1. Remove the AC line cord from the monitor to completely remove power.
2. Follow the instructions for "Removing the Monitor Top Cover" on page 7-19.
3. Follow the instructions for "Replacing the Main Board" on page 7-35.
4. Remove the two screws holding the motor mount in place.
5. Remove the two screws holding the motor assembly on the motor mount. Retain the motor mount and all screws.
6. Install the new motor on the motor mount and tighten both screws.
7. Position the new motor in place, aligning the motor gear with the roller gear. Push the motor assembly slightly forward against the roller gear. There should be a slight clearance between the teeth. Check clearance by rotating the print roller back and forth. (There should be a slight rotation.)
8. Secure the motor mount to the main board mounting plate. Tighten both screws.
9. Replace and align the printhead by following the instructions on page 7-41 and page 7-43.
10. Replace the main board and secure all eight mounting screws.
11. Re-connect all cables.
12. Replace the monitor top cover.

Cleaning the Printhead

The thermal printhead heater elements must be cleaned at regular intervals to remove any accumulated paper dust. The heater elements may be cleaned with methanol or isopropyl alcohol. Care must be taken to avoid touching the heater elements with bare hands.

CAUTION
AIR DRY—Allow to air dry completely prior to using the monitor.

Replacing the Sensor Board

Equipment Required

- Phillips screwdriver
- Sensor board (part no. 15231)
- Sensor board insulator (part no. 2000147-001)
- Cable tie, x2 (part no. 608036)
- Cable mount adhesive back, x2 (part no. 608030)

Procedure

1. Remove the AC line cord from the monitor to completely remove power.
2. Follow the instructions for "Removing the Monitor Top Cover" on page 7-19.
3. Follow the instructions for "Replacing the Main Board" on page 7-35.
4. Note the location of the printhead assembly relative to the notches on each side. This is the nominal location for when it is replaced later. Remove the four screws from the printhead assembly downstop plate and set aside.
5. Remove the three screws from the main board mounting plate and slide back and out to remove.
6. Remove the two screws holding the drawer microswitch in place.
7. Snip the sensor board cable tie located on the monitor bottom panel.
8. Pull the recorder drawer forward slightly.
9. Snip the cable tie on the back of the recorder drawer.
10. Pull drawer forward and lift out.

CAUTION
LOOSE ROLLERS—The drawer rollers are normally held in place by the drawer. Take care not to dislodge them while the drawer is removed.

11. Turn drawer over and peel off the sensor board insulator.
12. Remove the four flathead screws securing the sensor board. Discard the board, but retain the screws.
13. Insert the new board, secure all four screws, and cover with a new insulated sheet.
14. Secure the sensor board cable with a cable tie on the back of the recorder drawer.
15. Align the drawer over the slot, drop down, and slide into place.
16. Pull drawer fully foward to allow slack on the sensor board cable.
17. Secure the sensor board cable with a cable tie on the monitor bottom panel.

18. Replace the microswitch and secure both screws. Make sure the microswitch clicks when the drawer is closed.
19. Replace the main board mounting plate, pulling the plate forward, parallel with the roller while tightening the screws.
20. Return the printhead assembly to its original position as noted in step 4.
21. Replace the main board, re-connect all cables, and replace the monitor top cover.
22. Check printing and re-align the printhead as necessary. (See "Aligning the Printhead" on page 7-43.)