6

Removing and Replacing Cardiograph Components

This chapter contains information for removing and replacing the PageWriter Touch cardiograph subassemblies. For information about the Philips repair philosophy, see “Repair Philosophy” on page 5-2. If you require further technical assistance, contact the nearest Philips Response Center. See “Other Resources” on page 1-29.

NOTE The way the wires and cables are routed and dressed inside the main housing plays an important part in reducing electromagnetic and radio frequency interference emitted by the cardiograph. When you reassemble any part of the cardiograph, make sure to route and dress all cables and wires as they were originally configured.

This chapter includes the following information:

Required Tools

Use the following tools to remove and replace the cardiograph subassemblies:

- #1 Phillips Head screwdriver
- T10 Torx driver
- T15 Torx driver
- T25 Torx driver
- Optional T25 Torx T-handle driver with 8" long shank (available from Philips Medical Systems, part number 453563479711)
- Diagonal cutters (for cutting cable ties)
- 5 mm and 8 mm hex nut drivers
- 13 mm open end wrench
- Tweezers
- Small flat bladed screwdriver

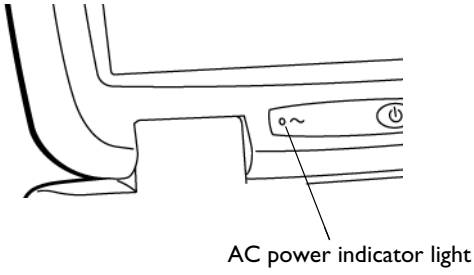
Removing and Replacing Batteries

Removing the Batteries

To remove the batteries:

1 Unplug the AC power cord. Make sure the AC power switch at the rear of the cardiograph is turned to the Off position and the green AC power indicator light is not illuminated.

Figure 6-11 AC power light indicator

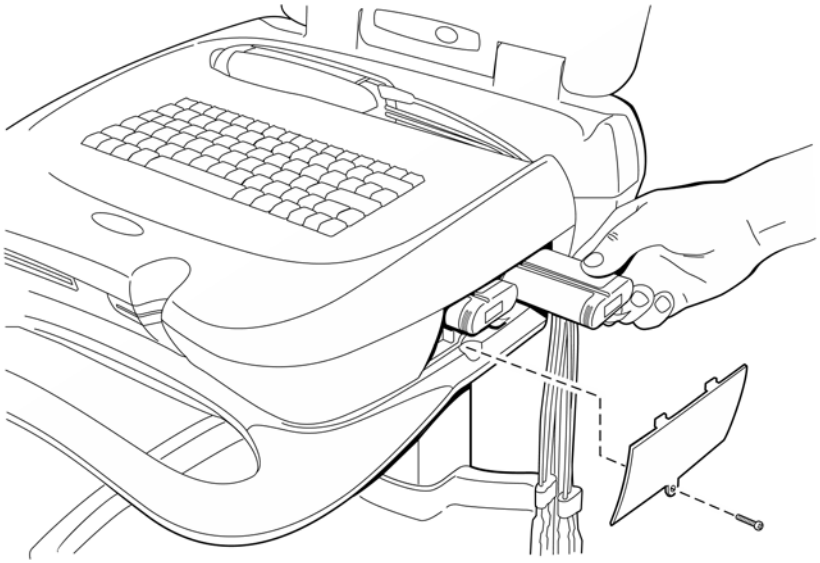


For an overview of cardiograph components, see “PageWriter Touch Cardiograph Components” on page 1-11.

2 Unscrew the battery door using a Phillips head screwdriver.

3 Pull the tabs to remove the batteries.

Figure 6-12 Removing the Batteries



WARNING **Properly dispose or recycle any depleted batteries according to local regulations. Do not disassemble, puncture, or incinerate the batteries.**

Replacing the Batteries

NOTE Before inserting the batteries into the battery compartment, ensure that AC power is not applied to the cardiograph, and that the AC power indicator light (front of cardiograph) is not lit.

To replace the batteries:

1 Insert the new batteries at the same time into the battery compartment. Ensure that both batteries are fully seated inside the battery compartment. See page 6-3.

2 Re-attach the battery door.

3 Tighten the screw to the battery door using a Philips head screwdriver. Do not over tighten.

Patient Interface Module (PIM)

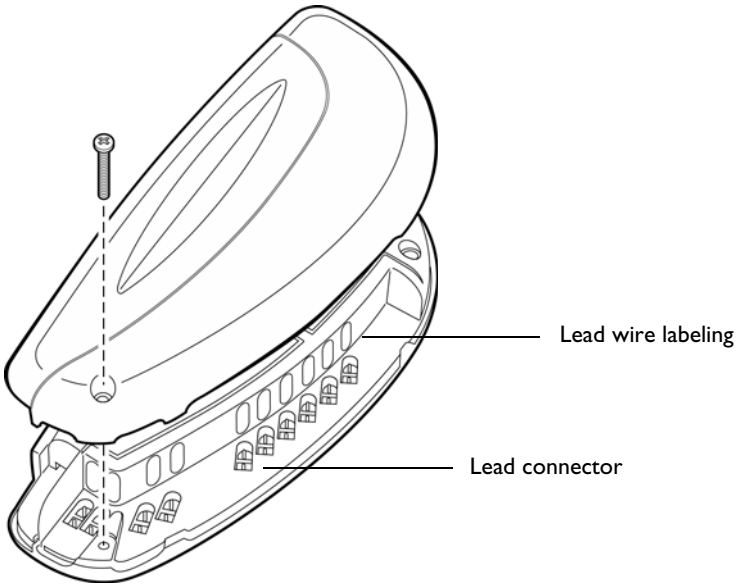
The patient interface module (PIM) is a hand-held device that contains all of the cardiograph's waveform data acquisition electronics and an Action button to take ECG Snapshots from the bedside. The PIM is available in a standard 12-lead or optional 16-lead model, the following illustrations show the standard 12-lead PIM. The PIM connects to the patient data cable and to the lead wires attached to the patient.

Replacing Lead Wires

To replace the lead wires:

1 Unscrew the PIM cover (using a Phillips head screwdriver.)

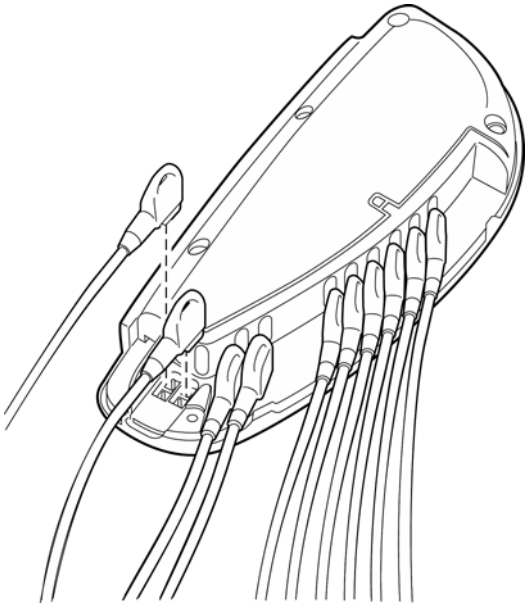
Figure 6-13 Unscrewing the PIM Cover



2 Remove the PIM cover to expose the lead wire connectors.

3 Remove the lead wire(s) by pulling the connector up.

Figure 6-14 Removing Lead Wires



4 Match the lead wire labeling (on each lead) with the same lead wire connector on the PIM.

Figure 6-15 12-Lead PIM AAMI Lead Wire Labeling

Figure 6-16 12-Lead PIM IEC Lead Wire Labeling

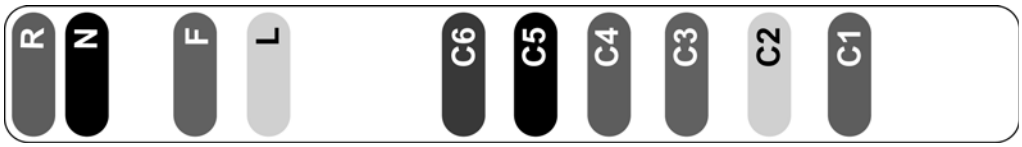


Figure 6-17 16-Lead PIM AAMI Lead Wire Labeling

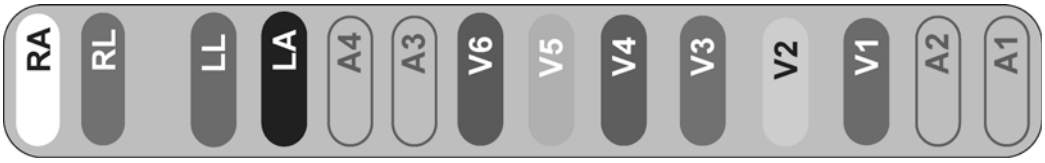
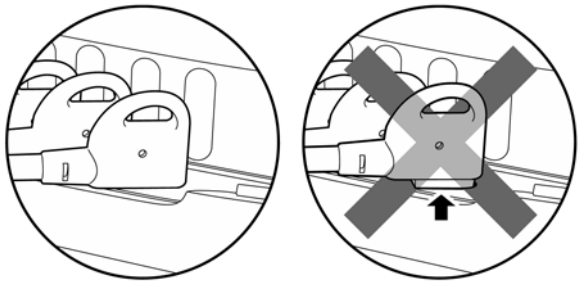


Figure 6-18 16-Lead IEC PIM IEC Lead Wire Labeling

5 Replace the lead wire by firmly pressing the connector into the socket until fully seated.



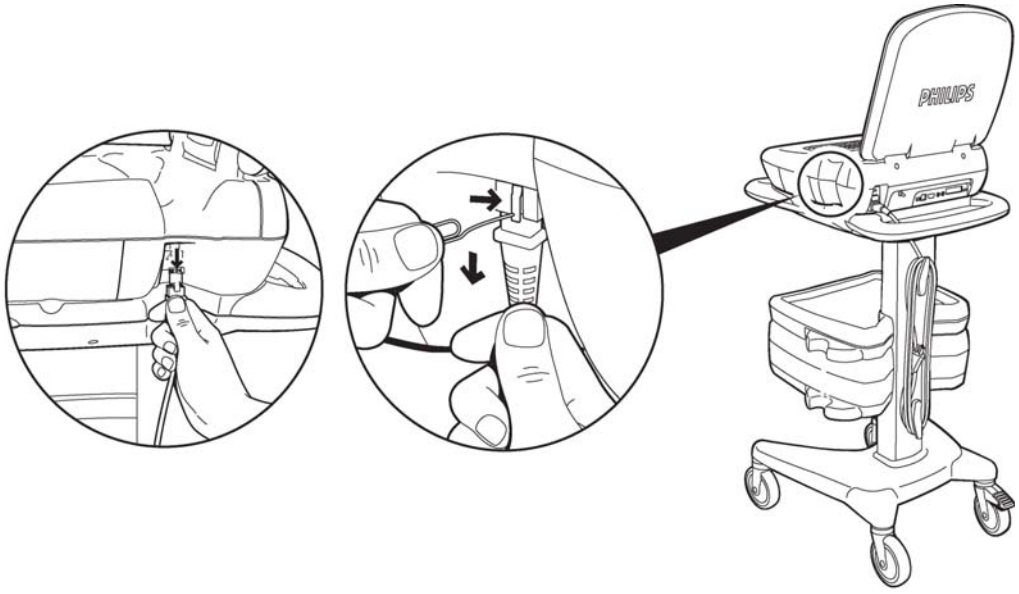
6 Attach the PIM cover.

Removing the PIM

To remove the PIM:

1 Disconnect the PIM data cable from the RJ-11 receptacle, located on the right side of cardiograph.

Figure 6-19 Disconnecting the PIM Data Cable



2 Remove the data cable.

CAUTION Due to the complexity of the PIM, do not attempt to troubleshoot or to replace individual parts. You must replace the entire assembly.

Replacing the PIM

To replace the PIM:

1 Connect the PIM to the RJ-11 receptacle, on the right side of the cardiograph.

2 After replacing the PIM, load the PIM software from the internal CompactFlash (CF) card as described in Appendix A, “Software Installation Instructions" on page B-5.

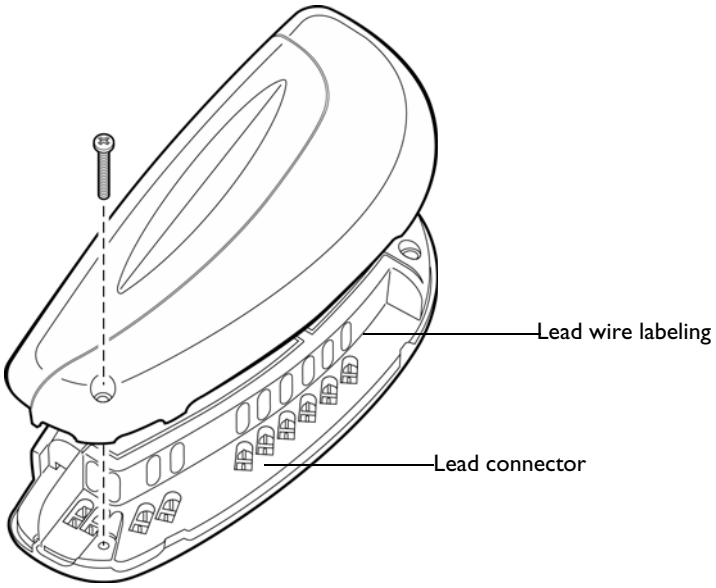
WARNING **To ensure personal safety and to prevent damage to the system, connect the data cable only to the RJ-11 receptacle, located on the right side of the cardiograph. Do not connect the data cable into the LAN port or into the optional modem card dongle.**

Replacing the PIM Data Cable

To replace the data cable:

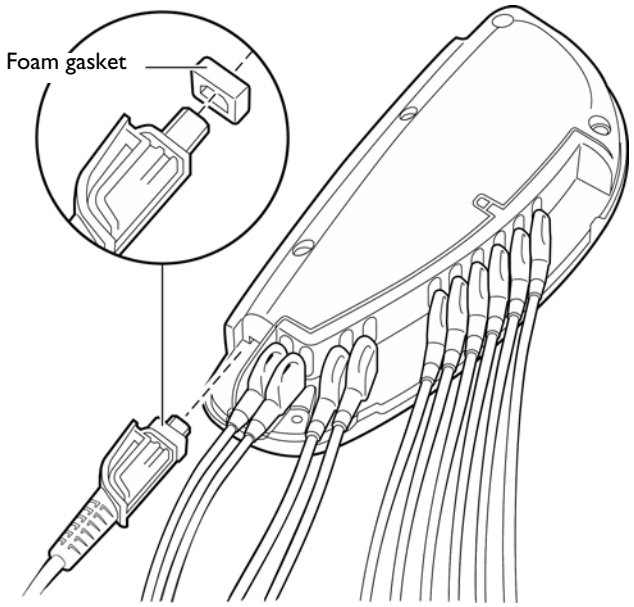
1 Unscrew the PIM cover using a Phillips head screwdriver. See page 6-3.

Figure 6-20 Unscrewing the PIM Cover



2 Disconnect and replace the data cable. Make sure to attach the foam gasket.

Figure 6-21 Disconnecting the Data Cable



3 Attach the PIM cover.

Removing and Replacing the AC Fuses

The AC fuses need to be replaced when the cardiograph is plugged into AC power, with the AC power switch turned to the On position, but the green AC power indicator light does not illuminate.

For information about replacing fuses, see “Replacing the AC Fuses” on page 3-10.

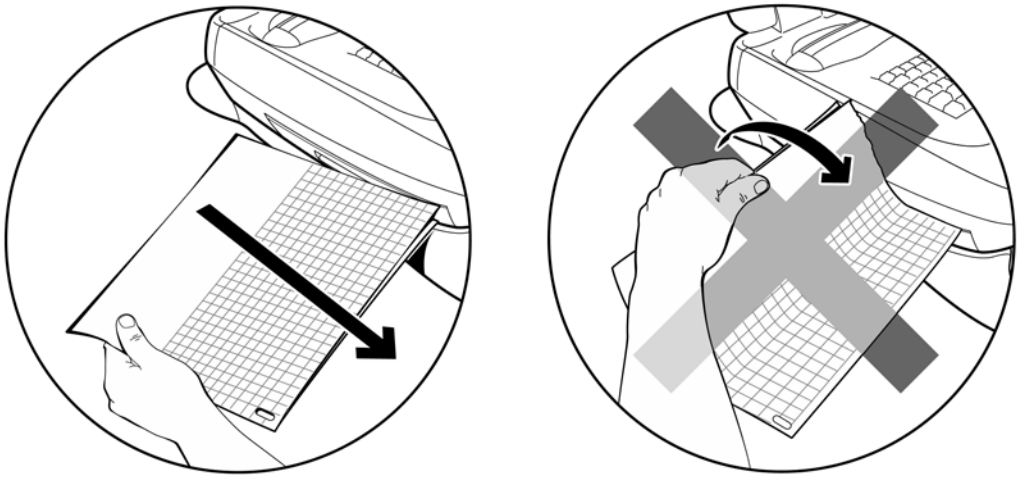
Removing and Replacing the Paper Tray

Removing the Paper Tray

To remove the paper tray:

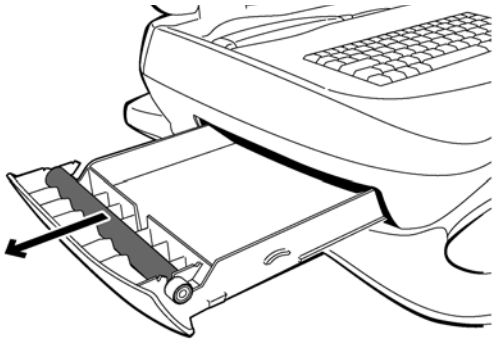
1 Tear off any unused thermal paper.

Figure 6-22 Tearing Off Excess Thermal Paper



2 Pull out the paper tray until it stops.

Figure 6-23 Opening the Paper Tray



3 Remove any unused paper.

4 Carefully lift tray, and pull it out completely.

Replacing the Paper Tray

To replace the paper tray:

1 Insert the paper tray into the opening.
Make sure the metal bar is above the paper tray.

2 Close the paper tray.

Removing and Replacing the Cart Casters

In October 2006, improvements to the cart caster locking pedals were made to make them more durable. PageWriter Touch cardiographs shipped beginning in October, 2006 with serial number prefix **US2060** include the new caster pedals. These cardiographs are labeled with part number **989803127431 Rev K**. Additionally, you can identify the improved caster pedals by the manufacturer's name CATIS molded into the surface of the pedal.

If the caster pedal fails without causing damage to the threads in the cart base, replace the individual caster pedal, as described in the following procedure.

If the threads in cart base are damaged along with the caster pedals, replace the entire cart base, as described in "Removing and Replacing the Cart Base" on page 6-14.

Removing the Cart Casters

To remove the cart casters:

1. Unplug the AC power cord.
2. Remove the batteries. See page 6-3.
3. Remove the paper tray. See page 6-9.
4. Using a number 1 Philips screwdriver, remove the two screws that secure the cardiograph to the cart.
5. Remove the cardiograph from the cart by slightly lifting the front of the cardiograph then sliding it forward to clear the rear locking tabs on the cart.
6. Turn the cart over.

7 Remove the existing directional lock casters. Depending upon the age of the cart base, remove the casters in one of the following ways:

– Using a 8 mm hex key, remove the two M10 bolts

– Using a 6 mm hex key, remove the one M8 bolt

Figure 6-24 Removing M10 Bolts

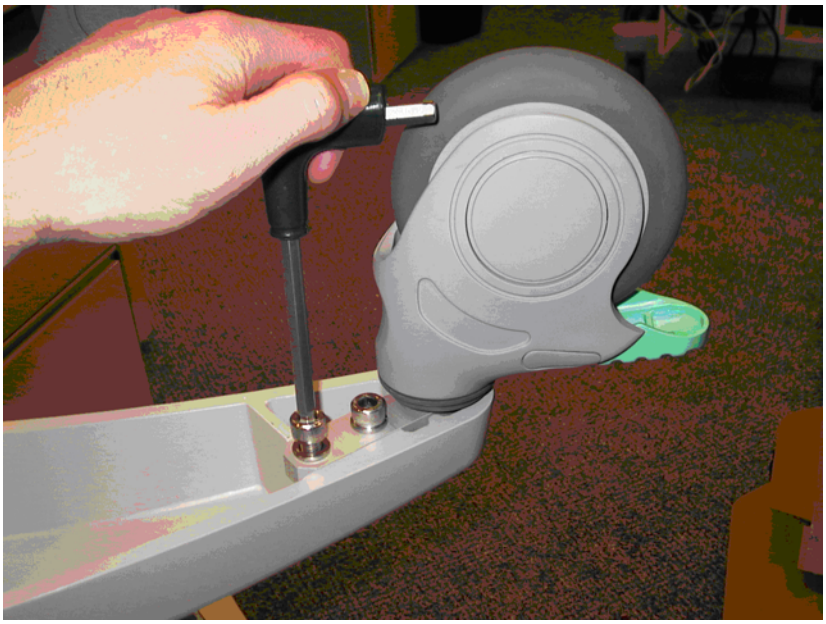
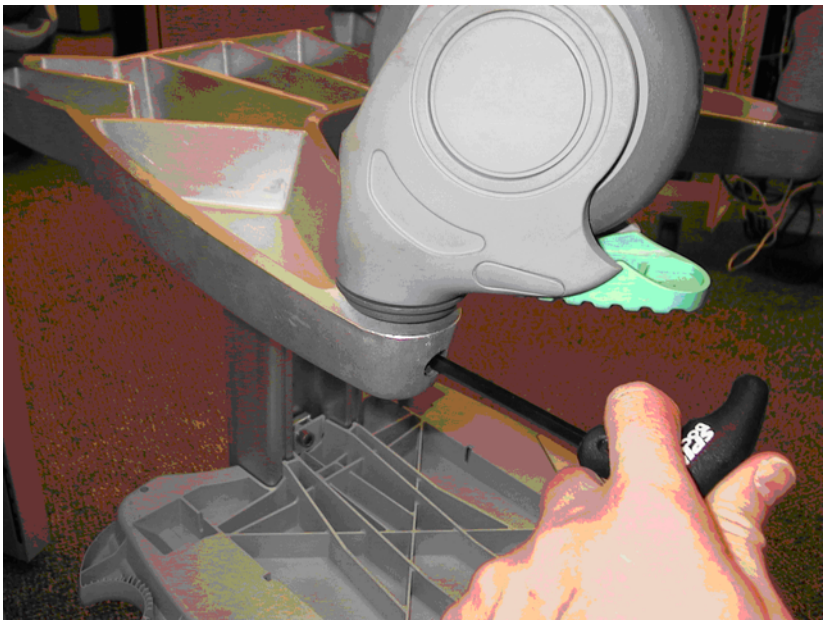
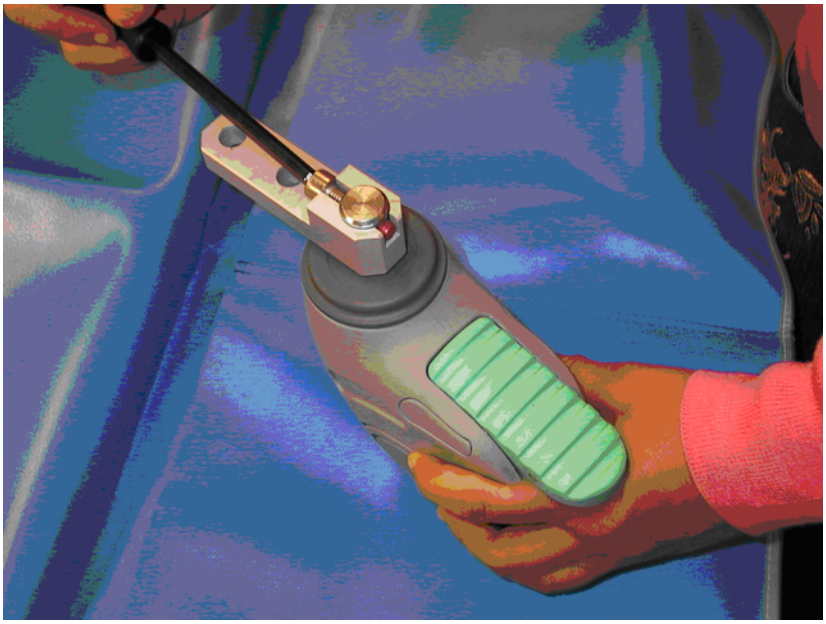


Figure 6-25 Removing M8 Bolt



8 If present, remove the aluminum blocks from the casters using a 6 mm hex key.

Figure 6-26 Removing Aluminum Block



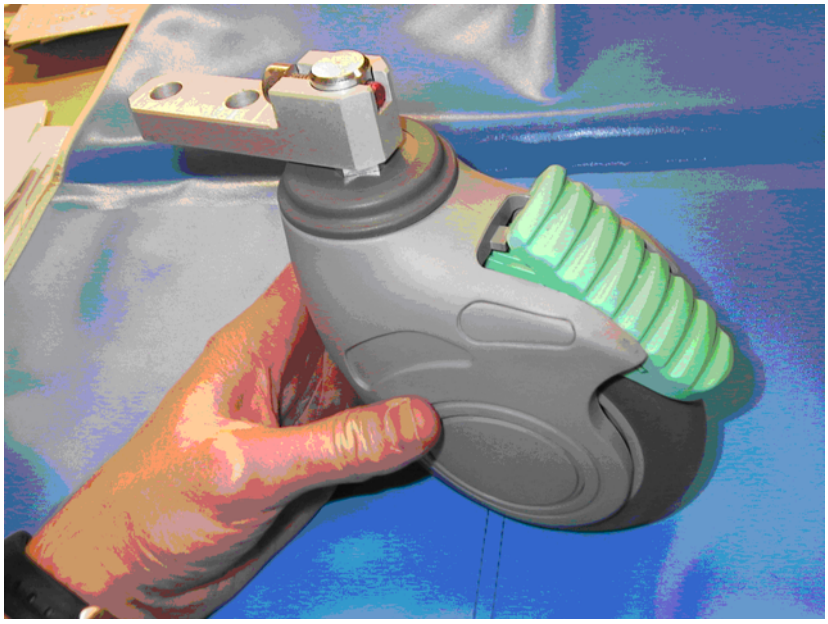
Replacing the Casters

NOTE Before installing the new casters, depress the pedal on the caster and rotate the stud until it locks in position. The new casters only lock in one position, so it is important that the caster is oriented correctly on the cart base.

To replace the casters:

1 Using the new bolt provided in the kit, install the aluminum block (if present) on the caster in the correct orientation, as shown in Figure 6-27.

Figure 6-27 Installing the Caster Aluminum Block



2 Firmly tighten the bolt. If using a torque wrench, use a torque setting of 150 to 180 lbs.

3 Install the casters on the cart base with the locking pedal facing outwards.

4 Firmly tighten the one M8 bolt or the two M10 bolts. If using a torque wrench, use a torque setting of 150 to 180 lbs.

5 Turn the cart back over. Verify that both locking pedals face outwards when the casters are locked as shown in Figure 6-28.

Figure 6-28 Casters Locked

Removing and Replacing the Cart Base

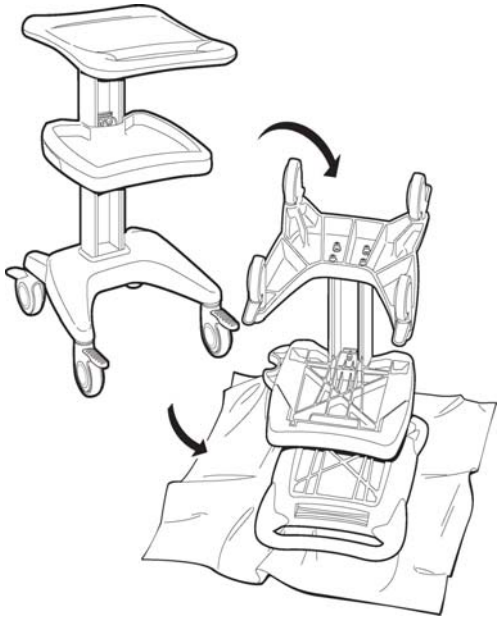
If the threads in cart base are damaged along with the caster pedals, replace the entire cart base.

Removing the Cart Base

To remove the cart base:

1. Unplug the AC power cord.
2. Remove the batteries. See page 6-3.
3. Remove the paper tray. See page 6-9.
4. Using a number 1 Philips screwdriver, remove the two screws that secure the cardiograph to the cart.
5. Remove the cardiograph from the cart by slightly lifting the front of the cardiograph then sliding it forward to clear the rear locking tabs on the cart.
6. Turn the cart over.

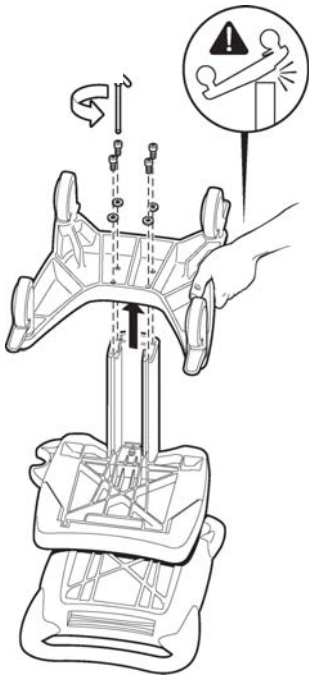
Figure 6-29 Turning Over the Cart Base



CAUTION The base is heavy. Be careful when removing it.

7 While holding onto the base, remove the four bolts.

Figure 6-30 Removing the Cart Base Bolts



8 Remove the base.

Replacing the Cart Base

To replace the cart base:

1 Install the new base.

2 Secure the *new* bolts to the base.

3 Using a torque wrench, firmly tighten the four bolts to 120 to 150 in-lbs.

Removing and Replacing the Cart Top Assembly

The cart handle may discolor and peel after extended cardiograph use. Although this is a cosmetic issue only, the cart top assembly has been redesigned and can be replaced to address this issue.

Removing the Cart Top Assembly

To remove the cart top assembly:

1 Unplug the AC power cord.

2 Remove the batteries. See page 6-3.

3 Remove the paper tray. See page 6-9.

4 Using a number 1 Phillips screwdriver, remove the two screws that secure the cardiograph to the cart.

5 Using a Torx 25 driver, remove the four screws that secure the cart to the support base.

6 Lift the cart top assembly off of the support base.

Replacing the Cart Top Assembly

To replace the cart top assembly:

1 Place the replacement cart top assembly on the support base.

2 Using a Torx 25 driver, replace the four screws and tighten to 40 to 50 in-lbs.

3 Secure the cardiograph to the cart top assembly with the two Phillips screws.

Removing and Replacing the Top Cover

Removing the Top Cover

CAUTIONS When you remove the top cover, make sure the cardiograph is securely mounted to the cart or is on a large stable surface. Failure to do so can cause the cardiograph to tip.

The nylon screws are made of a composite that can be easily damaged. Be careful when removing them.

WARNING **Do not touch any of the exposed connectors if you have batteries installed, or if the AC power cord is connected while the cardiograph is open. When the batteries are installed or the cardiograph is connected to AC power, there are dangerous voltages on certain components even if the AC power switch is set to the Off position.**

This procedure is most easily performed with the cardiograph attached to the cart, if present.

To remove the top cover:

1 Unplug the AC power cord.

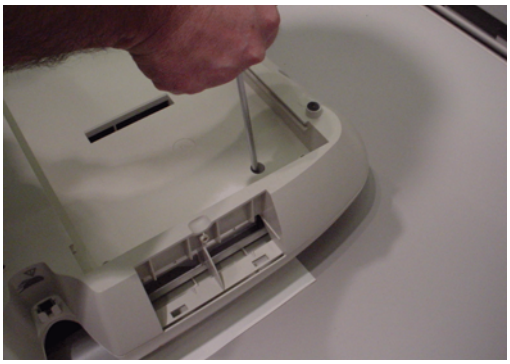
2 Remove the batteries. See page 6-3.

3 Remove the paper tray. See page 6-9.

4 Remove the two M5 screws from the underside of the bottom housing, using a T25 Torx driver. You can remove the two screws while the cardiograph is on the cart through the access holes in the shelf, or if the cardiograph is not on a cart, turning the cardiograph over.

Figure 6-31 Removing the Top Cover

Removing screws with cardiograph on cart



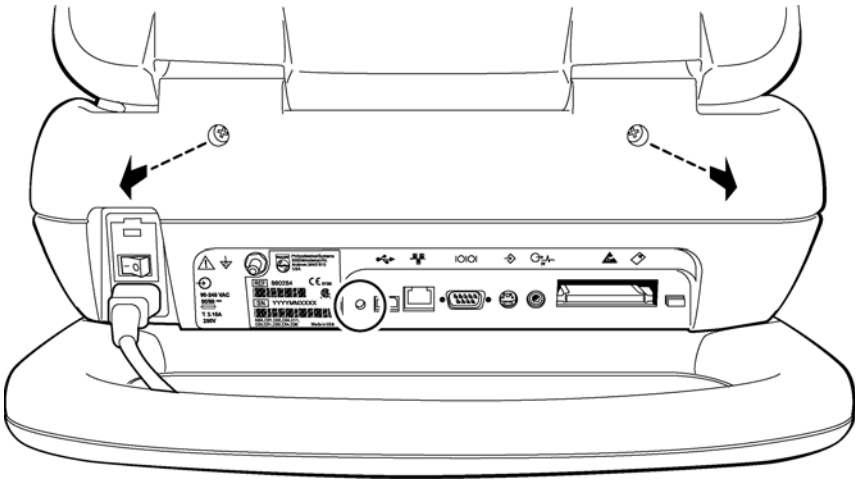
Turning cardiograph upside down and removing screws

NOTE Use a T-Handle T25 Torx driver with a length of at least 7" (part number 453563479711).

5 If the unit is upside down, turn it right side up carefully, as the loosened screws will fall out.

6 Using a Phillips-head screwdriver, remove the rear console cover by carefully removing the two (2) M5 x 12mm nylon screws from the rear of the top cover.

Figure 6-32 Removing the Rear Console

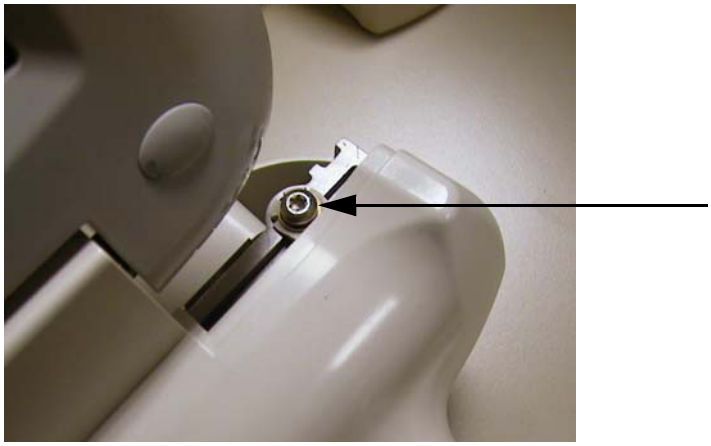


7 Rotate the display as shown. Consider placing something under the display as the weight will tip the cardiograph back.

Figure 6-33 Rotating the Display Down

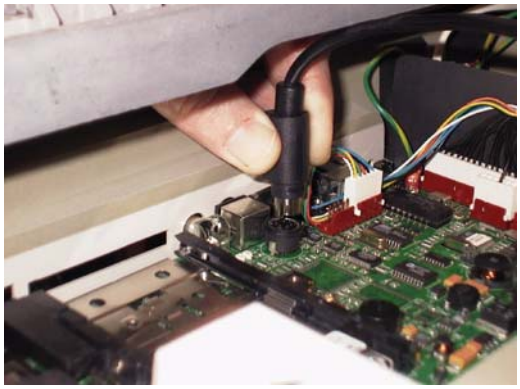
8 Remove the two (2) M5 x 12mm screws, one on each side of the bracket, that attach the top cover to the hinge bracket.

Figure 6-34 Removing the Screws From the Hinge Bracket



9 Lift the top cover slightly and disconnect the PS2 keyboard cable from the main control board. Be sure to grasp the collar when removing the connector, as shown.

Figure 6-35 Disconnecting the Keyboard Cable



10 Fully remove the cover, and set it aside.

Replacing the Top Cover

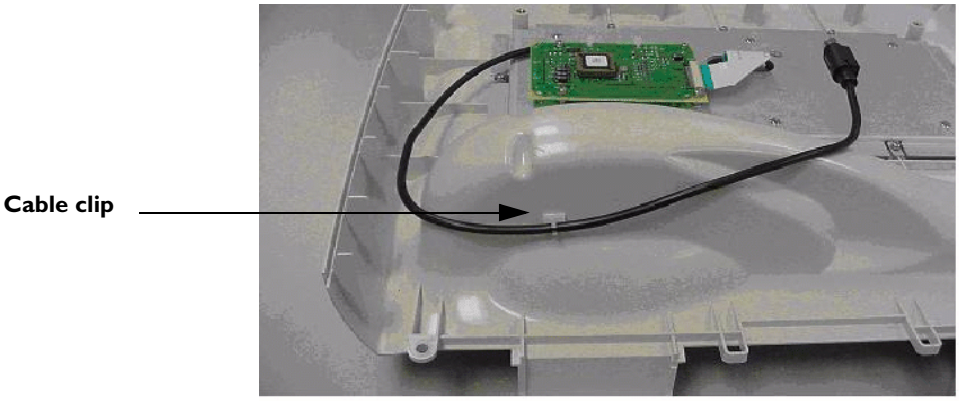
CAUTIONS When you replace the top cover, make sure the cardiograph is securely mounted to the cart or is on a large stable surface. Failure to do so can cause the cardiograph to tip.

The nylon screws are made of a composite that can be easily damaged. Be careful when removing them.

To replace the top cover:

1 Make sure that keyboard cable is routed as shown.

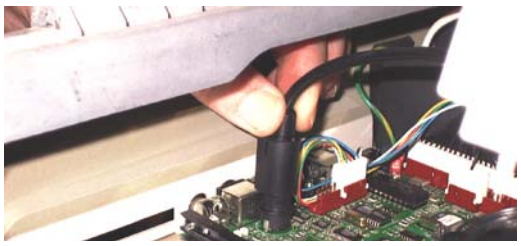
Figure 6-36 Keyboard Cable Routing



2 Place the top loosely into position and connect the keyboard cable to the PS2 connector on the main control board.

NOTE Do not hold the connector by the collar (figure 6-35) when pressing down. Be sure to hold the connector by the strain relief, as shown in figure 6-37.

Figure 6-37 Attaching the Keyboard Cable Connector



3 Place the top cover into position, and secure the top to the hinge bracket with the two (2) M5 x 12mm screws. See figure 6-34.

4 Reattach the rear cover, and tighten the two (2) M5 x 12mm nylon screws. See figure 6-32.

5 Replace the screws in the underside of the bottom housing, and tighten using a T25 Torx driver.

Removing and Replacing the Display

The display housing assembly is a highly complex assembly consisting of the LCD display, touch screen, and associated interface circuitry and cables.

CAUTION Due to the complexity of the display, do not attempt to troubleshoot or replace individual parts. You must replace the entire display.

Removing the Display

To remove the display:

1 Unplug the AC power cord.

2 Remove the batteries. See page 6-3.

3 Remove the top and rear covers. See page 6-16.

CAUTION When you remove the top assembly, make sure the cardiograph is securely mounted to the cart or on a large stable surface. Failure to do so can cause the cardiograph to tip.

WARNING **Do not touch any of the exposed connectors if you have batteries installed, or if the AC power cord is connected while the cardiograph is open. When the batteries are installed or the cardiograph is connected to AC power, there are dangerous voltages on certain components even if the AC power switch is set to the Off position.**

4 Cut the tie wrap securing the display cable to the hinge bracket, as shown below. Do not damage cable.

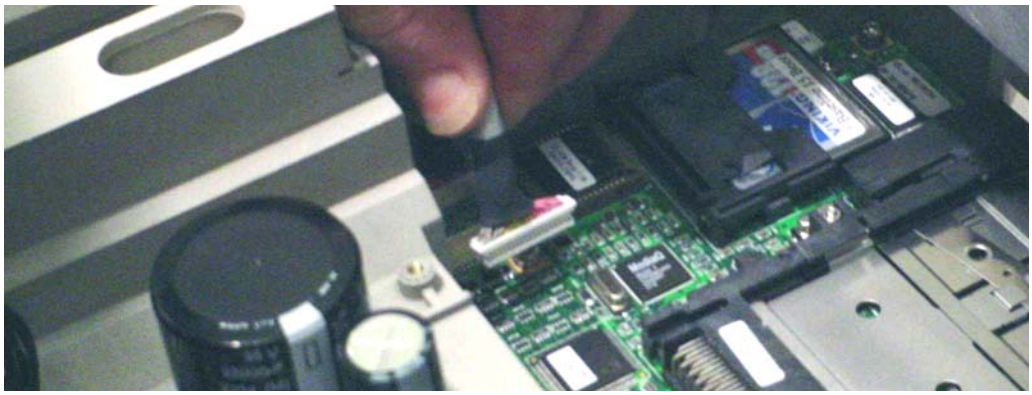
Figure 6-38 Cutting the Tie Wrap

5 Remove the display cable from the bracket by carefully pulling it to the side.

Figure 6-39 Removing Display Cable From Bracket

6 Disconnect the white J8 and J9 connectors by pulling the display cable straight upward.

Figure 6-40 Pulling Out the J8 and J9 Connectors



7 Rotate the display so that it is completely closed.

8 Remove the four M4 screws from the hinges.

CAUTION The display housing assembly is heavy. To prevent the display from falling, support it as you rotate or remove it.

Figure 6-41 Removing the Hinge Screws

9 Lift the display from the main housing.

Replacing the Display

To replace the display:

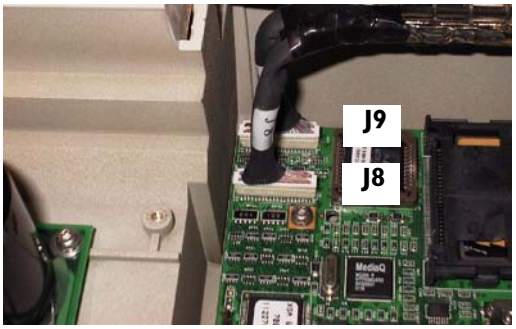
1 Align the display hinges with the display bracket.

2 Using new M4 x 9.5 mm screws for the replacement display, tighten one hinge at a time securely to the display bracket.

3 After you securely tighten all four screws, check for any misalignment in the display hinges by opening and closing the display.

4 Insert J9 and J8 connectors into the main control board, as shown.

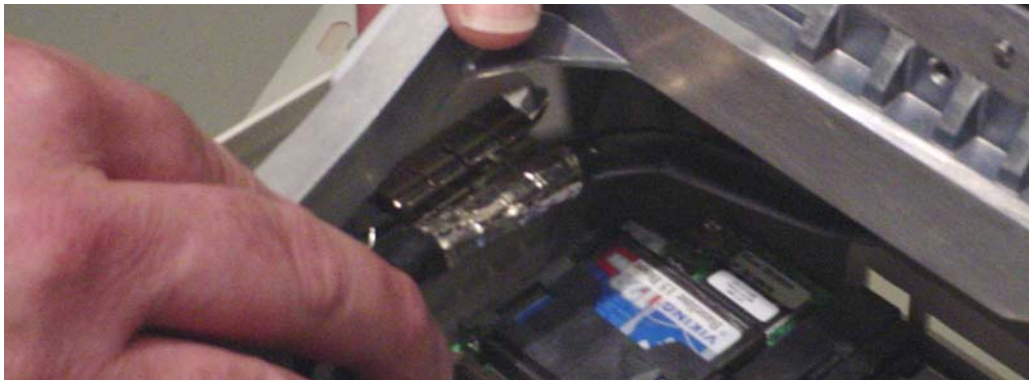
Figure 6-42 Orientation For J8 and J9 Connectors



CAUTION Do not reverse connectors or you could cause permanent damage to the main control board. The numbers are indicated next to each connector.

5 Insert the display cable into the bracket, as shown.

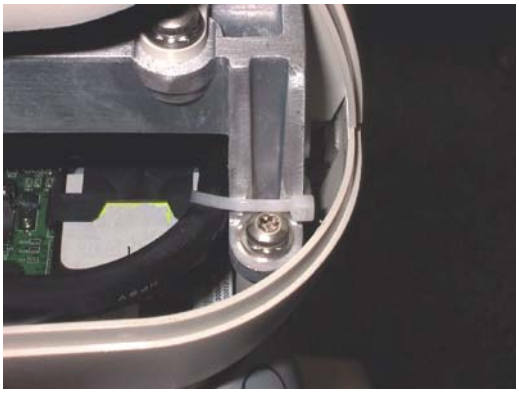
Figure 6-43 Inserting the Display Cable Into the Bracket



NOTE Make sure the grounded-shield portion of the cable fits snugly into the bracket fingers, with no tension or twisting in the cable between the bracket and the J8 and J9 connectors.

6 Install the tie wrap in the following location, as shown. Remove any excess.

Figure 6-44 Location of the Tie Wrap For the Display



7 Re-attach top cover. See page 6-19.

8 Re-attach rear cover.

Replacing the Display Hinge

To replace the display hinge:

1 Follow the procedure to remove the display assembly. See page 6-20.

2 Place the display assembly on a flat surface with the display facing upwards.

3 Remove the four rubber screw hole plugs located at the four corners of the display bezel. Remove the four M3 x 10mm screws found underneath using a T10 Torx driver.

Figure 6-45 Removing the rubber plugs and screws

4 Turn the display over. The four M3 x 10mm screws will fall out.

5 Lift the rear cover off the display.

Figure 6-46 Lifting the rear cover off of the display

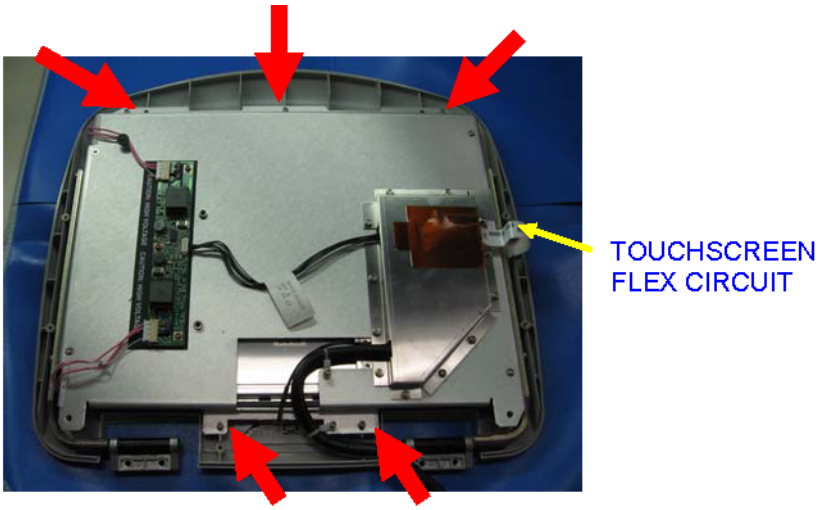
6 Disconnect the On/Standby connector as shown.

Figure 6-47 Disconnecting the On/Standby connector

7 Remove the five M3 x 8mm screws using a T10 Torx driver, as shown.

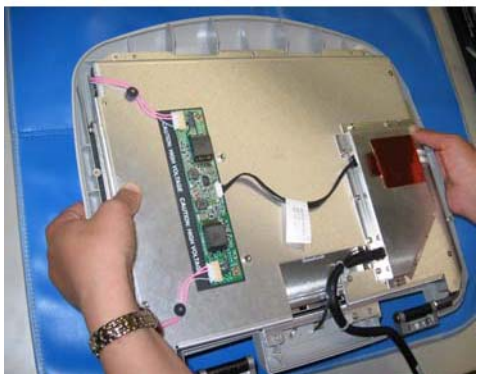
NOTE Once these screws are removed, the display LCD and touchscreen panel will be free-floating. Ensure that the touchscreen and LCD do no separate during the following steps, as the touchscreen flex circuit is susceptible to damage.

Figure 6-48 Removing the five M3 x 8mm screws



8 While squeezing the display assembly together, carefully turn the display over. Lift the front bezel assembly off as shown.

Figure 6-49 Turning over display and lifting front bezel



9 Using a T20 Torx driver, remove the two M5 x 9mm screws that fasten the right hinge assembly to the display pan.

NOTE This procedure describes replacing both hinges, even if only one has failed.

Figure 6-50 Removing the two M5 x 9mm screws

10 Note the difference between the right and left hinge assemblies (see figure below). Using the two new M5 x 9mm screws provided, install the replacement right hinge assembly. Install the screw at the top of the hinge first, only finger tight. Tighten both screws to 20 in/lbs.

Figure 6-51 Right and left hinge assemblies

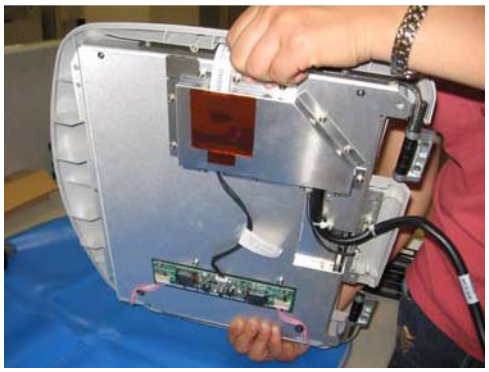
11 Remove and replace the left hinge assembly following the same procedure.

12 Place the front bezel on top of the touchscreen. If the bezel does not lay flat on the touchscreen, the touchscreen may need to be re-centered over the LCD.

CAUTION Do not apply too much force to the bezel as this may break the touchscreen glass panel.

13 While squeezing the display assembly, carefully turn the display assembly over.

Figure 6-52 Turning the display over



14 Install the five M3 x 8mm screws to secure the front bezel to the display. Tighten to 6 in/lbs.

15 Connect the On/Standby cable connector.

16 Place the rear cover on the display. While squeezing the two halves of the display together, turn the display over.

17 Install the four M3 x 10mm screws at the four corners of the display. Tighten to 6 in/lbs.

18 Install the four rubber screw hole plugs.

19 Install the display on the cardiograph. See page 6-22.

CAUTION Use the four new M4 x 9.5mm screws provided in the hinge replacement kit. Tighten one hinge at a time securely to the hinge bracket.

20 After you securely tighten all four screws, check for any misalignment in the display hinges by opening and closing the display.

21 Insert the J8 and J9 connectors onto the main control board.

Removing and Replacing the Keyboard Assembly

Removing the Keyboard Assembly

To remove the keyboard assembly:

1 Unplug the AC power cord.

2 Remove the batteries. See page 6-3.

3 Remove the top cover. See page 6-16.

4 Turn the top cover over.

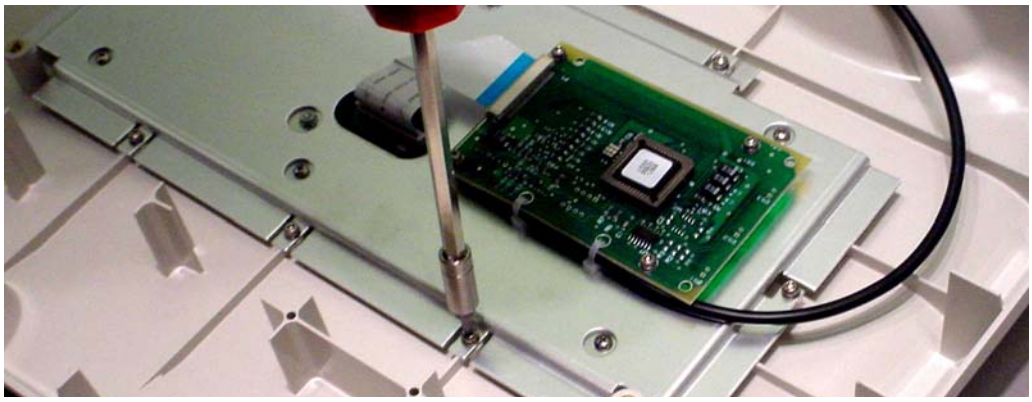
5 Open the lock on the keyboard flex cable connector, and then disconnect the flex cable from the keyboard, as shown.

Figure 6-53 Disconnecting the Flex Cable

6 Remove the eight screws from the edge of the keyboard bracket, as shown.

CAUTION The keyboard and interface card should be replaced as a complete assembly.

Figure 6-54 Removing Screws From the Keyboard Bracket



7 Remove the interface card from the keyboard bracket by removing the four screws.

Replacing the Keyboard Assembly

To replace the keyboard assembly:

1 Place keyboard in opening of the top cover.

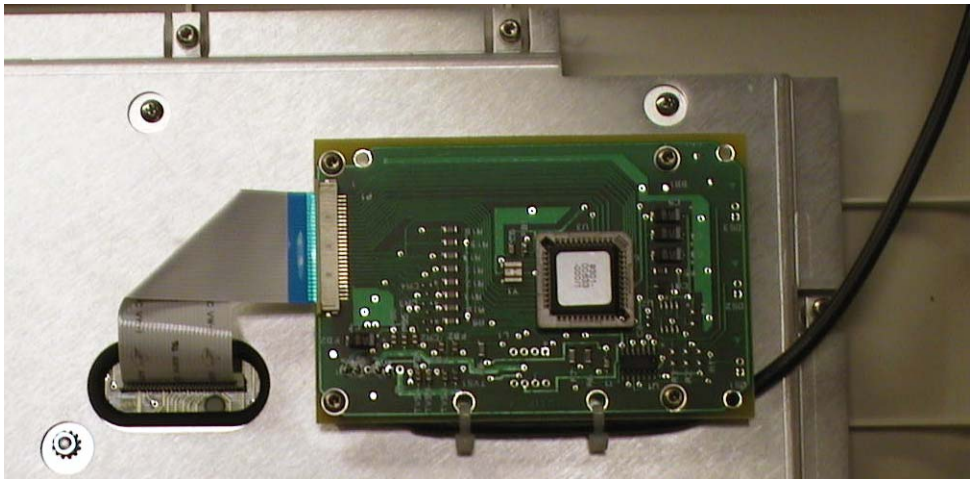
2 Place bracket over keyboard and align the mounting holes on the keyboard bracket to the inserts on the top housing.

3 Insert the eight (8) M3 x 6mm screws that fasten the bracket to the top housing.

4 Insert the four (4) M3 x 8 mm screws that fasten the interface card to bracket.

5 Open the lock on the keyboard flex cable connector, and insert the flex cable into the keyboard.

Figure 6-55 Correct Placement of the Flex Cable



6 Close the lock.

7 Turn the top cover over, and attach the top cover. See page 6-16.

8 Insert the batteries. See page 6-3.

9 Plug the AC power cord into the power source.

Removing and Replacing the Diskette Drive

Removing the Diskette Drive

To remove the diskette drive:

1 Unplug the AC power cord.

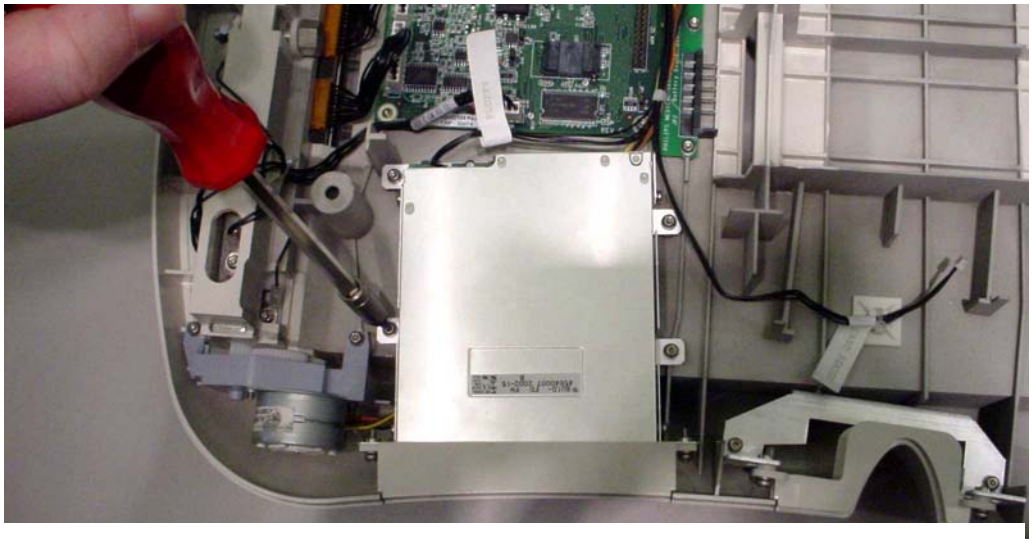
2 Remove the batteries. See page 6-3.

3 Remove the top cover. See page 6-16.

4 Remove the four M3 x 6mm screws that secure the drive to the main housing.

5 Lift the drive slightly, and disconnect the four-pin connector.

Figure 6-56 Removing the Diskette Drive



Replacing the Diskette Drive

To replace the diskette drive:

1 Connect the four-pin connector and insert the diskette drive.

2 Insert the four M3 x 6 mm screws that secures the diskette drive.

3 Attach the top cover. See page 6-16.

4 Insert the batteries. See page 6-3.

5 Plug the AC power cord into the power source.

Removing and Replacing the Printer Gearbox

Removing the Printer Gearbox

To remove the printer gearbox:

1 Unplug the AC power cord.

2 Remove the batteries. See page 6-3.

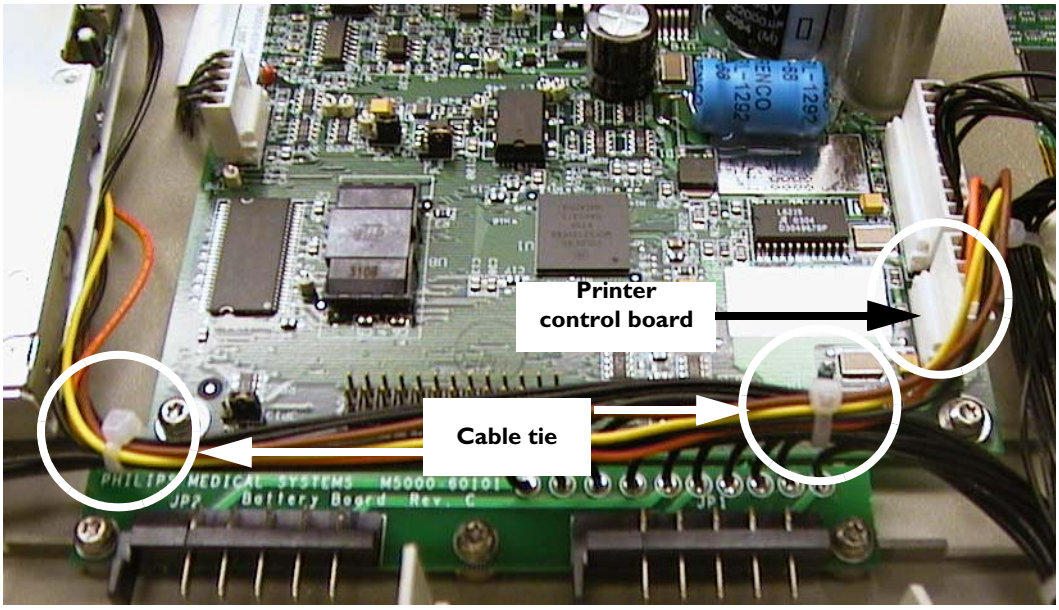
3 Remove the top cover. See page 6-16.

4 Remove the diskette drive. See page 6-30.

5 Disconnect the printer motor connector at the printer control board.

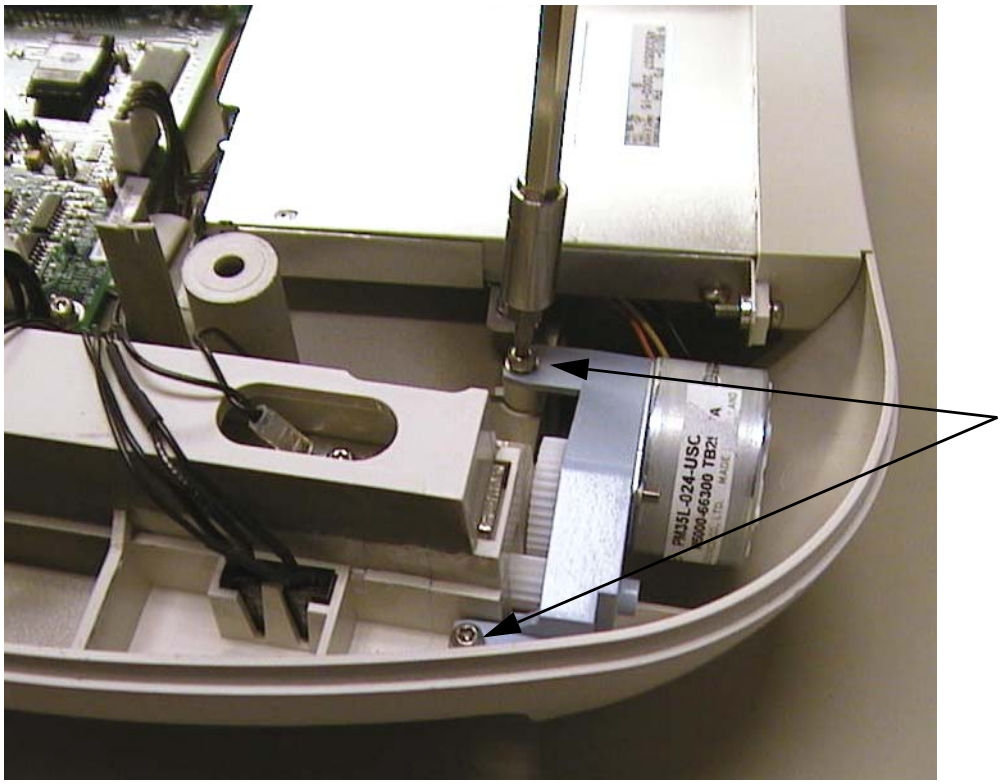
6 Cut the two cable ties. Do not damage the wires.

Figure 6-57 Cutting Cable Ties



7 Remove the two (2) M3 x 8mm screws that secure the printer gearbox to the main housing.

Figure 6-58 Removing Screws From the Printer Gearbox



8 Carefully lift the printer gearbox from the main housing.

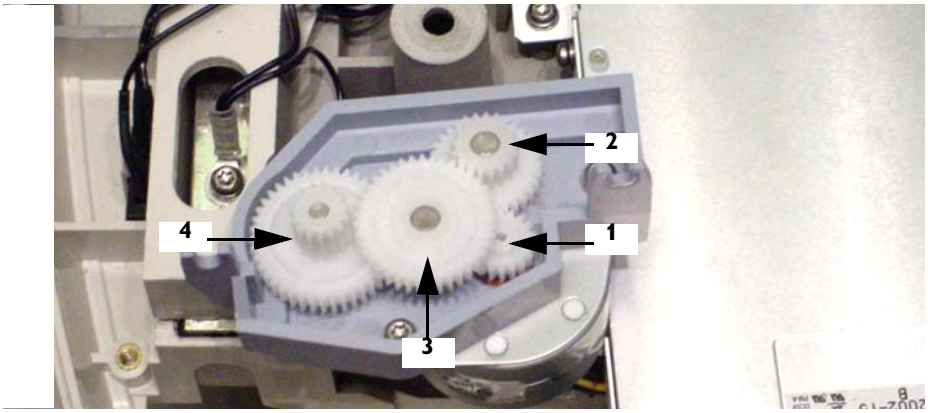
CAUTION Be sure not to tip the assembly, which will cause the individual gears to fall off the shafts.

Replacing the Printer Gearbox

To replace the printer gearbox:

1 Install the gears, as shown.

Figure 6-59 Installing the Printer Gears

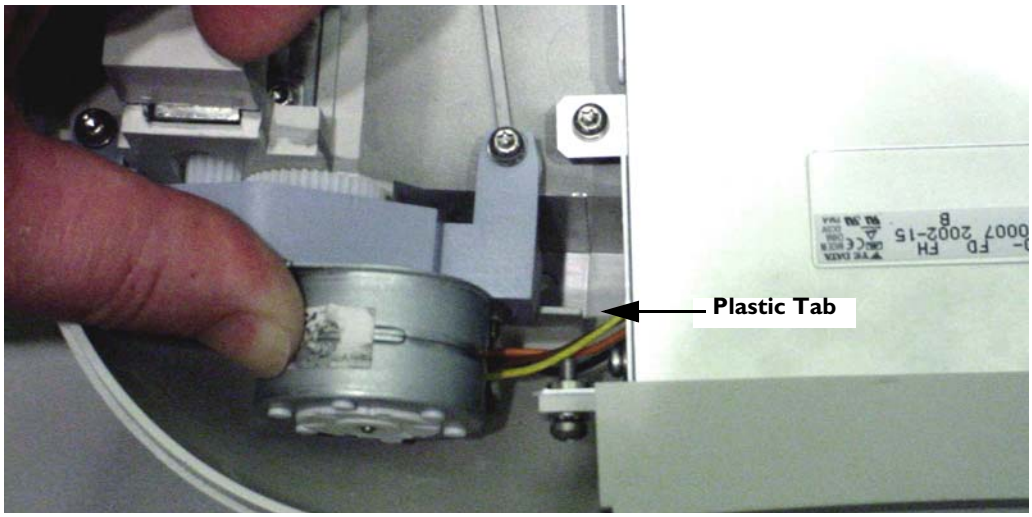


NOTE The gears are arranged on the shafts in the gear housing as shown. Each gear has a number molded into it.

2 Position the printer gearbox in the main housing.

NOTE When you tighten the printer gearbox screws, make sure to push the printer gearbox tight against the plastic tab in the main housing as shown.

Figure 6-60 Pushing Gearbox Against Tab



3 Attach the printer gearbox to the main housing with two (2) M3 x 8 mm screws. See Figure 6-58 on page 6-31.

4 Install the two tie wraps in the location, as shown in Figure 6-57 on page 6-31. Remove any excess.

Removing and Replacing the Print Head

Removing the Print Head Assembly

CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the print head assembly.

To remove the print head:

1 Unplug the AC power cord.

2 Remove the batteries. See page 6-3.

3 Remove the paper tray. See page 6-16.

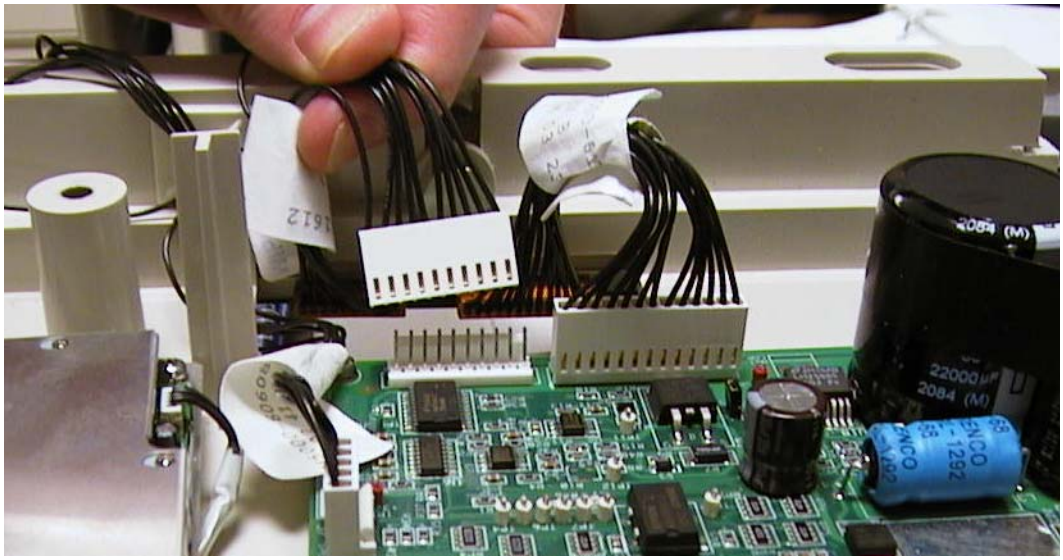
4 Remove the top cover. See page 6-16.

5 With the cardiograph upside down, remove the paper guide bar, as shown below.

Figure 6-61 Removing the Paper Guide Bar

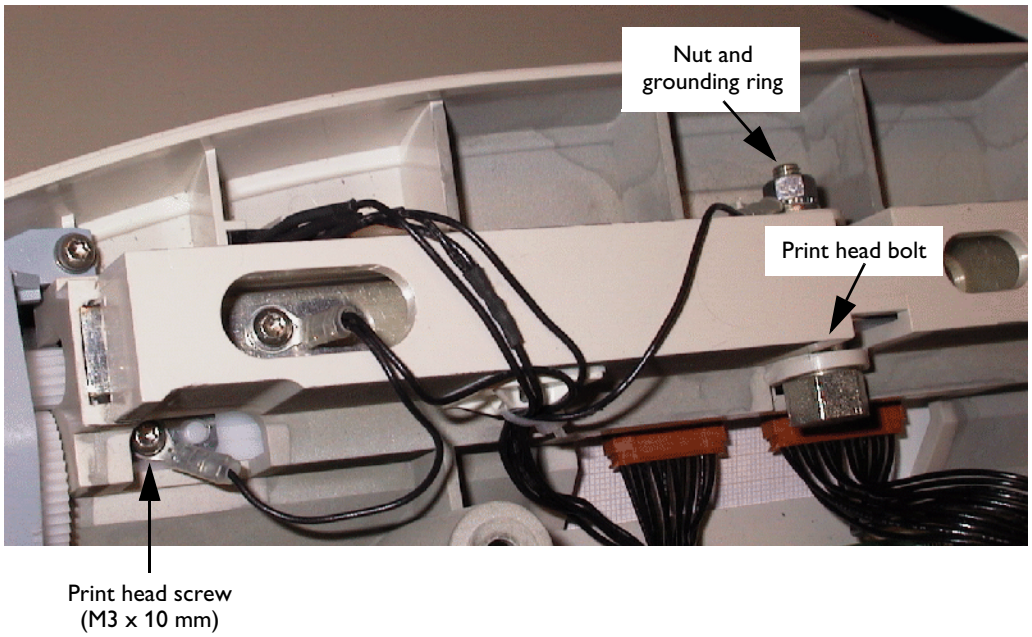
6 Turn over the instrument, and disconnect print head data and power ribbon connectors from the printer control board, as shown below.

Figure 6-62 Print Head Connectors on the Printer Control Board



7 Remove the M3 x 10 mm screw from the print head, shown below.

Figure 6-63 Print Head Components



8 Remove the nut and grounding ring from the print head bolt, as shown in Figures 6-63 and 6-64.

9 Remove the print head bolt by reaching under the print head well, and applying upward force on the actual print head while removing the bolt.

CAUTION If you are reusing the print head, use gloves or other protective layer when pressing on the thermal surface. DO NOT touch with bare skin.

10 Carefully allow the print head assembly to drop down from the print head well.

Replacing the Print Head Assembly

CAUTIONS Handle print head by the edges only or by the attached plastic holder. DO NOT touch the thermal element with bare fingers.

To replace the print head:

1 Insert print head assembly in print head well.

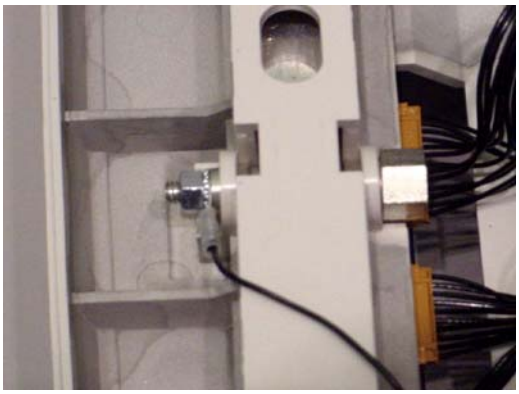
2 Pull the data and power ribbon cables through the slots.

3 Apply upward force to the print head, and insert the print head bolt, shown in Figures 6-63 and 6-64.

CAUTION Use gloves or other protective layer when pressing on the thermal surface. DO NOT touch with bare skin.

4 Place the grounding ring terminal on the bolt, and tighten the nut.

Figure 6-64 Location of Grounding Ring Terminal on the Print Head Bolt



5 Insert the M3 x 10 mm screw into the print head, re-attaching the ground ring terminal, shown in figure 6-63.

6 Connect the print head data and power cables to the printer control board, shown in figure 6-63.

NOTE Make sure there is enough slack in the cables to give the print head full range of motion.

7 Install the paper guide bar. See page 6-33.

8 Insert the paper tray. See page 6-9.

9 Attach the top cover. See page 6-19.

10 Insert the batteries. See page 6-3.

11 Plug the AC power cord into the power source.

Removing and Replacing the Boot ROM Chip

Some cardiographs shipped before November, 2004 with serial number prefix **USN04** may experience problems when returning from Standby mode. When the On/Standby button is pressed, the display remains black, and the printer periodically cycles, making a *clicking* sound.

All main control boards shipped after November, 2004 have updated Boot ROM firmware which corrects this problem. However, if the cardiograph is experiencing this problem as described, and the main control board is older than November of 2004, update the Boot ROM firmware as described in the following procedure.

You do not need to save the cardiograph's configuration or reload software.

You will need following equipment for this procedure:

- AMP PLSS chip extraction tool 453564016261

CAUTION Failure to follow the BOOT ROM replacement procedure may result in a damaged main control board.

Removing the Boot ROM Chip

To update the Boot ROM firmware:

1 Unplug the AC power cord.

2 Remove the batteries. See page 6-3.

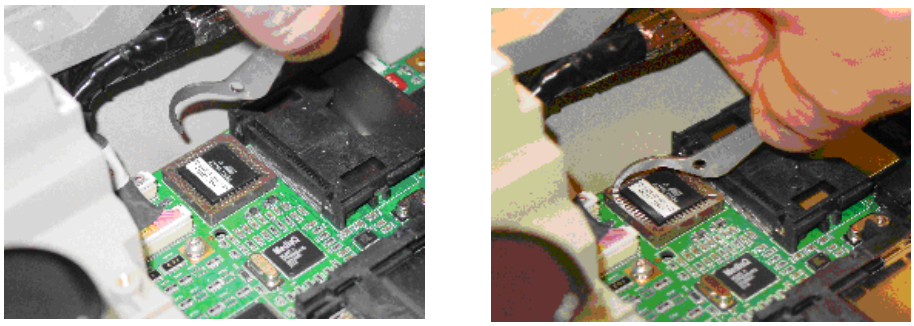
3 Remove the top cover. See page 6-16.

4 Locate the Boot ROM, next to the CompactFlash card. (See Figure 7-2 on page 7-5 for the bottom housing assembly diagram).

5 Check the version number on the label. Verify that the version is V1.78 or older. If so, proceed with the next step.

6 Insert the curved end of the AMP chip extraction tool into the corner of the socket closest to the Display cable connector.

Figure 6-65 Inserting the Chip Extraction Tool

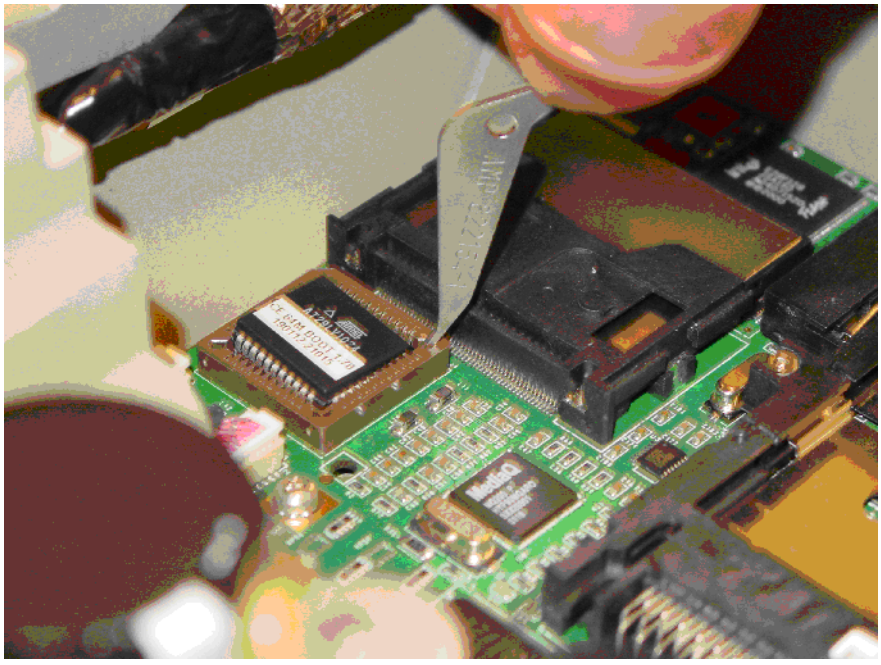


CAUTION Do not attempt to extract the Boot ROM from the socket on the first try. The Boot ROM socket is easily damaged.

7 Gently rotate the chip extraction tool to slightly lift the Boot ROM.

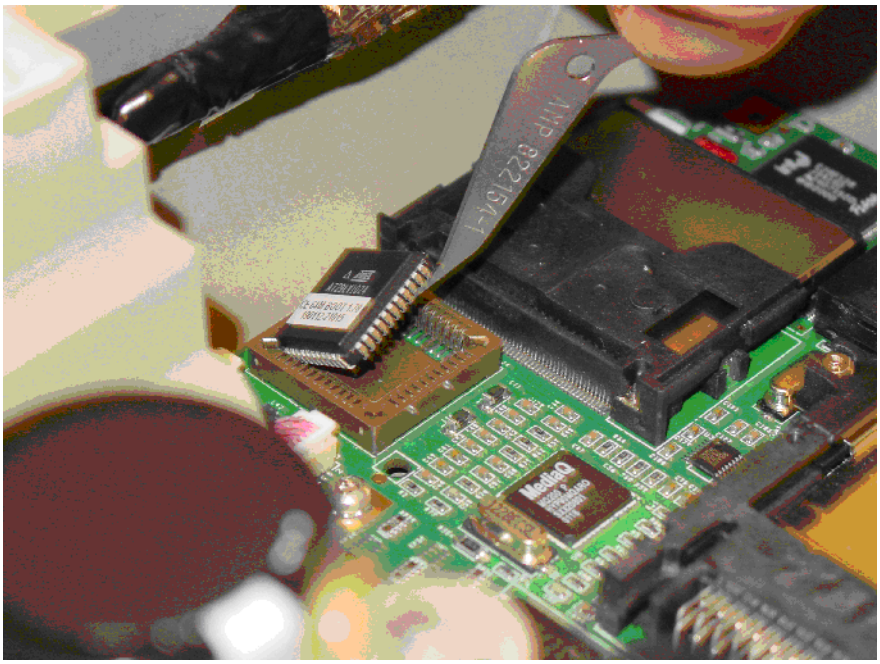
8 Insert the opposite end of the chip extraction tool into the opposite corner of the socket.

Figure 6-66 Rotating the Chip Extraction Tool



9 Gently apply downward pressure to the chip extraction tool to lift the Boot ROM from the socket.

Figure 6-67 Lifting the Boot ROM Chip

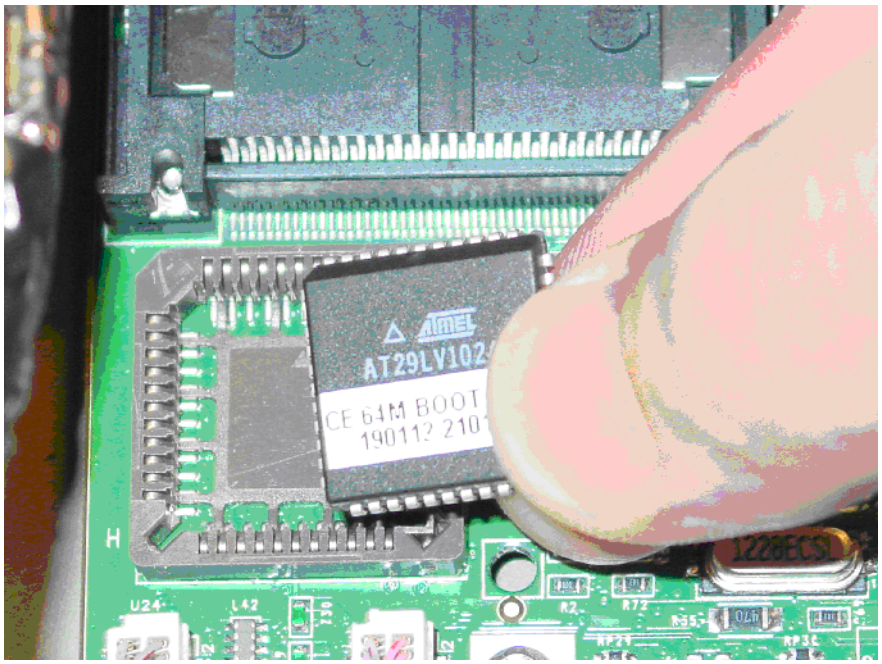


Replacing the Boot ROM Chip

To replace the Boot ROM chip:

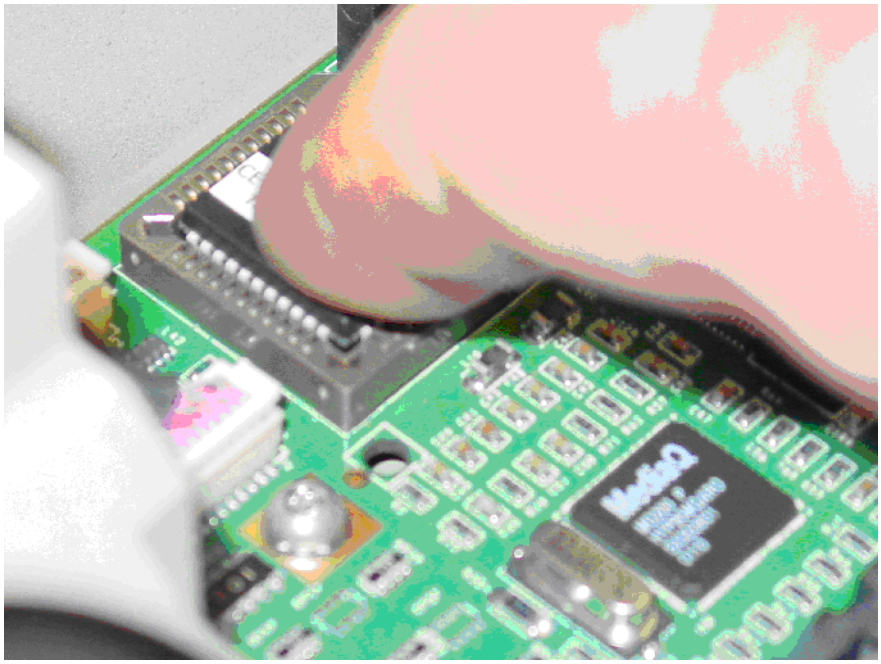
1 Line up the beveled corner of the Boot ROM lines with the beveled corner of the socket.

Figure 6-68 Lining Up the Boot ROM Chip



2 Gently press the new Boot ROM chip into place.

Figure 6-69 Inserting the Boot ROM Chip



3 Replace the top cover. See page 6-19.

4 Re-insert the PC Card, if one was present previously.

5 Reconnect any peripherals or cables that were attached to the rear panel.

6 Connect the PIM. See page 6-6.

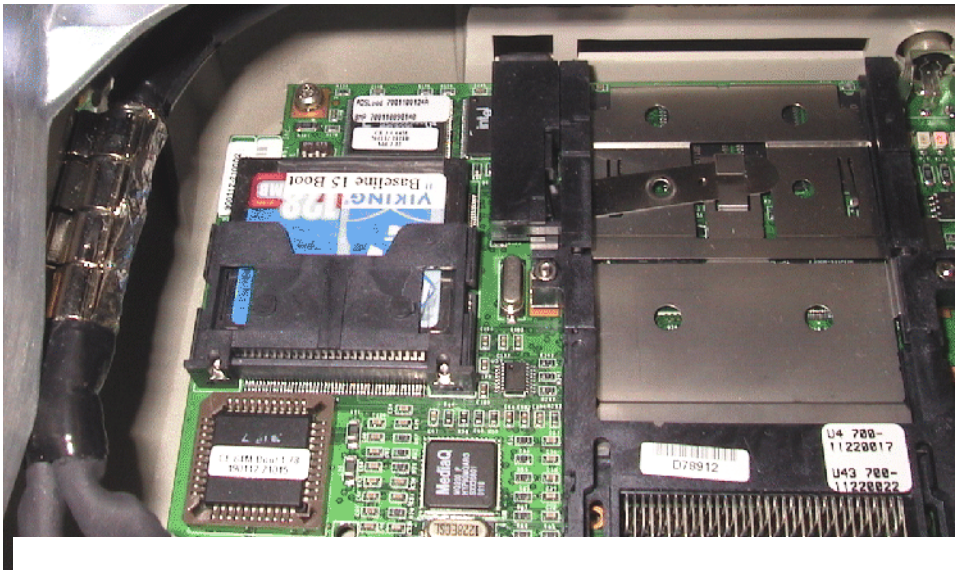
7 Install the batteries. See page 6-3.

8 Plug the AC power cord into the power source.

Removing and Replacing the Main Control Board

The main control board consists of the printed circuit assembly and the internal CompactFlash (CF) card. Custom configuration settings, and any ECGs saved to the internal **Main Archive** are stored on the internal CF card. Before replacing the main control board and CF card, save the cardiograph configuration settings as a *custom settings* file to removable media (PC card, USB memory stick, diskette). After the main control board is replaced, the custom settings file can be reloaded on the cardiograph using the removable media. Any ECGs saved to the internal Main Archive need to be transferred to TraceMasterVue, or to removable media.

Figure 6-70 CompactFlash (CF) Card



CAUTION DO NOT remove or swap the CF card contained on the replacement (new) main control board. Swapping the CF card may result in an unverified software combination. When returning the defective main control board, please also include the internal CF card.

Removing the Main Control Board

CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the main control board.

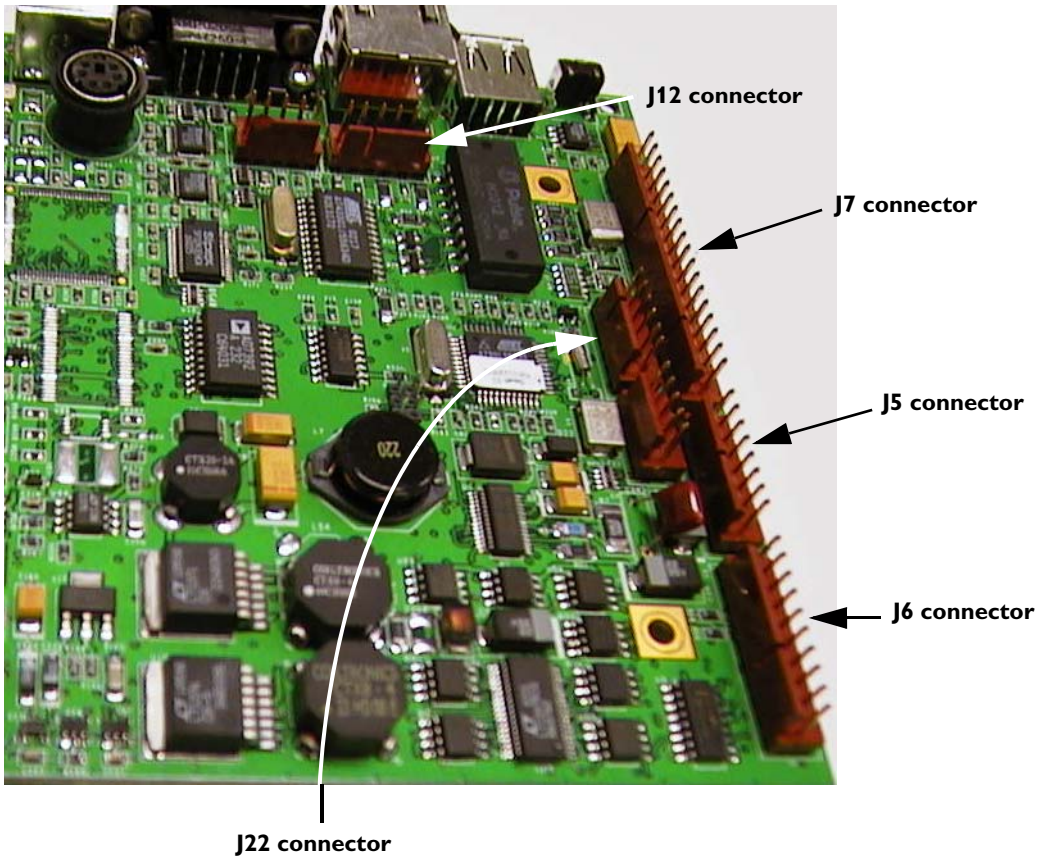
To remove the main control board:

1. Back up the cardiograph configuration to removable media (PC card, USB memory stick, diskette). This can only be done if the cardiograph is operational. For more information, see Chapter 3 of the *PageWriter Touch Instructions for Use*.
2. Transfer any archived EGGs to removable media (PC card, USB memory stick, diskette) in case you need to restore them after replacing the main board. This can only be done if the cardiograph is operational. For more information, see Chapter 8 of the of the *PageWriter Touch Instructions for Use*.
3. Unplug the AC power cord.
4. Remove the batteries. See page 6-3.
5. If a PC card is inserted into the slot located on the rear of the cardiograph, remove it by pressing the eject button.
6. Remove any peripherals or cables attached to the rear panel of the cardiograph.
7. Remove the top cover. See page 6-16.

NOTE To minimize any flexing of the main control board, remove all cables prior to removing any of the screws.

8. Disconnect the J5, J6, J7, and J12 connectors.

Figure 6-71 Main Control Board, J5, J6, J7, J12, J22 Connectors



NOTE Connectors are not attached in Figure 6-71.

9 Disconnect the J22 connector.

10 Remove the display cable from the bracket by carefully pulling it to the side. See Table 6-39

NOTE Pay close attention to the position of the J8 and J9 connectors. You will need to reattach them in the same manner when replacing the board. See figure 6-42.

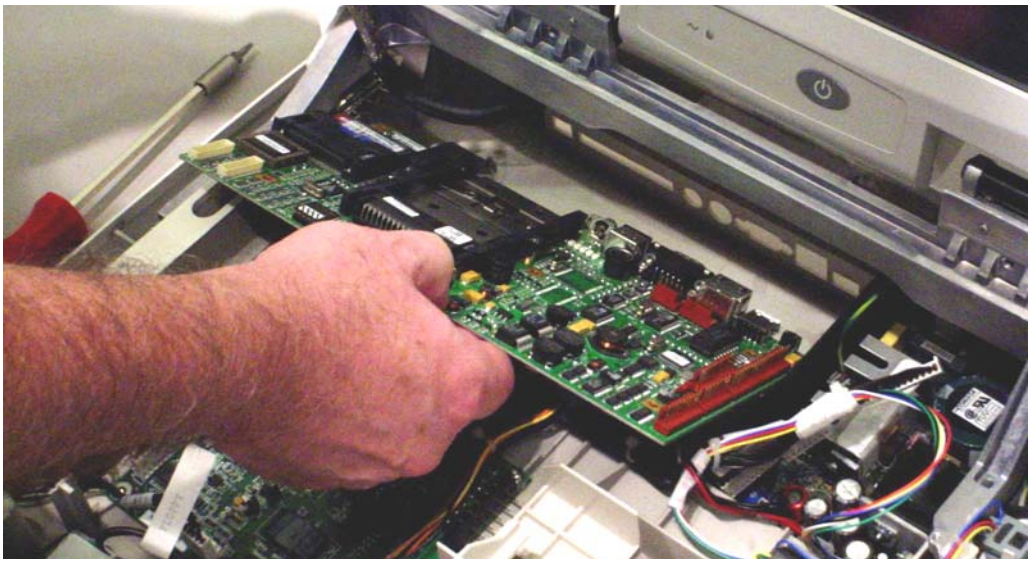
11 Disconnect the J8 and J9 connectors by pulling the display cable straight up. See figure 6-42.

12 Remove the five screws that secure the main control board to the main chassis using a T10 Torx driver.

NOTE Pay close attention to the ground lug location under one of the screws. See Figure 6-75 on page 6-44.

13 Carefully lift the main control board up and out from under the display mounting bracket, as shown below.

Figure 6-72 Lifting Out the Main Control Board

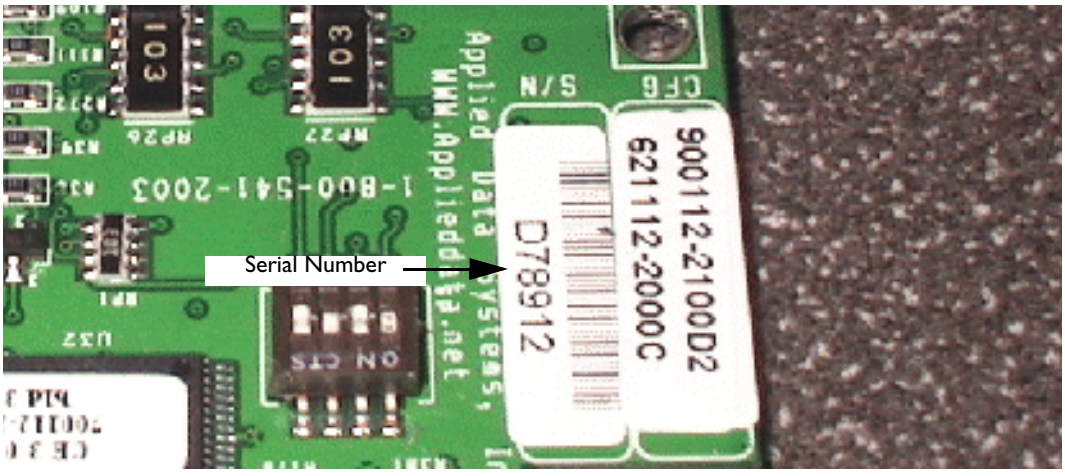


Replacing the Main Control Board

To replace the main control board:

1 Record the serial number from the main control board on the service record. The serial number is located under the CompactFlash (CF) card.

Figure 6-73 Location of Serial Number on the Main Control Board



2 Make sure that the DIP switches are set as follows: 1: OFF 2: OFF 3: ON 4: OFF.

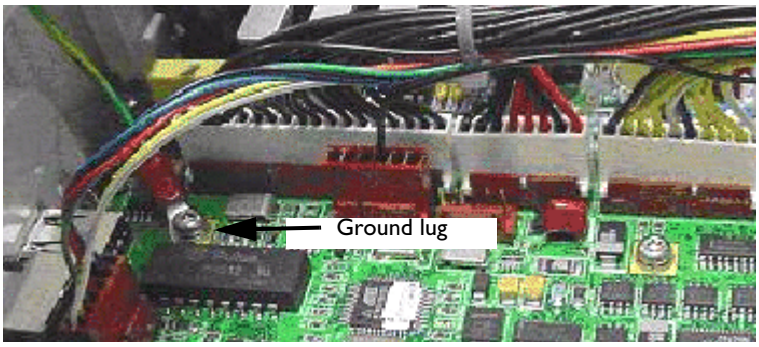
Figure 6-74 Dip Switches

3 Guide the main control board into place, being careful not to skew it.

4 Secure the main control board to the main housing, using a T10 Torx driver.

NOTE Pay close attention to the ground lug location under one screw, as shown. Ensure that the ground lug is positioned so that it does not touch adjacent components.

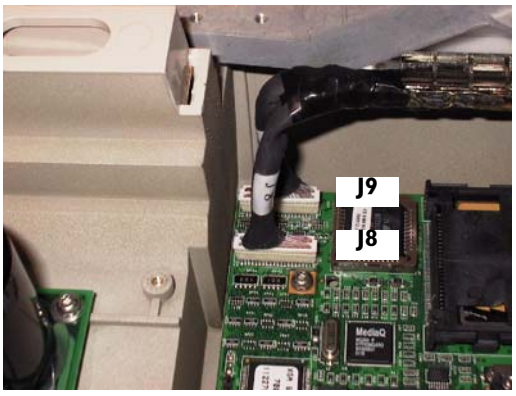
Figure 6-75 Location of Ground Lug



5 Replace the J8 and J9 connectors.

NOTE Make sure that the J8 and J9 connectors are oriented as shown.

Figure 6-76 Position of the J8 and J9 Connectors



6 Insert display cable into bracket. See Figure 6-43 on page 6-23.

7 Re-attach the J5, J6, J7, J12, and J22 connectors. See Figure 6-71 on page 6-42.

8 Re-attach keyboard connector. See page 6-20.

9 Replace the top cover. See page 6-19.

10 Re-insert the PC card, if one was present previously.

11 Reconnect any peripherals or cables that were attached to the rear panel.

12 Connect the PIM. See page 6-6.

13 Install the batteries. See page 6-3.

14 Plug the AC power cord into the power source.

15 After you replace the main board, reload the cardiograph software using the appropriate procedure outlined in Appendix A, “Software Installation Instructions.”

Restoring Files from the Compact Flash Card

If you are unable to save the custom configuration settings on the cardiograph or transfer ECGs from the internal Main Archive, use the following procedures to restore the files from the CF card.

To remove the CF card from the main control board:

1 Remove the CF card from the defective main control board.

2 Insert the CF card into a PC Card adapter.

3 Insert the PC Card adapter into the PC Card slot at the rear of the cardiograph.

To restore the configuration file from the CF card:

1 Touch the **Config** button on the Command Toolbar.

2 Touch the **Load** button on the Configuration Context Toolbar.

The **Load Configuration File** window appears.

3 Under **Select Input Source** touch the drop-down arrow button to display the drop-down list.

4 Touch **PC Card** to select it for the input media.

5 Touch the **Browse** button.

The Select File Path window appears.

6 Under **Filename** (right side of screen), select the **ActiveSettings.cfg** file located in the **Sierra** folder.

The ActiveSettings.cfg file appears highlighted in blue.

7 Touch the **Select** button.

The Load Configuration File window appears with the ActiveSettings.cfg file displayed under **Enter Input Filename** field.

8 Touch the **OK** button. The ActiveSettings.cfg file is saved to the cardiograph and the cardiograph automatically restarts.

NOTE If a PC is being used to transfer ECGs from the CF card, the ECG files are located in the **SierraArchiveInternal** folder.

To transfer an ECG from the archive:

1. Under **Selected Archive** (top left of screen) touch the drop-down arrow button or the displayed Archive name to display the drop-down list of available Archives.
2. Touch an Archive to select it. The selected Archive is highlighted in blue and appears under **Selected Archive** (top left of screen). The ECGs in the selected Archive appear on the ECG list (center of screen).

NOTE The **Main Archive-ID Complete** Archive contains all ECGs that can be transferred to a TraceMasterVue ECG Management System.

3. Touch the ECG to be transferred. To select multiple ECGs, touch the first ECG to be selected, and then press and hold the *Shift* key (on keyboard). Continue to select ECGs by pressing the up and down arrow keys on the keyboard.

CAUTION Do not select multiple ECGs by touching a single ECG and then dragging across the screen. Doing so may cause the cardiograph to freeze and discontinue normal operation. If the cardiograph does not operate normally, it will require a full reset. See "Restarting the Cardiograph" on page 5-48 for more information.

4. When all ECGs have been selected, touch the **Transfer** button on the Context Toolbar.

NOTE The **Transfer** button on the Context Toolbar will be grayed out and cannot be used if an ECG with incomplete required patient information is selected to be transferred.

5. The **Copy Selected ECGs** window appears. Under **Select Copy Destination** touch the drop-down arrow button to display the drop-down list.
6. Touch a destination to select it. The selected destination is highlighted in blue.
7. Touch the **Delete Selected ECGs** check box to have the ECG(s) deleted from the original Archive after transmission from the cardiograph is complete.
8. Touch the **OK** button.
9. The **Transfer Selected ECGs** progress bar window appears and the ECGs are transferred.

Removing and Replacing the Power Supply Assembly

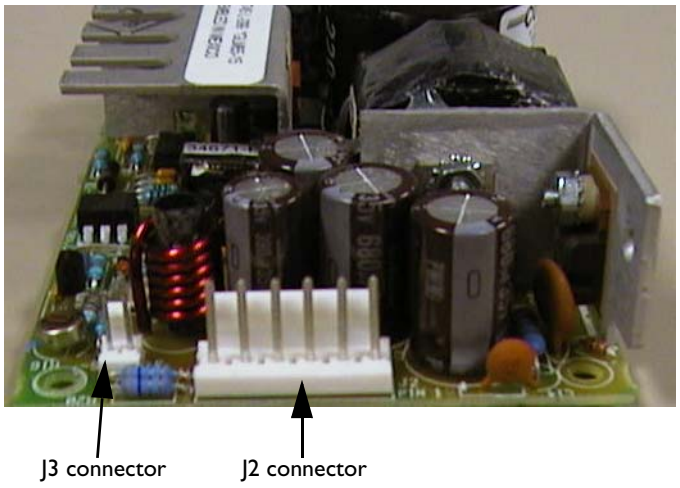
CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the power supply assembly.

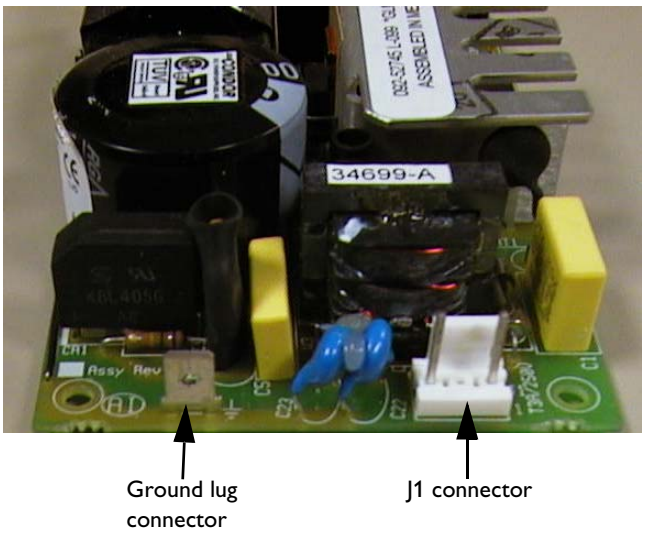
Removing the Power Supply Assembly

To remove the power supply assembly:

1. Unplug the AC power cord.
2. Remove the batteries. See page 6-3.
3. Remove the top cover. See page 6-17.
4. Disconnect the J1, J2, J3 connectors by grasping the connector wires and pulling straight up.

Figure 6-77 Power Supply Assembly, J2, J3 Connectors





5 Remove the four (4) M3 x 6mm screws that secure the power supply to the bottom housing, using a Torx T10 driver.

6 Lift the power supply from the bottom housing.

7 Disconnect the ground spade lug connector from the power supply. See Figure 6-77 on page 6-47.

Replacing the Power Supply Assembly

To replace the power supply assembly:

1 Be sure the insulator material is positioned under the power supply.

2 Connect the ground spade lug connector to the power supply. See Figure 6-77 on page 6-47.

TIP It is much easier to connect the ground spade lug connector before you insert the power supply.

3 Replace the power supply in the main housing.

4 Insert the four (4) M3 screws that secure the power supply to the main housing, using a Torx T10 driver.

5 Connect the J1, J2, J3 connectors. See Figure 6-77 on page 6-47.

6 Attach the top cover. See page 6-17.

7 Insert the batteries. See page 6-3.

8 Plug the AC power cord into the power source.

Removing and Replacing the Printer Control Board

CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the printer control board.

Removing the Printer Control Board

To remove the print control board:

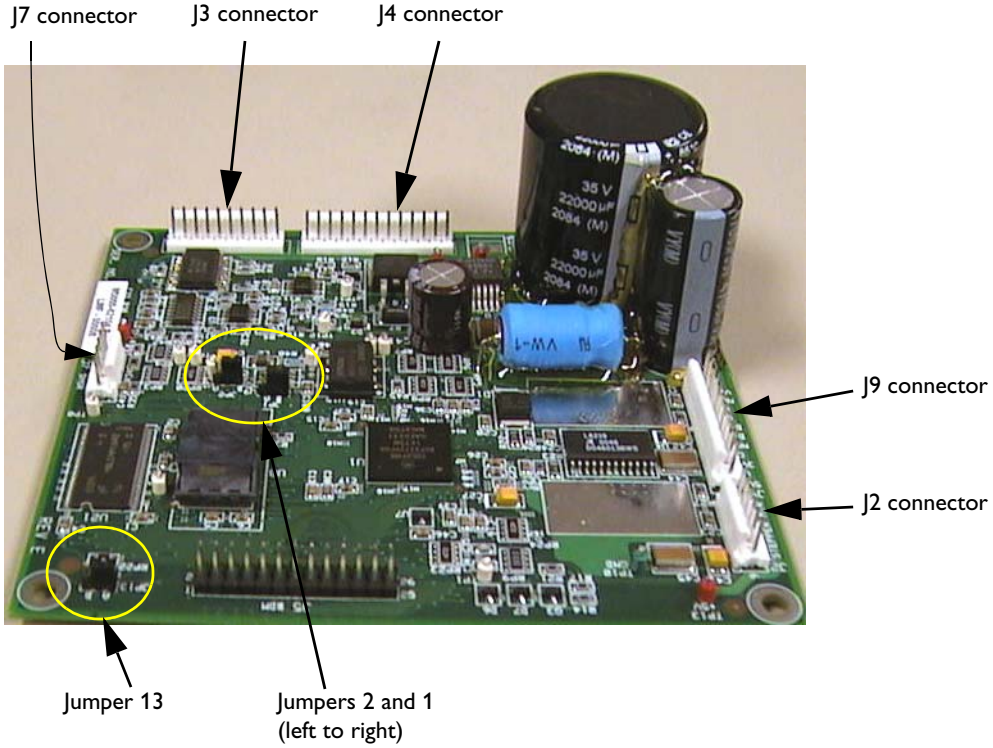
1 Unplug the AC power cord.

2 Remove the batteries. See page 6-3.

3 Remove the top cover. See page 6-17.

4 Disconnect the J2, J3, J4, J7, and J9 connectors by grasping the connector wires and pulling straight up.

Figure 6-78 Printer Control Board, J2, J3, J4, J7, J9 Connectors and Jumpers



5 Remove the four (4) M3 x 6mm screws that secure the printer control board to the bottom housing, using a Torx T10 driver.

6 Lift the printer control board from the bottom housing.

Replacing the Printer Control Board

To replace the printer control board:

1 Be sure the jumpers on the printer control board are set as follows (see figure 6-78, above):

- JP1: B
- JP2: B
- JP13: A

2 Replace the printer control board into the bottom housing.

3 Insert the four M3 x 6mm screws that secure the printer control board to the bottom housing, using a Torx T10 driver.

4 Re-attach the J2, J3, J4, J7, and J9 connectors. See figure 6-78.

5 Replace the top cover. See page 6-17.

6 Insert the batteries. See page 6-3.

7 Plug the AC power cord into the power source.

8 After you replace the printer control board, load the printer control software from the internal CompactFlash (CF) card as described in Appendix A, “Software Installation Instructions" on page B-5.

Removing and Replacing the Magnetic Card Reader

Removing the Magnetic Card Reader

To remove the magnetic card reader assembly:

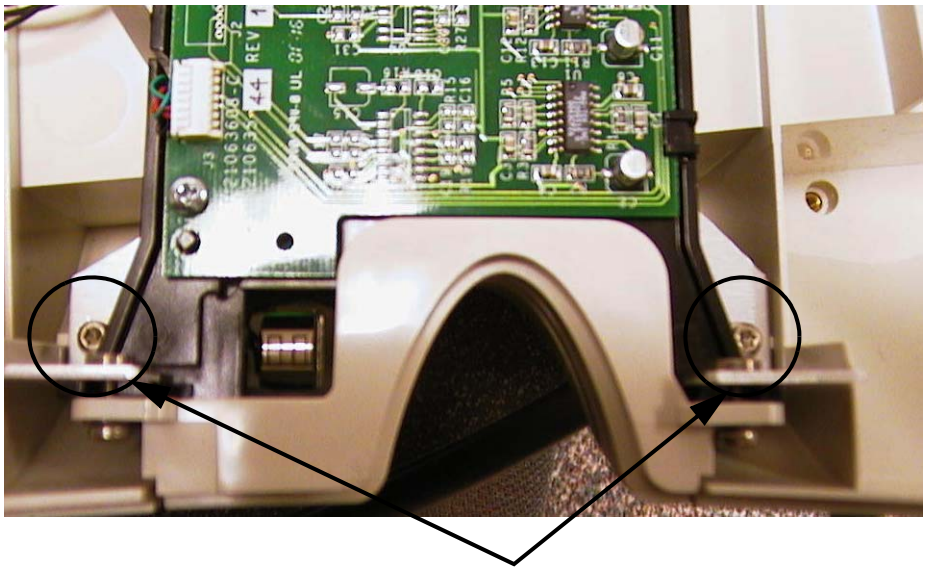
1 Unplug the AC power cord.

2 Remove the batteries. See page 6-3.

3 Remove the top cover. See page 6-17.

4 Remove the two M3 x 6mm screws that secure the card reader to the bottom housing, using a Torx T10 driver.

Figure 6-79 Removing Magnetic Card Reader Screws



5 Slightly lift the card reader.

6 Disconnect the four-pin connector at the back of the assembly.

Replacing the Magnetic Card Reader

To replace the magnetic card reader assembly:

1. Re-attach the four-pin connector.
2. Insert the two (2) M3 x 6mm screws that secure the card reader to the bottom housing, using a Torx T10 driver. See Figure 6-79 on page 6-50.
3. Replace the top cover. See page 6-17.
4. Insert the batteries. See page 6-3.
5. Plug the AC power cord into the power source.

Removing and Replacing the Main Cable Harness Assembly

Removing the Main Cable Harness Assembly

The main cable harness assembly consists of the following individual cables. If any of these cables fail, you must replace the entire harness assembly.

- Main cable harness (M5000-61600)
- DC power cable harness (M5000-61601)
- Patient data cable (M5000-61603)
- Battery interconnect (M5000-61604)

To remove the main cable harness assembly:

1. Unplug the AC power cord from the rear of the cardiograph.
2. Remove the batteries from the cardiograph. See page 6-3.
3. Disconnect the PIM from the RJ-11 receptacle on the right side of the cardiograph.
4. Remove the top cover. See page 6-17.
5. Depending on the cardiograph model, either remove the patient data cable wires from the cable clamp (see Figure 6-80 on page 6-52) or cut the cable tie that secures the patient data cable wires to the display hinge bracket (see Figure 6-81 on page 6-52).

Figure 6-80 Model A cardiograph method of routing patient data cable

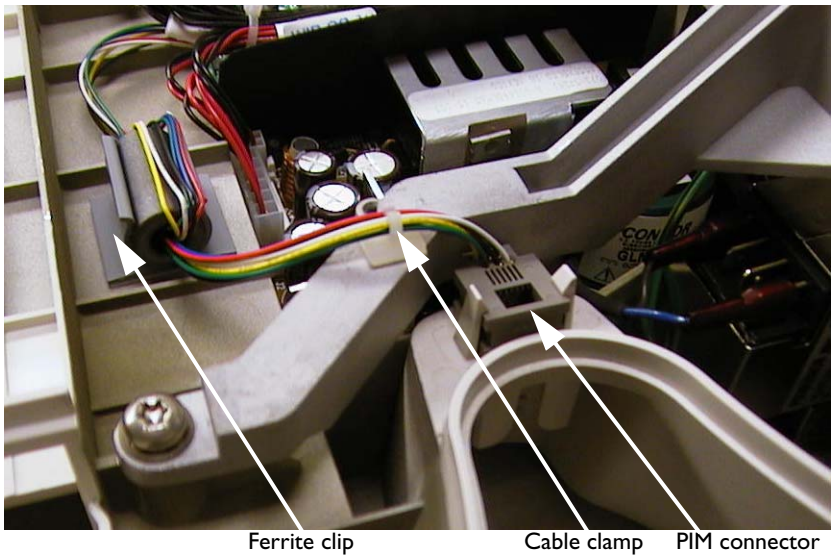
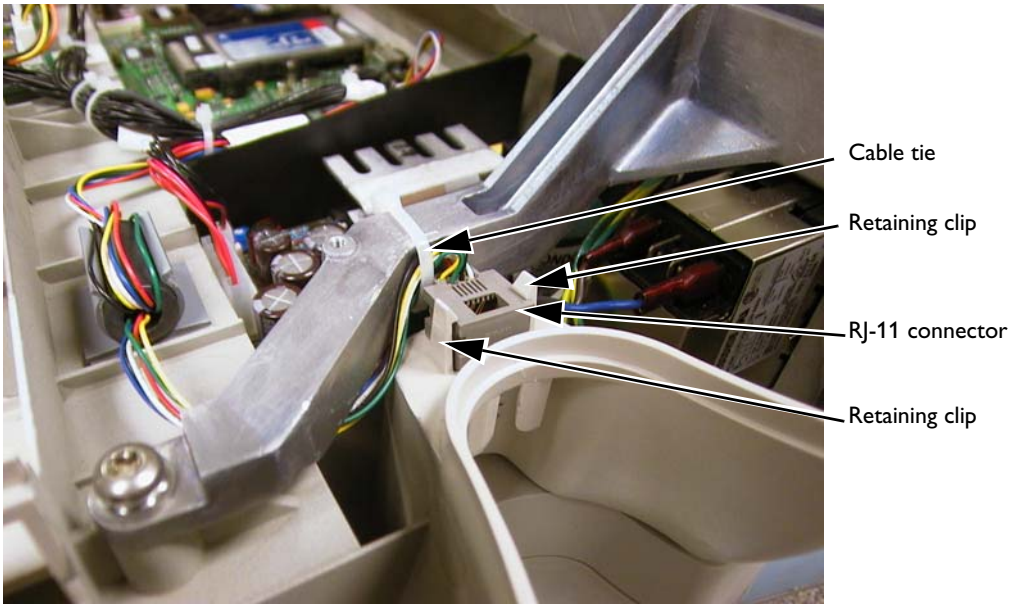


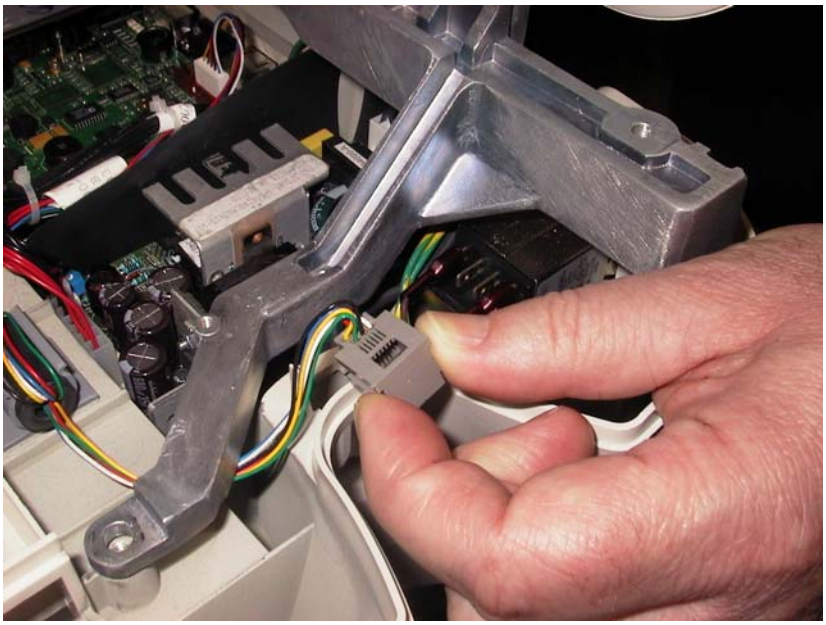
Figure 6-81 Model B cardiograph method of routing patient data cable



6 Remove the PIM RJ-11 connector from the bottom housing by carefully spreading the retainer clips that secure the RJ-11 connector. Pull up on the clips.

CAUTION Do not break the retaining clips. If the clips are broken the entire bottom housing will require replacement.

Figure 6-82 Removing the PIM Connector



7 If the patient data cable is routed underneath the hinge bracket (see Figure 6-81 on page 6-52) remove the two screws that fasten the right side of the display hinge bracket to the bottom housing. Lift the hinge bracket slightly and slide the patient data cable out (see Figure 6-83 on page 6-53).

Figure 6-83 Display Hinge Bracket Screws

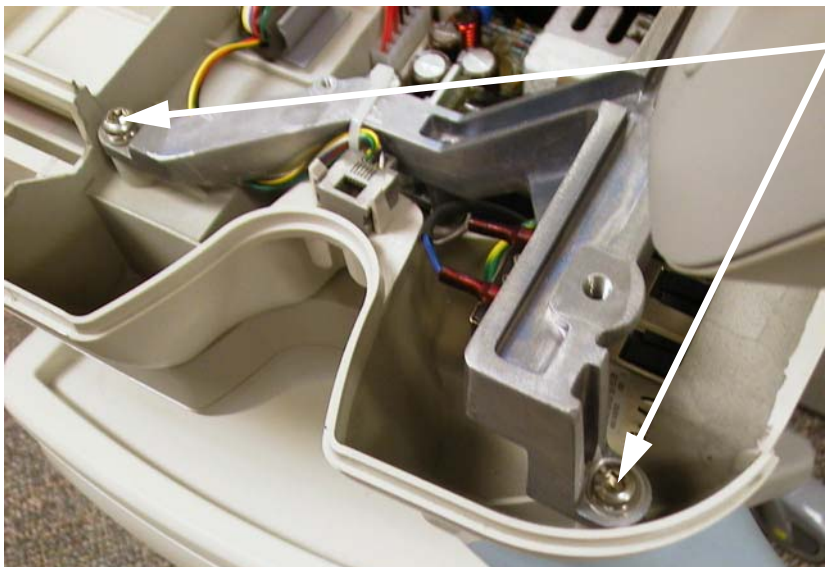
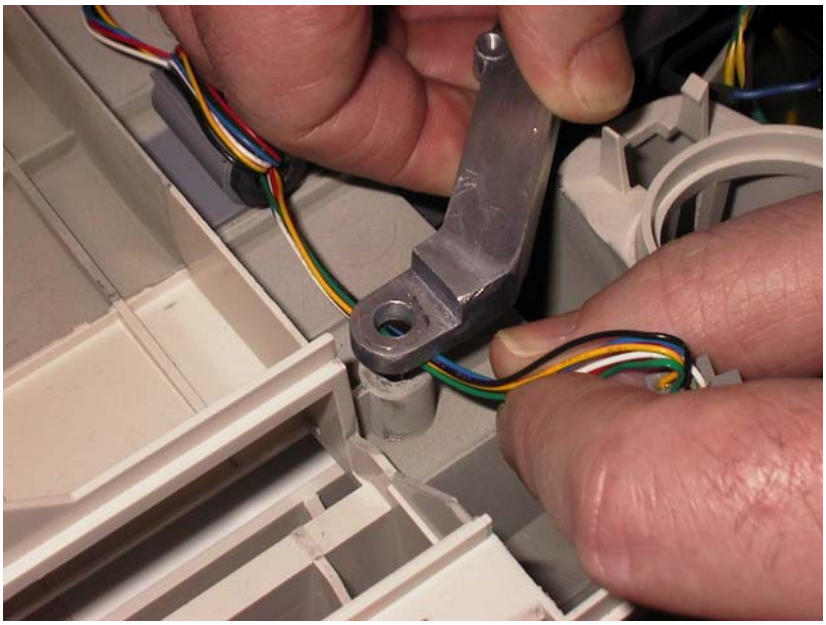


Figure 6-84 Sliding the patient data cable out from under the display hinge bracket



8 Remove the ferrite from its clip.

9 Remove the J2 and J3 connectors from the power supply assembly by grasping the wires of each connector, and then pulling each straight up. See Figure 6-77 on page 6-47.

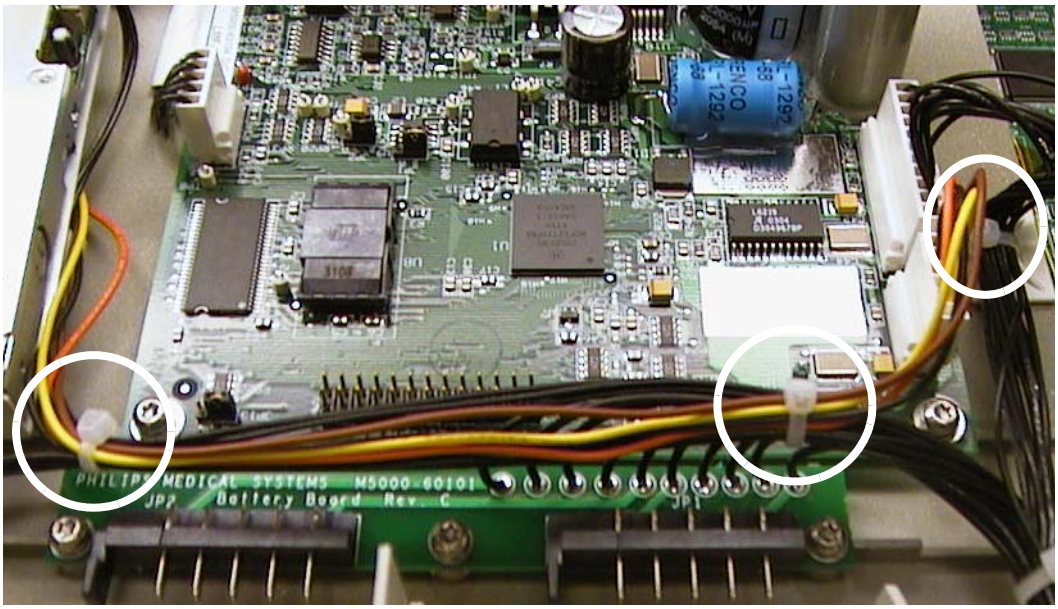
10 Remove J5, J6, J7, and J12 connectors from the main control board by grasping the wires of each connector, and then pulling straight up. See Figure 6-71 on page 6-42.

11 Remove the J22 connector by grasping the connector directly, and then pulling straight up. See Figure 6-71 on page 6-42.

12 Cut the cable ties at three locations, as shown. See Figure 6-85 on page 6-55.

CAUTION Do not damage the wires.

Figure 6-85 Cutting Cable Ties



13 Remove the J9 connector from the printer control board by grasping all the connector wires, and then pulling straight up. See Figure 6-78 on page 6-49.

14 Using a Torx T10 driver, remove the three M3 x6mm screws that secure the battery interconnect to the main housing.

15 Disconnect the cable marked “diskette drive” from the diskette drive.

16 Disconnect the cable marked “magnetic card reader” from the magnetic card reader, if present.

17 Lift the main cable harness from the main housing.

Replacing the Main Cable Harness Assembly

To replace the main cable harness:

1 Connect the cable marked “magnetic card reader” into the magnetic card reader, if present.

2 Connect the cable marked “diskette drive” into the diskette drive.

3 Using a Torx T10 driver, insert the three M3 x 6mm screws to secure the battery interconnect to the bottom housing.

4 Attach the J9 connector to the printer control board. See Figure 6-78 on page 6-49.

5 Attach cable ties at the three locations described in step 12 of the previous section, “Removing the Main Cable Harness Assembly.” Remove any excess.

CAUTION Do not stress the wires going to the battery interconnect board directly below the middle cable tie.

6 Attach the J22 connector to the main control board. See Figure 6-71 on page 6-42.

7 Attach the J2 and J3 connectors to the power supply assembly. See Figure 6-77 on page 6-47.

8 Attach the J5, J6, J7, and J12 connectors to the main control board. See Figure 6-71 on page 6-42.

9 Insert the ferrite into its clip. See Figure 6-80 on page 6-52.

10 Route the PIM cable under the hinge bracket (see Figure 6-81 on page 6-52). This will require the temporary removal of the two screws fastening the right side of the display hinge bracket to the bottom housing (see Figure 6-82 on page 6-53) and (see Figure 6-83 on page 6-53). Replace the two screws after the patient data cable is in place.

CAUTION Ensure that the clip is correctly positioned. Failure to do so may damage the patient data cable when you install the top cover.

11 Insert the PIM RJ-11 connector into the main housing and snap it into place.

12 Secure the patient data cable to the display hinge bracket with a cable tie. See Figure 6-84 on page 6-54. Dress the individual wires close to the hinge bracket so that they will not be pinched when the top cover is installed. See Figure 6-87 on page 6-57 for an example of correct cable dressing, and see Figure 6-88 on page 6-57 for an example of incorrect cable dressing.

Figure 6-86 Routing of the patient data cable

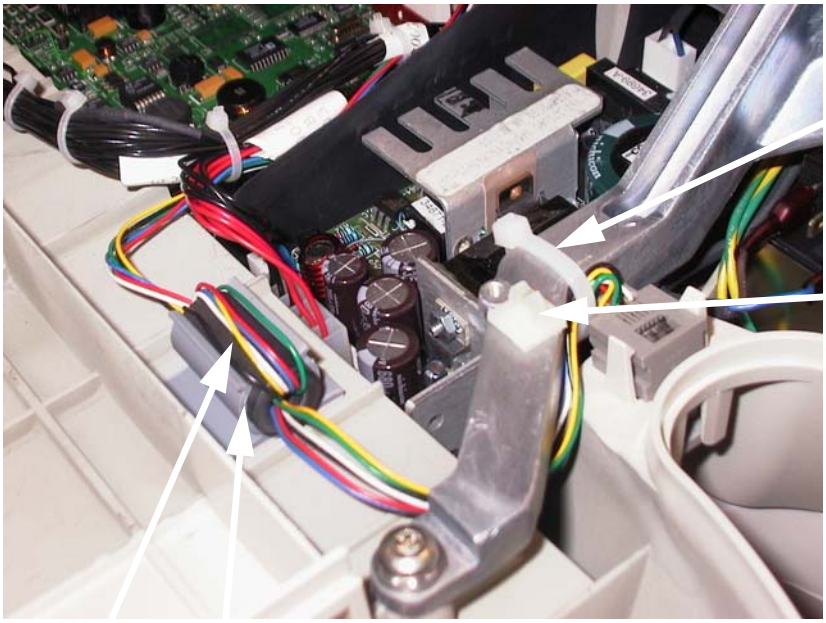
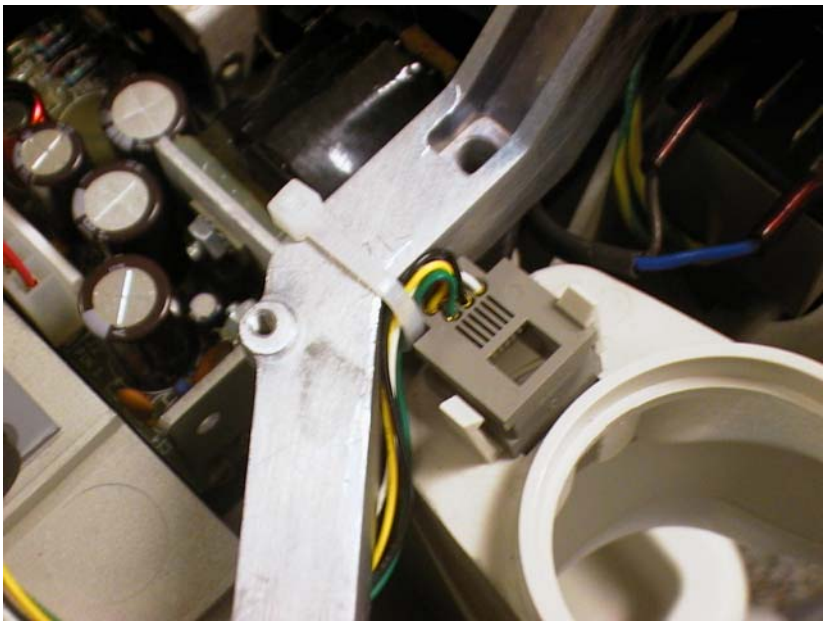
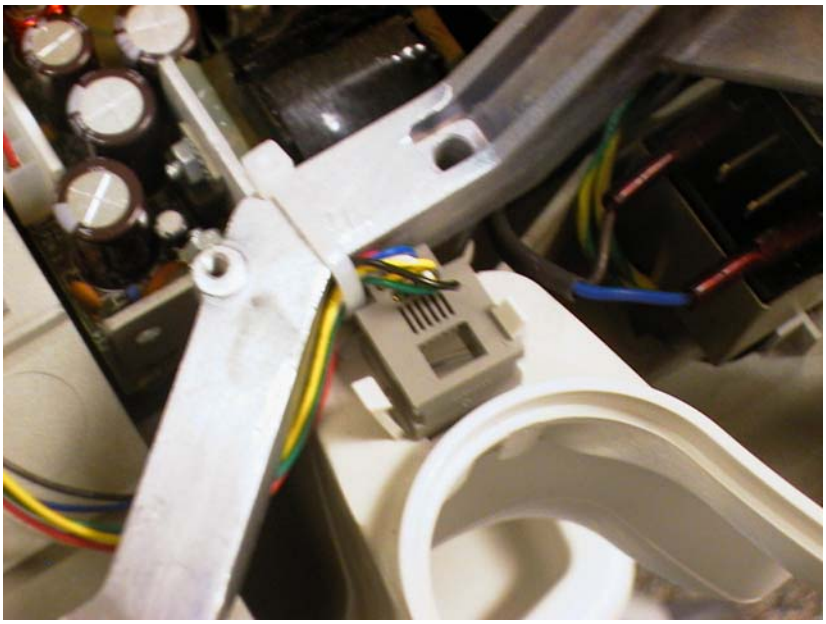


Figure 6-87 Correct patient data cable dressing



Wires dressed closely to display hinge bracket

Figure 6-88 Incorrect patient data cable dressing



13 Attach cable ties at the three locations described in step 12 of the previous section, “Removing the Main Cable Harness Assembly.” Remove any excess.

14 Replace the top cover.

15 Reattach the PIM.

16 Insert the batteries into the cardiograph.

17 Plug the AC power cord into the AC power connector on the rear of the cardiograph and then into the power source.

Removing and Replacing the Top of Form Sensor Cable Harness

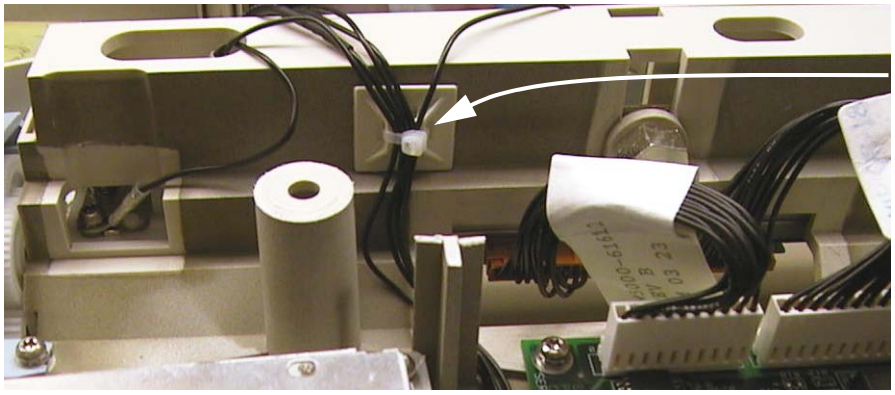
CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the print head assembly.

Removing the Top of Form Sensor Cable Harness

To remove the top of form sensor cable harness:

1. Unplug the AC power cord.
2. Remove the batteries. See page 6-3.
3. Remove the top cover. See page 6-17.
4. Remove the paper guide bar. See page 6-33
5. Remove the print head. See page 6-33.
6. Remove the J7 connector from the printer control board by grasping the connector wires, and pulling straight up. See Figure 6-78 on page 6-49.
7. Cut the tie wrap. Do not damage the wires.

Figure 6-89 Top of Form Sensor Tie Wrap



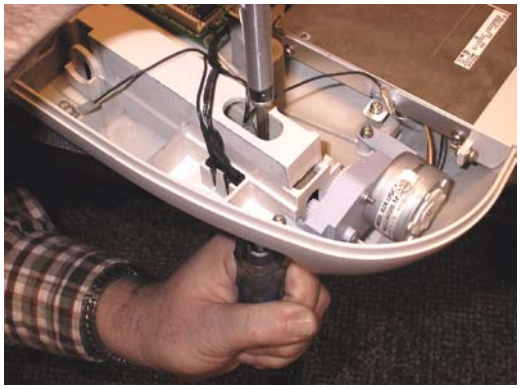
8 Carefully pry back the plastic tab, and pull the top of form sensor from the well.

CAUTION Take care not to break the clip. Doing so will require replacement of the entire bottom housing.

Figure 6-90 Top of Form Sensor

9 Remove the M3 screw, nut, and grounding lug from the leaf spring, as shown below, using a 5mm nut driver and T10 Torx driver.

Figure 6-91 Removing M3 Screw, Nut, and Ground Lug From Leaf Spring



10 Remove grounding ring terminals from print head bolt and M3x10mm print head screw. See Figure 6-53 on page 6-28.

Replacing the Top of Form Cable Harness

To replace the main cable harness:

1 Under the cardiograph, attach the M3 screw, nut, and grounding lug to the leaf spring, using a nut driver and T10 Torx driver.

2 Attach grounding ring terminals to print head bolt and M3x10mm print head screw. See Figure 6-53 on page 6-28.

3 Snap the top of form sensor into place. See figure 6-90.

4 Attach the tie wrap. Remove any excess. See figure 6-89.

5 Attach the J7 connector to the printer control board. See Figure 6-78 on page 6-49.

6 Install the print head. See page 6-32.

7 Replace the top cover. See page 6-16.

8 Insert the batteries. See page 6-3.

9 Plug the AC power cord into the power source.

Removing and Replacing the Display Hinge Bracket

Removing the Display Hinge Bracket

To remove the display hinge bracket:

1 Unplug the AC power cord.

2 Remove the batteries. See page 6-3.

3 Remove the rear cover. See page 6-17.

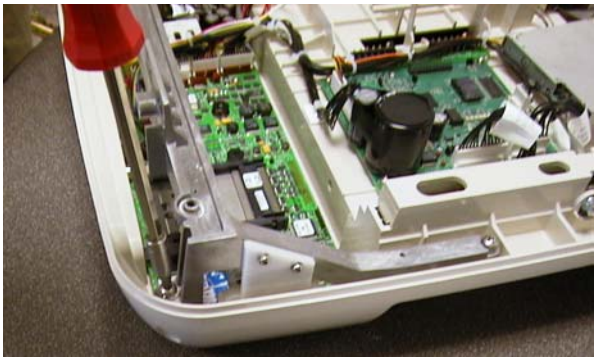
4 Remove the top cover. See page 6-17.

5 Remove the display and set aside. See page 6-18.

6 Unclip the patient data cable from the cable clamp or cut the cable tie that secures the patient data cable to the display hinge bracket. See Figure 6-80 on page 6-52 and see Figure 6-81 on page 6-52.

7 Remove the four (4) M5 x 12mm screws that secure the display hinge bracket to the main housing, using a T25 Torx driver.

Figure 6-92 Detaching the Hinge Bracket From the Main Housing



8 Lift the display hinge bracket from the main housing.

9 Remove the display cable bracket from the hinge display bracket, using a T10 Torx driver.

Figure 6-93 Removing the Display Cable Bracket From the Hinge Bracket

Replacing the Display Hinge Bracket

To replace the display hinge bracket:

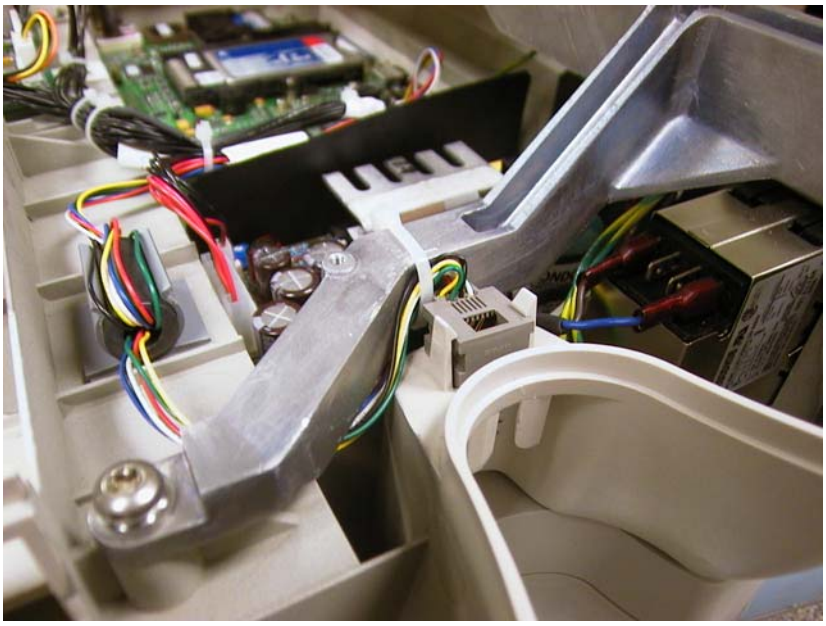
1 Attach the display cable bracket to the hinge display bracket, using a T10 Torx driver. See figure 6-93.

2 Replace the display hinge bracket in the main housing. Ensure that the patient data cable is routed underneath the display hinge bracket

3 Insert the four (4) M5 x 12mm screws to secure the display hinge bracket to the main housing, using a T25 Torx driver. See figure 6-92.

4 Secure the patient data cable to the display hinge bracket with a cable tie as shown in Figure 6-84 on page 6-54. Dress the individual wires close to the hinge bracket so that they will not be pinched when the top cover is installed. See Figure 6-87 on page 6-57 for an example of correct cable dressing, and see Figure 6-88 on page 6-57 for an example of incorrect cable dressing.

Figure 6-94 Patient data cable routed underneath display hinge bracket



5 Attach the display. See page 6-18.

6 Replace the top cover. See page 6-17.

7 Attach the rear cover. See page 6-17.

8 Insert the batteries. See page 6-3.

9 Plug the AC power cord into the power source.

Removing and Replacing the On/Standby Label

The On/Standby label can be removed and replaced if it is faded or worn.

Figure 6-95 The On/Standby label

To remove and replace the on/standby label:

1 Insert a razor knife or similar instrument underneath a corner of the label.

2 Lift the label at one corner and carefully peel it off.

3 Align the replacement label, and affix to the cardiograph.