8-2-6 Blank Cover Replacement Procedure

Note: The removal and installation procedure for the Blank Cover is the same as that described for the *DVD and Printer Cover Replacement Procedure* section, on page 8-11 in this case making use of the blank cover.

8-2-6-1 Tools

Phillips screwdriver.

8-2-6-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-6-3 Blank Cover Removal Procedure

Note: The Blank cover is secured to the mechanical platform by 4 snap-lock securing clips on the inner side of the cover - illustrated below.

1) Remove the *right side* cover:

2.) Grip the bottom of the cover and pull it towards you to release it from the snap-lock securing clips (Figure 8-30). Remove the cover.

Securing Clips

Figure 8-8 Removing the Blank Cover

8-2-6-4 Blank Cover Installation Procedure

1) Return the cover to the right of the system, carefully aligning the 4 snap-lock securing clips with the securing pins.
2.) Push the cover until it clicks in position.
3.) Install the *right side* cover.

8-2-7 Printer Cover Replacement Procedure

8-2-7-1 Tools

Phillips screwdriver.

8-2-7-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

Note: The removal and installation procedure for the printer cover is the same as that described for the *DVD and Printer Cover Replacement Procedure* section, on page 8-11 in this case making use of the printer cover.

8-2-7-3 Printer Cover Removal Procedure

Note: The Printer cover is secured to the mechanical platform by 4 snap-lock securing clips on the inner side of the cover.

1) Remove the *right side* cover:
2.) Grip the bottom of the cover and pull it towards you to release it from the snap-lock securing clips (Figure 8-30). Remove the cover.

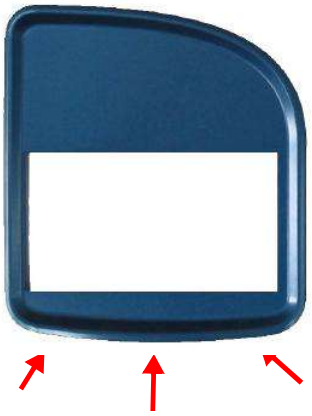


Figure 8-9 Removing the Printer Cover

8-2-7-4 Printer Cover Installation Procedure

1) Return the cover to the right of the system, carefully aligning the 4 snap-lock securing clips with the securing pins.
2.) Push the cover until it clicks in position.
3.) Install the *right side* cover.

8-2-8 Front Cover Replacement Procedures

8-2-8-1 Tools

Phillips screwdriver

8-2-8-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-8-3 Front Cover Removal Procedure

Note: The Front Cover is secured to the base of the mechanical platform by a screw through a securing tab on each side of the cover (left and right inner side).

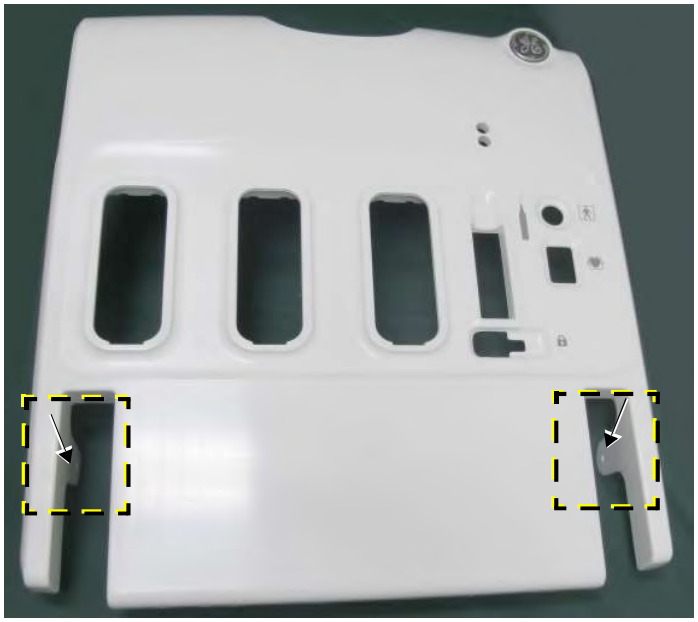


Figure 8-10 Front Cover - Securing Tabs

1) Remove all probes and ECG cables currently connected to the system.
2) Remove the front Basket for probe cable management - (hold with both hands and pull *upwards*).

8-2-8-3 Front Cover Removal Procedure (cont'd)

3.) Remove the following covers: *left* side, *right* side, *DVD*.

4) Place the RS probe connector locking mechanism in the *OPEN* (unlocked) position.

Figure 8-11 RS Probe Connector Lock - OPEN

The locking mechanism is now aligned to clear the aperture in the Front Cover, enabling removal of the cover.

8-2-8-3 Front Cover Removal Procedure (cont'd)

On the RS cable assembly, press the release button and pull the slider to the side to provide access to the two securing screws. Then, unfasten the two screws and remove the RS cable assembly (front part) - see Figure 8-12.

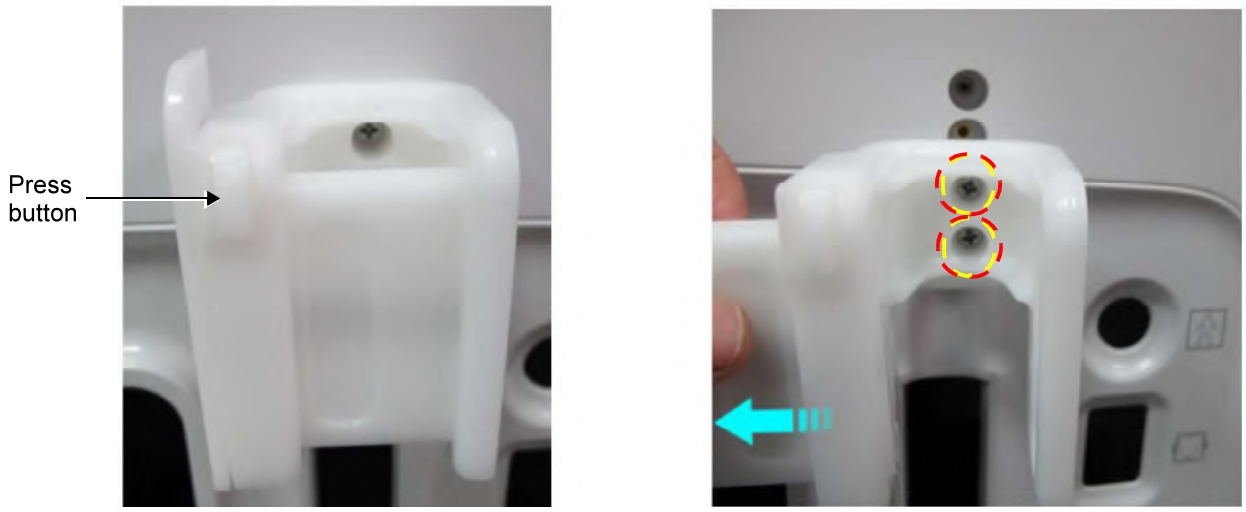


Figure 8-12 Removing the RS Cable Assembly - Front Part

5.) Loosen and remove each of the two screws from the securing tabs (one each side of the cover - *left* and *right* - inner sides) - see Figure 8-13.

Figure 8-13 Removing Screw from Front Cover Securing Tab

8-2-8-3 Front Cover Removal Procedure (cont'd)

6) Working from the front of the system, pull the top of the cover *towards* you then lift the cover straight up over the wheel arches and remove it from the system.

Figure 8-14 Removing the Front Cover

8-2-8-3 Front Cover Removal Procedure (cont'd)

7.) Unfasten the three securing screws shown in Figure 8-15 and remove the rear part of the RS cable assembly from the top of the electronic cage.

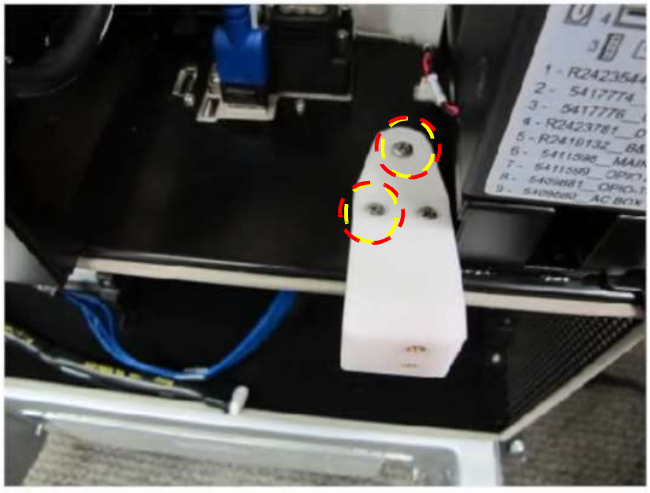


Figure 8-15 Removing the RS Cable Assembly - Rear Part

8-2-8-4 Front Cover Installation Procedure

1) Fit the rear part of the RS cable assembly to the top of the electronic cage and secure firmly in position with the three screws - see Figure 8-15.
2) Return the front cover to its original position, aligning the lower portion with the base of the mechanical platform. Make sure the wheel arch cutouts are positioned correctly on either side.
3) Push the *upper* portion of the cover back into position.
4) Return each of the two screws (previously removed) to the securing tabs on either side of the cover and tighten securely.
5.) Place the front part of the RS cable assembly in the correct position, then use the two securing screws to fasten it to the rear part. Close the slider. Refer to Figure 8-13 on page 8-19.
6) Install the *DVD, right* side and *left* side covers.

8-2-9 Right Rear Cover Replacement Procedure

8-2-9-1 Tools

Phillips-type screwdriver

8-2-9-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-9-3 Right Rear Cover Removal Procedure

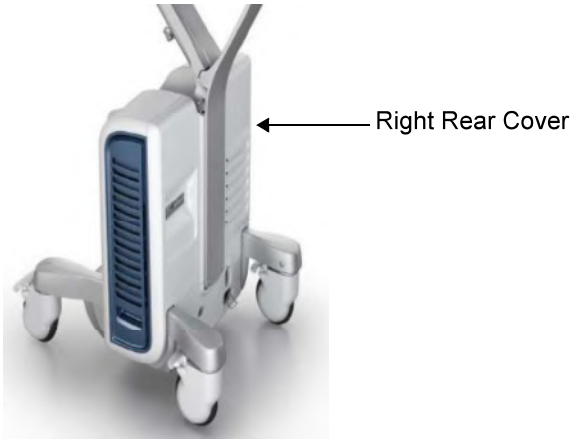


Figure 8-16 Right Rear Cover

Note: The right rear cover is secured to the base of the mechanical platform by two screws: one at the top of the cover; one through a securing tab on the inner right side of the cover (Figure 8-17).

1) Disconnect any peripherals currently connected to the system.
2) Remove the following covers: *right side*, *DVD*, *left side*, *front*.

8-2-9-3 Right Rear Cover Removal Procedure (cont'd)

Figure 8-17 Right Rear Cover - Removing Securing Screws

3) Remove the screw from the top bracket of the cover (Figure 8-17, left).

4.) Remove the screw from the securing tab on the bottom inner right side of the cover (Figure 8-17, right).

5) Lift the cover *upwards* and carefully release the top of cover from the locating pin on the side of the mechanical platform (shown in Figure 8-18).

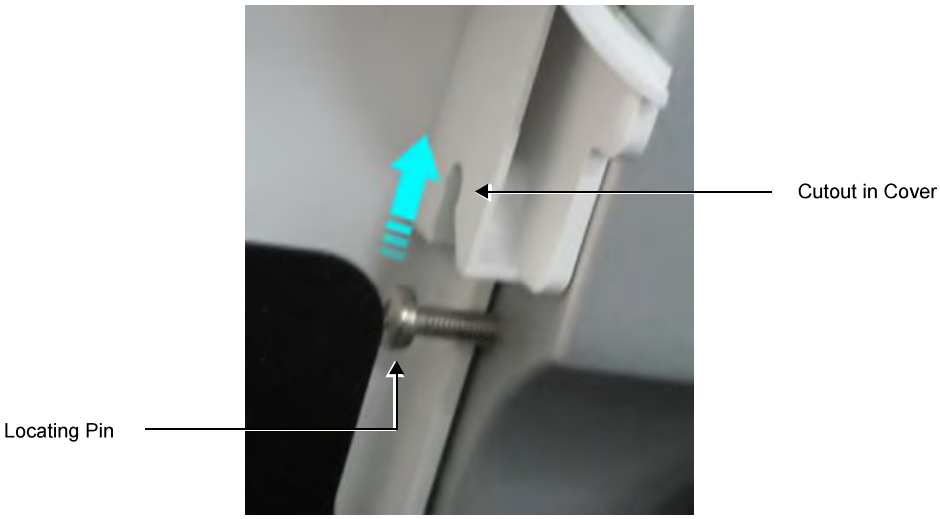


Figure 8-18 Releasing Top of Cover from Locating Pin

8-2-9-3 Right Rear Cover Removal Procedure (cont'd)

6.) Push the cover up and away from you (Figure 8-19) and remove from the system.

.

Figure 8-19 Removing the Right Rear Cover

8-2-9-4 Right Rear Cover Installation Procedure

1) Return the right rear cover to its original position at the rear of the system, taking care to tilt it sufficiently so that the lower portion overlaps the system chassis on the right side - Figure 8-19.
2) Make sure the cutout in the cover is properly aligned with the locating pin (Figure 8-18) then push the cover *downwards* to secure it in position.
3) Return the screw (previously removed) to the securing tab on the inner right side of the cover and tighten securely - Figure 8-17, right.
4) Return the screw (previously removed) to the top bracket of the cover and tighten securely Figure 8-17, left.
5) Install the following covers: *front*, *left side*, *DVD*, *right side.*
6.) Reconnect any peripherals previously connected to the system.

8-2-10 Left Rear Cover Replacement Procedure

8-2-10-1 Tools

Phillips screwdriver.

8-2-10-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-10-3 Left Rear Cover Removal Procedure

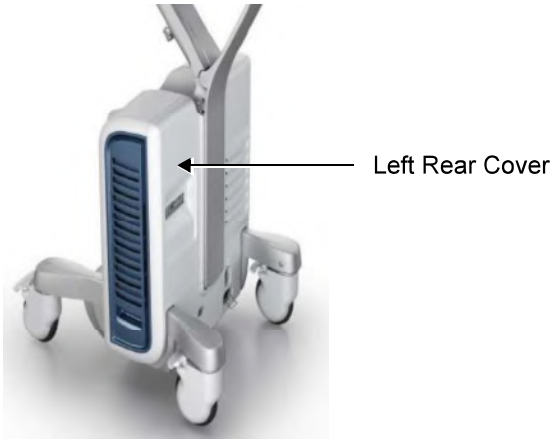


Figure 8-20 Left Rear Cover

Note: The left rear cover is secured to the mechanical platform by two screws: one at the top of the cover; one through a securing tab on the inner right side of the cover (Figure 8-21).

1) Remove the following covers: *left side*, *right side*, *DVD*, *front*.

8-2-10-3 Left Rear Cover Removal Procedure (cont'd)

Figure 8-21 Left Rear Cover - Removing Securing Screws

2) Remove the screw from the top bracket of the cover (Figure 8-21, left).

3.) Remove the screw from the securing tab on the bottom inner left side of the cover (Figure 8-21, right).

4) Lift the cover *upwards* and carefully release the top of cover from the locating pin on the side of the mechanical platform (shown in Figure 8-18).

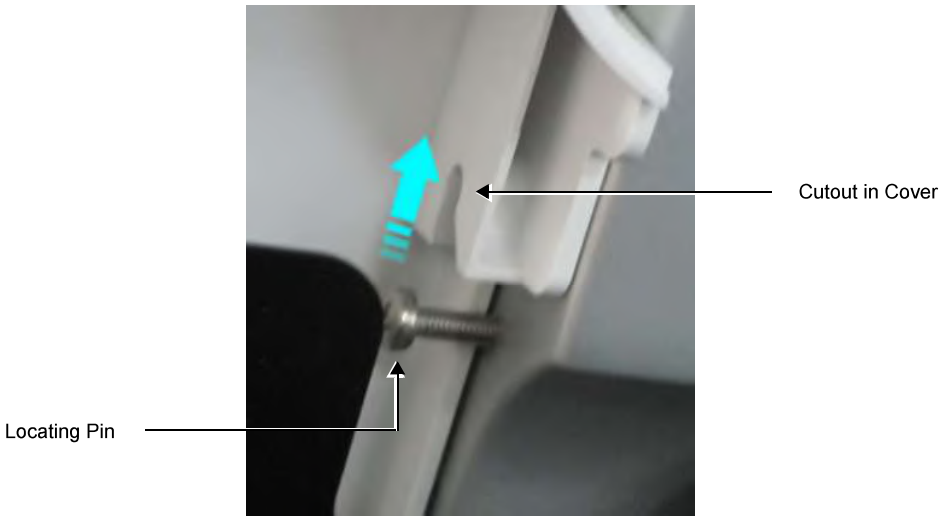


Figure 8-22 Releasing Top of Cover from Locating Pin

8-2-10-3 Left Rear Cover Removal Procedure (cont'd)

5.) Pull the cover *towards* you, then lift and remove it from the system.

Figure 8-23 Removing the Left Rear Cover

8-2-10-4 Left Rear Cover Installation Procedure

1) Return the left rear cover to its original position at the rear of the system, taking care to tilt it sufficiently so that the lower portion overlaps the system chassis on the left side - Figure 8-19.
2) Make sure the cutout in the cover is properly aligned with the locating pin (Figure 8-18) then push the cover *downwards* to secure it in position.
3) Return the screw (previously removed) to the securing tab on the inner right side of the cover and tighten securely - Figure 8-17, right.
4) Install the following covers: *front*, *DVD, right side*, *left side.*
5.) Reconnect any peripherals previously connected to the system.

8-2-11 OPIO Basket Replacement Procedure

8-2-11-1 Tools

None

8-2-11-2 Preparations

Remove all contents from the basket.

8-2-11-3 OPIO Basket Removal Procedure

1) Working from the rear of the system, grip the rear of the basket with both hands.

2.) Pull the basket *towards* you to release it from the two snap-lock securing clips - one on either side of the keyboard interface column - see Figure 8-24. Remove the basket.

Figure 8-24 Removing the OPIO Basket

8-2-11-4 OPIO Basket Installation Procedure

1) Working from the rear of the system, return the basket to its original position on the keyboard interface column.

2) Using both hands, carefully push it *inwards* to secure it on the two snap-lock securing clips - one on either side of the column - refer to Figure 8-25.

Figure 8-25 Installing the OPIO Basket

CAUTION THE BASKET HAS A MAXIMUM CARRYING CAPACITY OF 4 KGS. DO NOT EXCEED THIS LIMIT!

8-2-12 Rear Folder Box Replacement Procedure

8-2-12-1 Tools

None

8-2-12-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-12-3 Rear Folder Box Removal Procedure

1) Remove all contents from the folder box.
2) Working from the rear of the system, hold the rear folder box with both hands and carefully lift it *upwards* to release the two plastic hooks from the two supporting pins (located one each side of the Support Column - illustrated in Figure 8-26).
3.) Remove the rear folder box.

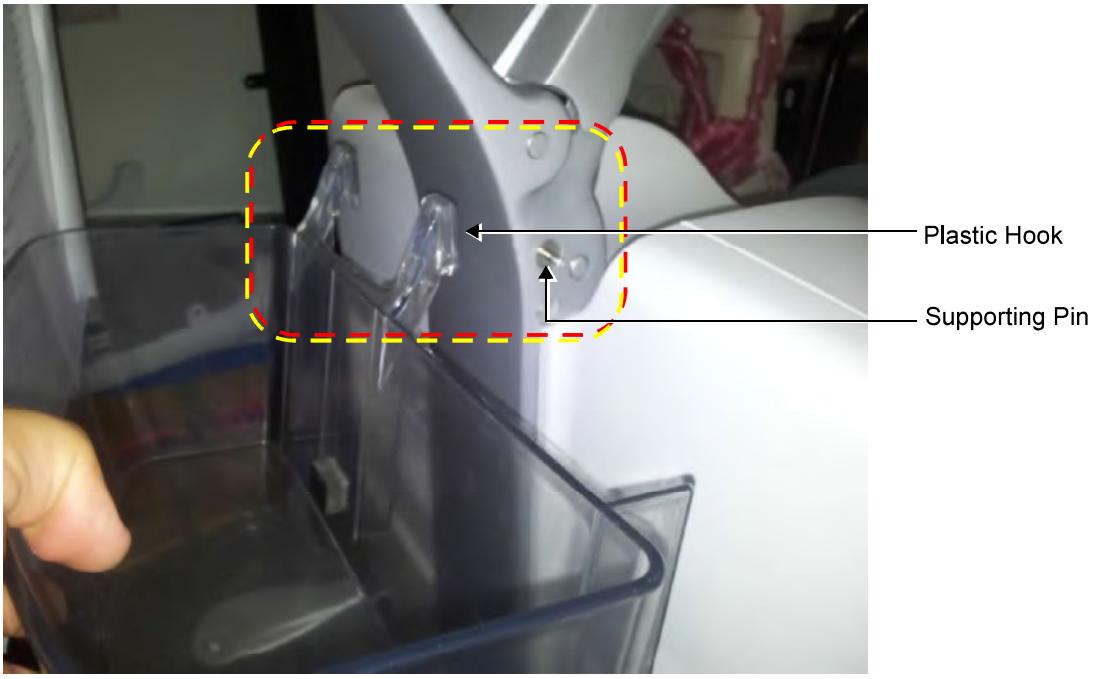


Figure 8-26 Releasing the Rear Folder Box from the Support Column

8-2-12-4 Rear Folder Box Installation Procedure

1) Peel off the protective strip from the adhesive pad located on the rear of the folder box (shown in Figure 8-27) to expose the adhesive surface.

Figure 8-27 Rear Folder Box - Adhesive Pad at Rear

2) Holding the rear folder box with both hands, carefully align it against the rear of the support column, then push it *downwards* to secure the two plastic hooks onto the two supporting pins located each side of the support column- refer to Figure 8-26.

3.) Make sure the folder box is correctly positioned then push the adhesive pad against the column to firmly fix the box in position - see Figure 8-28.

Figure 8-28 Rear Folder Box Installed on Vivid S60N/Vivid S70NSupport Column

CAUTION **THE FOLDER BOX HAS A MAXIMUM CARRYING CAPACITY OF 2 KGS. DO NOT EXCEED THIS LIMIT!**

8-2-13 AC Distribution Box Cover Replacement Procedure

8-2-13-1 Tools

None

8-2-13-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-2-13-3 AC Distribution Box Cover Removal Procedure

Note: The cover is secured to the base of the mechanical platform by two snap-lock securing clips on the bottom inner side of the cover - illustrated below.

1) Working from the rear of the system, raise the AC cable securing clip to the UP position.

Figure 8-29 Removing the AC Distribution Box Cover

The clip is now aligned to clear the aperture in the cover.

8-2-13-3 AC Distribution Box Cover Removal Procedure (cont'd)

2.) Grip the bottom of the AC Distribution Box cover and pull it towards you to release it from the lower snap-lock securing clips. Remove the cover (Figure 8-30).

Securing Clips

Figure 8-30 Removing the AC Distribution Box Cover

8-2-13-4 AC Distribution Box Cover Installation Procedure

1) Return the AC Distribution Box cover to its original position at the rear of the system.
2) Position the AC cable securing clip to clear the aperture in the cover (Figure 8-30).
3) Align the bottom of the cover with the two securing clips and push it until it clicks into position.

Figure 8-31 AC Distribution Box Cover Installed

Section 8-3
Control Console Components - Replacement Procedures

8-3-1 21.5" Monitor Replacement Procedure

8-3-1-1 Tools

- Phillips screwdriver
- Calibrated Torque tool, 1.3 Nm +/- 5% for Phillips screws

8-3-1-2 Preparation

1.) Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in Power Shut Down on page 4 - 8.

1) Lower the console to the *maximum down* position.
Make sure it is aligned in the central position (not pulled to one side or the other).

2.) Fold the monitor forward into the face-down position, then lock the articulated arm.

8-3-1-3 Remove the 21.5 inch Monitor

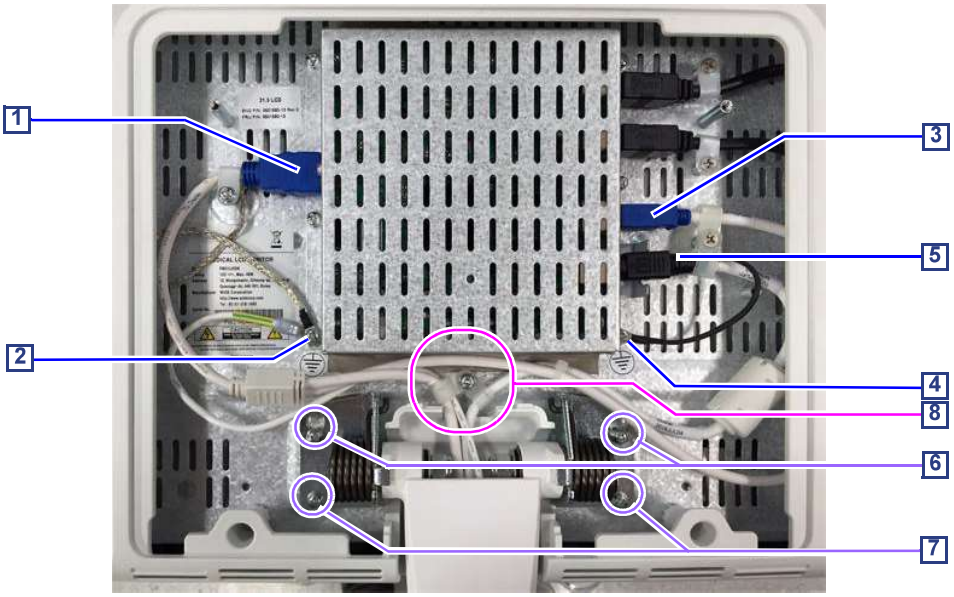
Figure 8-32 Monitor Rear Cover's fixing screws

1.) Remove the Monitor's Rear Cover as described below:

a.) Remove the two fixing screws (Figure 8-32).

b.) Remove the Monitor's Rear Cover.

8-3-1-3 Remove the 21.5 inch Monitor (cont'd)



1 - BIF-to-Display: HDMI
2 - Ground (from HDMI cable and to Arm)
3 - USB
4 - Ground (from power cable)
5 - Power-to-Display
6 - Captive screws
7 - Securing screws
8 - Screw and P-clamp

Figure 8-33 Monitor Cables

2.) The cables are secured with P-clamps and screws.
Disconnect the monitor cables from the monitor as described below:

a.) Disconnect the DVI cable, including P-clamp and screw[1].

b.) Remove the serrated lock washer and screw to release the Ground cables [2].

c.) Disconnect the USB cable, including P-clamp and screw [3].

d.) Disconnect the Power cable, including P-clamp and screw [5].

e.) Remove the serrated lock washer and screw to release the Ground cable from the Power Cable [4].

f.) Remove screw and P-clamp positioned in center of monitor [8] securing two cables plus ground wire from the arm.

3.) Remove the two securing screws [7].

4.) Loosen the two captive screws [6].

5.) Hold the monitor with both hands and carefully move it to align the captive screws with the widest part of the key-hole slots and remove the monitor.
Carefully place the monitor face-down on a clean, soft, stable surface.

NOTE: After removing the Front Cover, if not installing the replacement Monitor immediately, keep the cover and screws in a safe place as they will be required later for refitting to the new Monitor.

8-3-1-4 Install the 21.5" Monitor

1.) Working from the front of the system, make sure the console is in the *maximum down* position and that it is aligned in the central position (not pulled to one side or the other).

2.) Place the monitor in the *face-down* position.

3.) Using two hands, position the monitor beneath the securing bracket, carefully aligning the two captive screws with the two key-hole slot openings.

4.) Pull the monitor towards you until the captive screws are correctly positioned while supporting the monitor from below with one hand, tighten the two screws with torque 1.3 Nm.

5.) Return the two securing screws to the securing bracket and fasten with torque 1.3 Nm.

6.) Secure the two ground cables.

7.) Plug in the Power cable, the USB cable and the HDMI cable. Refit the P-clamp and the screws for all cables, including the P-clamp in the middle of the screen.

8.) Install the Monitor's Rear Cover, and fasten it with the two screws with torque 1.3 Nm.

NOTE: When positioning the cover, make sure underlying cables are properly seated and will not become pinched or damaged by the cover.

8-3-2 Touch Screen Service Cover Replacement Procedure

8-3-2-1 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in Power Shut Down on page 4 - 8.

8-3-2-2 Touch Screen Service Cover Removal Procedure

Note: The Touch Screen Service Cover, located at the lower rear of the Touch Screen, clips into the Touch Screen Rear Cover by way of 4 securing tabs - Figure 8-34.

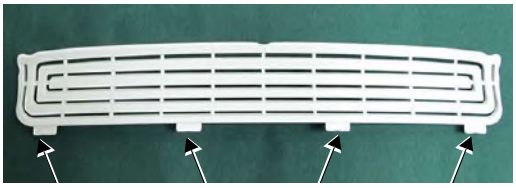


Figure 8-34 Touch Screen Service Cover - Securing Tabs

1) Raise the console to the *maximum up* position.
Make sure it is aligned in the central position (not pulled to one side or the other).
2) Using a flat screwdriver, carefully release the Service Cover snap-lock securing tabs (Figure 8-34) from the rear of the Touch Screen rear cover.
3) Using two hands, lift the service cover slightly to release it from the 4 securing tabs, then pull it forward to remove.

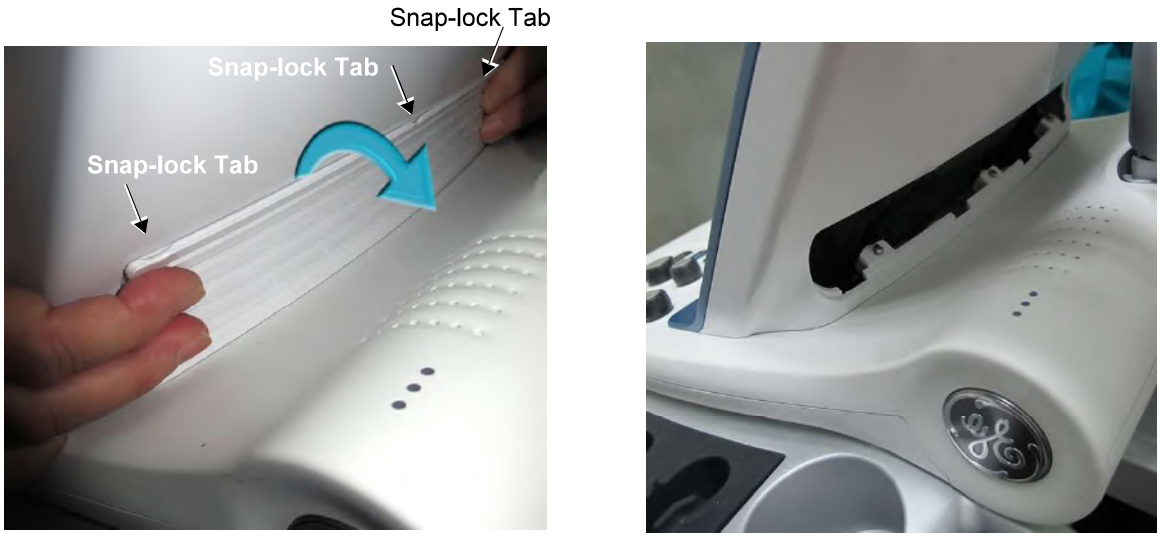


Figure 8-35 Removing the Touch Screen Service Cover

8-3-2-3 Touch Screen Service Cover Installation Procedure

Perform the steps described in the removal procedure, in the reverse order.

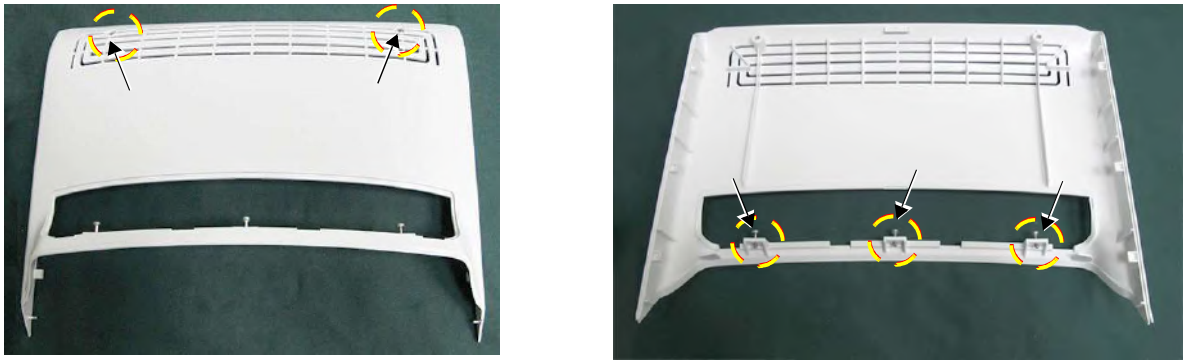
8-3-3 Touch Screen Rear Cover Replacement Procedure

8-3-3-1 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in Power Shut Down on page 4 - 8.

8-3-3-2 Touch Screen Rear Cover Removal Procedure

Note: The Touch Screen Rear Cover is fastened to the back of the Touch Screen by 3 screws through securing tabs located on the base of the cover and 2 screws at the top - Figure 8-34.



External View Internal View

Figure 8-36 Touch Screen Rear Cover - Securing Tabs and Screws

1) Check the console is raised to the *maximum up* position.
Make sure it is aligned in the central position (not pulled to one side or the other).

2) Remove the Touch Screen Service Cover:

- Touch Screen Service Cover Removal Procedure on page 8 - 38

8-3-3-2 Touch Screen Rear Cover Removal Procedure (cont'd)

3.) Remove the 3 securing screws (M3 x11 mm PAN PHI.) from the base of the cover - Figure 8-37.

Figure 8-37 Removing the Rear Cover (Base) Securing Screws

4.) Remove the 2 screws (M3 x11 mm PAN PHI.) from the top of the cover - Figure 8-38.

Figure 8-38 Removing the Rear Cover (Top) Securing Screws

8-3-3-2 Touch Screen Rear Cover Removal Procedure (cont'd)

5.) Using two hands, lift the rear cover slightly to release it from the 3 securing tabs, then pull it up and away from the back of the Touch Screen to remove.

Figure 8-39 Removing the Touch Screen Rear Cover

8-3-3-3 Touch Screen Rear Cover Installation Procedure

Perform the steps described in the removal procedure, in the reverse order.

Torque: 0.56 Nm +/- 5%

8-3-4 Touch Screen Replacement Procedure

8-3-4-1 Preparation

1.) Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in Power Shut Down on page 4 - 8.

2.) If the OPIO Basket is attached, remove it from the keyboard interface column (refer to: 8-2-11 - OPIO Basket Replacement Procedure.)

8-3-4-2 Touch Screen Removal Procedure

1) Working from the front of the system, raise the console to the *maximum up* position. Make sure it is aligned in the central position (not pulled to one side or the other).

2) Remove the following Touch Screen covers: *service, rear*:

Note: The Touch Screen Panel is fastened to the Touch Screen chassis by 4 screws (2 on each side).

3) Remove the two securing screws on both the *left* and *right* sides of the Touch Screen - Figure 8-40.

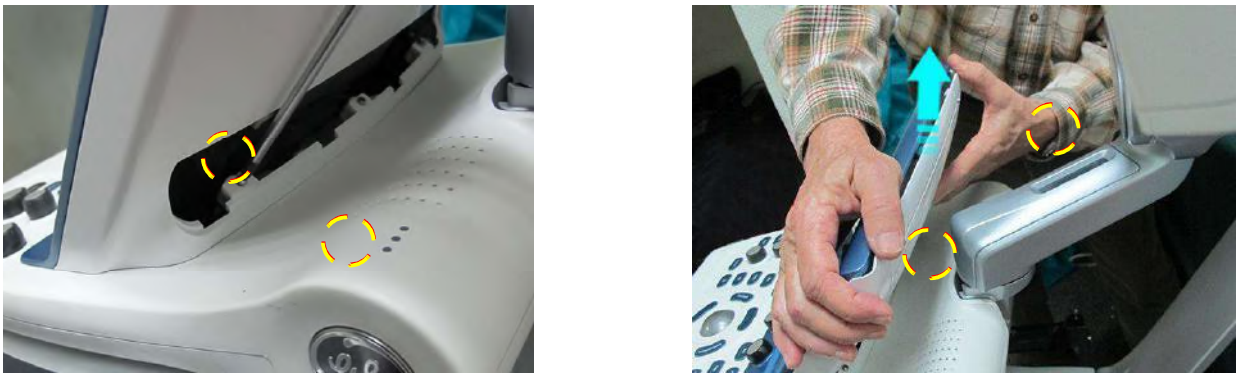


Figure 8-40 Removing the Touch Screen Securing Screws

8-3-4-2 Touch Screen Removal Procedure (cont'd)

4.) At the rear of the Touch Screen, disconnect the following two cables:

- DP-to-Touch Screen, see: [**A**] in Figure 8-41 and Figure 8-42.
- Power-to-Touch Screen, see: [**B**] in Figure 8-41 and Figure 8-42.

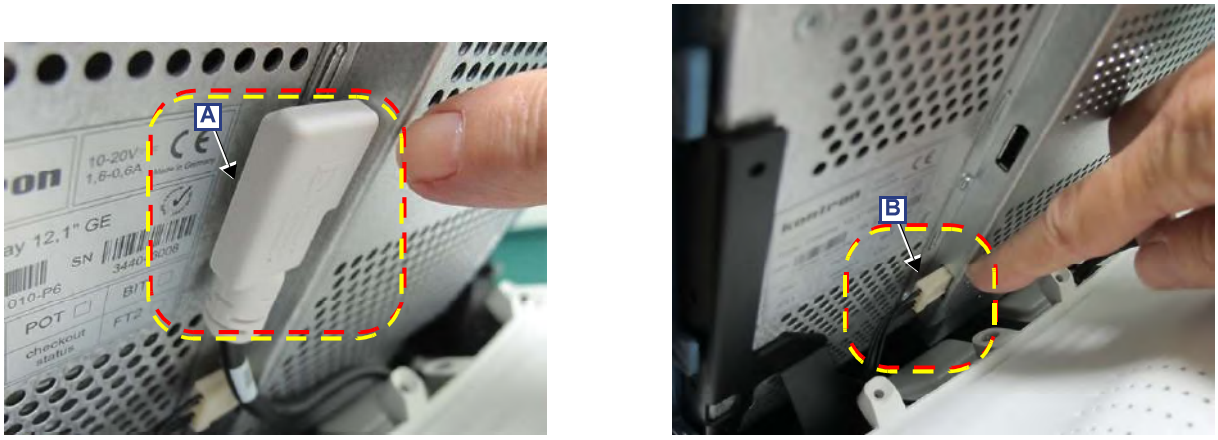


Figure 8-41 Disconnecting the Touch Screen Cables (1st version of Touch Panel)

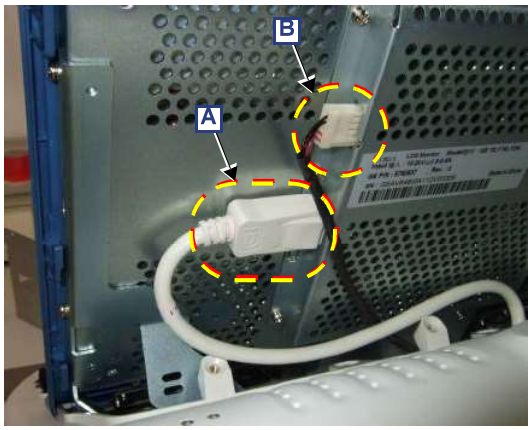


Figure 8-42 Disconnecting the Touch Screen Cables (2nd version of Touch Panel)

8-3-4-2 Touch Screen Removal Procedure (cont'd)

5.) Using a 7 mm socket, disconnect the Ground cable - Figure 8-43.

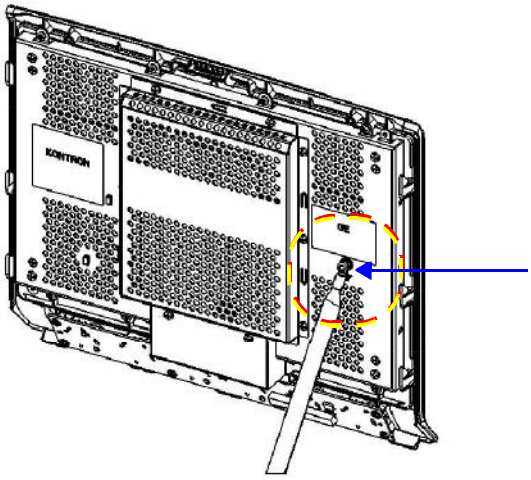


Figure 8-43 Disconnecting the Ground Cable

6.) Tilt the Touch Screen forward away from the chassis, then disconnect the two flex cables:

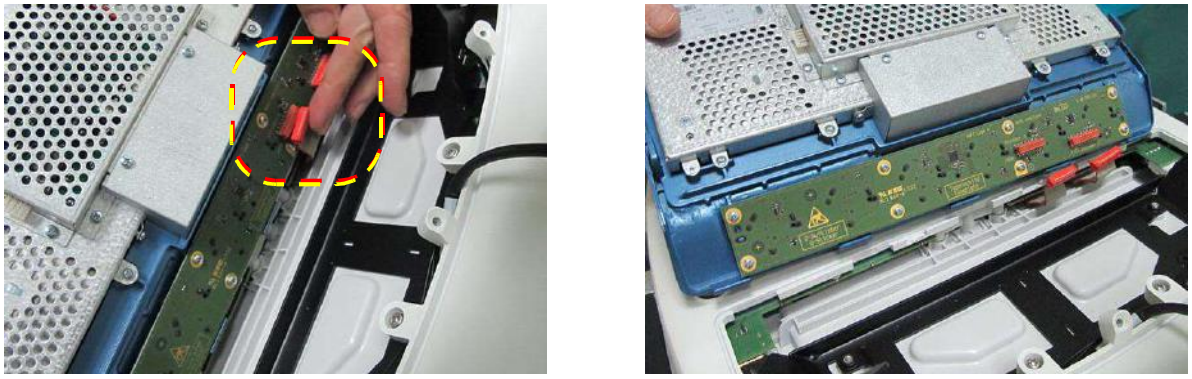


Figure 8-44 Disconnecting the Flex Cables

8-3-4-2 Touch Screen Removal Procedure (cont'd)

7.) Lift the Touch Screen off the chassis and remove from the system.

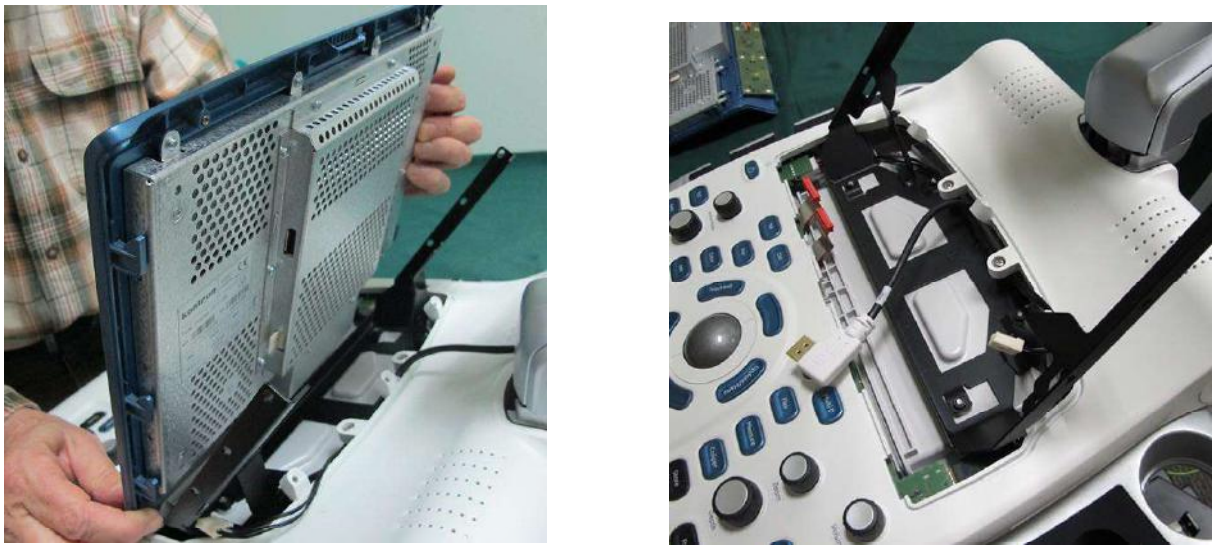


Figure 8-45 Removing the Touch Screen

8.) Carefully lie the Touch Screen face-down on a clean, soft, stable surface - Figure 8-46

Figure 8-46 Touch Screen Removed

9.) Remove the Touch Screen Rotaries Board:

NOTE: After removing the Touch Screen Rotaries Board, if not installing the replacement Touch Screen immediately, keep the Rotaries Board and screws in a safe place as they will be required later for refitting to the new Touch Screen.

8-3-4-3 Touch Screen Installation Procedure

1) Working from the front of the system, make sure the console is in the *maximum up* position and that is aligned in the central position (not pulled to one side or the other).

2.) Fit the Touch Screen Rotaries Board (previously removed) onto the replacement Touch Screen:

3.) Using two hands, position the base of the Touch Screen on the Touch Screen chassis, placing the base in the grooved channel and aligning the two screw securing holes on each side - Figure 8-40.

4.) Reconnect the Ground cable - Figure 8-43.

5.) Reconnect the two Touch Screen cables and make sure to route them as shown in Figure 8-47:

- Power cable *behind* the Touch Screen chassis screw [**A**]
- DP cable in *front* of the Touch Screen chassis screw [**B**]

Figure 8-47 Routing and Connecting the Touch Screen Cables

6.) Fasten each cable with cable-securing clips.

7.) Reconnect the two flex cables to the connectors on the rear of the Touch Screen - Figure 8-44. For easier access to the cable connectors, tilt the Touch Screen forward while connecting the cables.

8.) Fasten the 4 screws to secure the Touch Screen to the chassis - Figure 8-40.

Torque: 0.56 Nm +/- 5%.

9) Refit the following Touch Screen covers: *rear, service*:

8-3-5 Touch Screen Rotaries Board Replacement Procedure

8-3-5-1 Tools

- Phillips screwdriver
- Calibrated Torque tool, 0.56 Nm +/- 5% for Phillips screws

8-3-5-2 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in Power Shut Down on page 4 - 8.

8-3-5-3 Touch Screen Rotaries Board Removal Procedure

1) Raise the console to the *maximum up* position.
   Make sure it is aligned in the central position (not pulled to one side or the other).
2) Remove the following Touch Screen covers: *service, rear*:
3) Remove the Touch Screen:
4.) Remove the six rotary knobs from the Rotaries Board - Figure 8-49.

NOTE: After removing the Touch Screen Rotary Knobs, keep them safely, together with the screws, as they will be required for refitting to the new Touch Screen Rotaries Board.

5.) Carefully lay the Touch Screen face-down on a clean, soft, stable surface.

8-3-5-3 Touch Screen Rotaries Board Removal Procedure (cont'd)

6.) Remove the 8 securing screws from the Touch Screen Rotaries Board - Figure 8-48.

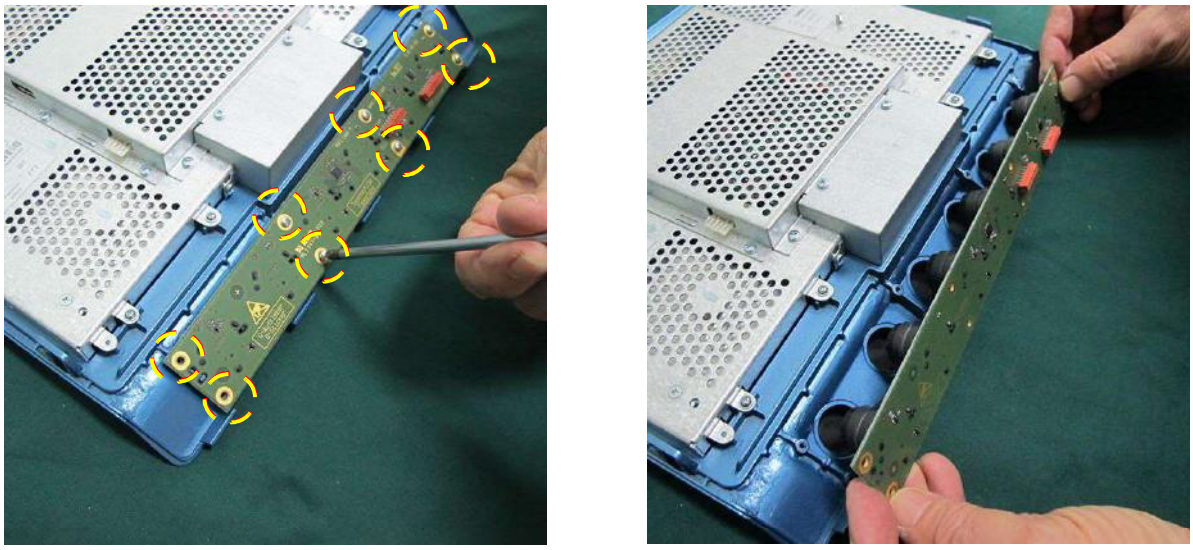


Figure 8-48 Removing the Touch Screen Rotaries Board

7.) Using both hands, lift the Rotaries Board away from the Touch Screen and remove.

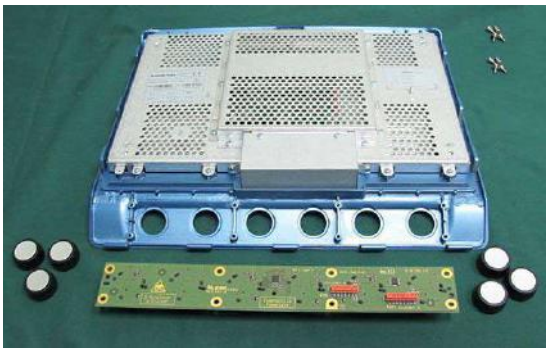


Figure 8-49 Touch Screen and Rotaries Board - Rotary Knobs Removed

8-3-5-4 Touch Screen Rotaries Board Installation Procedure

1.) Carefully place the Touch Screen Rotaries Board in position at the rear of the Touch Screen.

2.) Fasten securely with the 8 screws (previously removed).

Torque: 0.56 Nm +/- 5%.

3.) Install the Touch Screen on the system:

4) Refit the following Touch Screen covers: *rear, service*:

5) Fit the six Touch Screen Rotary Knobs:

8-3-6 Operating Panel Keyboard Assembly Replacement Procedure

8-3-6-1 Tools

- Phillips screwdriver
- flat screwdriver
- 4 mm Hex key
- Calibrated Torque tool, 1.3 Nm +/- 5% for 4 mm Hex key

8-3-6-2 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in Power Shut Down on page 4 - 8.

8-3-6-3 Operating Panel Keyboard Assembly Removal Procedure

Note: If the OPIO Basket is attached, remove it from the keyboard interface column (refer to OPIO Basket Removal Procedure on page 8 - 29).

1) Working from the front of the system, raise the console to the *maximum up* position.
2) Make sure that the console is aligned in the central position (not pulled to one side or the other).

Note: Adjacent to each of the four Hex screws (two on the left; two on the right) there is an arrow marking the position of the screws for easy identification:

3) Working from beneath the keyboard assembly, loosen the two Hex screws on the system's *right* side (arrows marked in the figure indicate the screw locations) as shown in Figure 8-50 below.

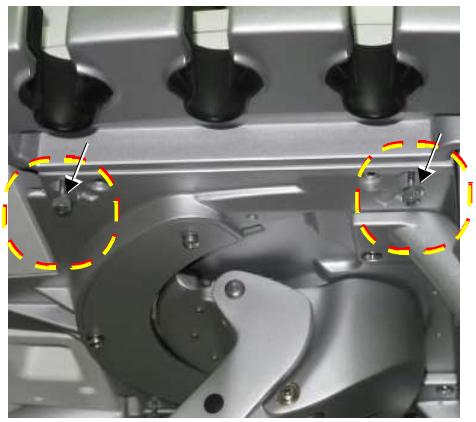


Figure 8-50 Removing the Hex Screws under Keyboard Assembly - Right Side

8-3-6-3 Operating Panel Keyboard Assembly Removal Procedure (cont'd)

4) Loosen the two captive Hex screws on the *left* side, as shown in Figure 8-51 below (arrows marked in the figure indicate the screw locations).

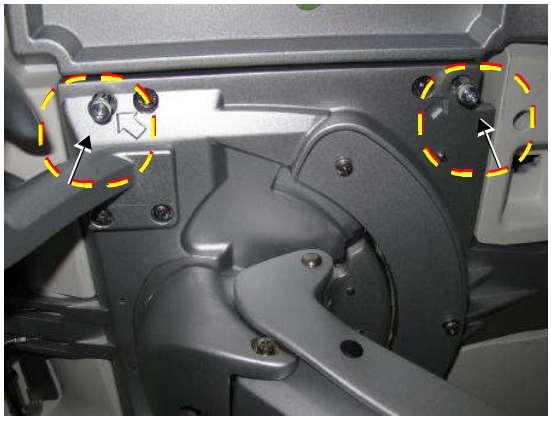


Figure 8-51 Loosening the Captive Hex Screws beneath Keyboard Assembly - Left Side

5) Before proceeding, place some protective sponge beneath the Keyboard Assembly unit to protect it from being damaged during the removal procedure - see Figure 8-52 below.

Figure 8-52 Protective Sponge shown Beneath OPIO

8-3-6-3 Operating Panel Keyboard Assembly Removal Procedure (cont'd)

6.) Tilt the keyboard assembly upwards, exposing the three cables connected to the keyboard assembly - see Figure 8-53 below.

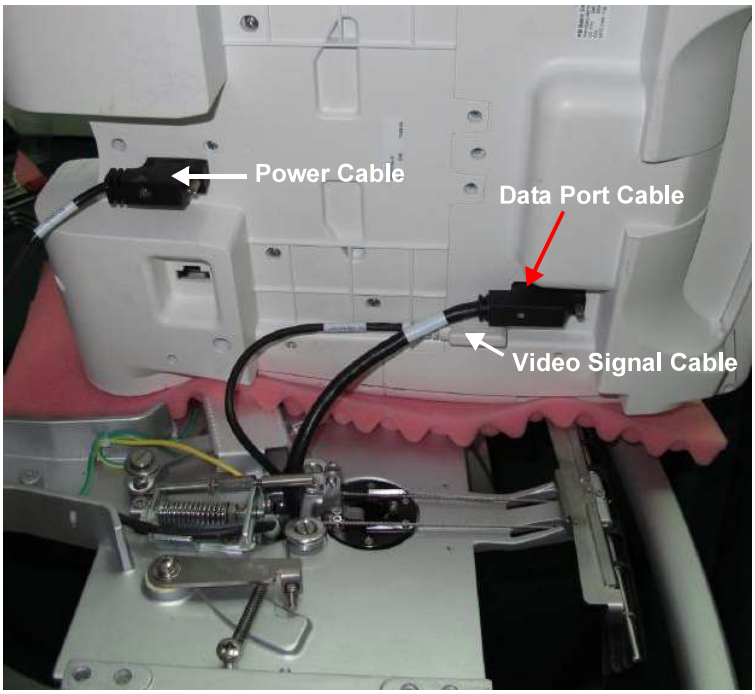


Figure 8-53 Underside of the Keyboard Assembly Showing Cables Connected

7) Using the appropriate screwdriver release the securing screw and unplug the Data Port Cable from the Keyboard Assembly as shown in Figure 8-53, above.

8.) Unplug the Video Signal cable and using a flat screwdriver, release the securing screw and unplug the power cable from the Keyboard Assembly - see Figure 8-53, above.

9) After releasing the three cables, lift the keyboard assembly *upwards* and remove it from the system.

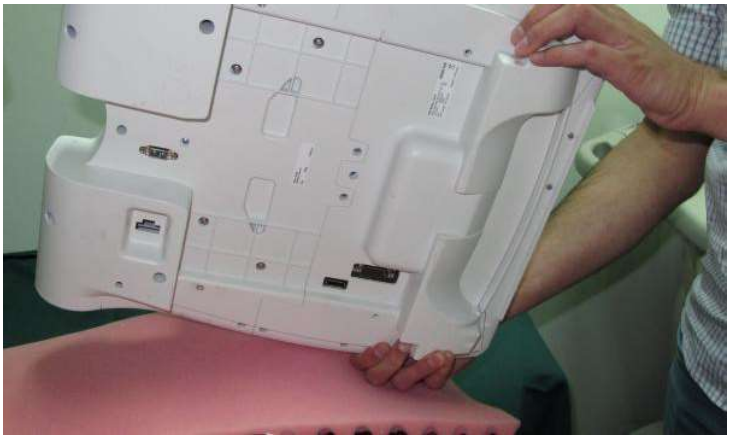


Figure 8-54 Removing the Keyboard Assembly from the System

8-3-6-4 Operating Panel Keyboard Assembly Installation Procedure

1) Working from the front of the system, make sure the console is raised to the *maximum up* position.
2) Make sure that the console is aligned in the central position (not pulled to one side or the other).
3) Follow the steps for the Keyboard Assembly Removal procedure in *reverse* order, as described in the Operating Panel Keyboard Assembly Removal Procedure on page 8 - 50.

   Torque: 4 pc. M5x28 captive screws: 1.3 Nm +/- 5%.
4) If used, return the basket to the keyboard interface column (refer to OPIO Basket Installation Procedure on page 8 - 29).

8-3-7 Operating Panel GE Logo 40 mm Replacement Procedure

NOTE: The Operating Panel is supplied without the GE logos fitted one on each side. When replacing the Operating Panel, it is necessary to order the Operating Panel and in addition, two GE logos (supplied as a separate part, see below).

One GE logo is located on either side of the Operating Panel as shown in Figure 8-55.

Operating Panel - GE Logo Right

Operating Panel - GE Logo Left Side

Figure 8-55 GE Logo - Located on Left and Right Side of Operating Panel

8-3-7-1 Tools

8-3-7-2 No special requirementsGE Logo Removal Procedure

NOTE: In the event that only the GE Logo is damaged (i.e. the Operating Panel is not being replaced), it is necessary to remove the old logo from the OPIO, as described below.

1) Using a blunt non-metallic instrument, gently raise one edge of the damaged GE logo.
2) Carefully prize the logo away from the Operating Panel.

8-3-7-3 GE 40 mm Logo Installation Procedure

1) Prior to adhering the logo, ensure the outer surface of the Operating Panel is clean, dry, and free of particles.
2) Remove the GE logo from it's packing.
3) Peel back the plastic protective outer layer from the logo and remove it to expose the adhesive surface.
4) Carefully place the logo in position ensuring that the letters are correctly oriented (upright), straight and parallel to the inlaid impression on the side of the Operating Panel.

⚠ Do not apply pressure to the center of the logo while adhering it to the Operating Panel as this will damage the part.

5.) Carefully applying even pressure **around the perimeter** of the logo to ensure a firm adhesion.
6.) Repeat the above steps to adhere a GE logo to the opposite side of the Operating Panel.

8-3-8 Operating Panel Label Replacement Procedure

NOTE: The Operating Panel is supplied without the Vivid S60N or Vivid S70N label - these are separate parts. When the OPIO is replaced, order the appropriate label when ordering the OPIO replacement part - see below:

- The Vivid™ S60N label identifies the 2D scanner
- The Vivid™ S70N label identifies the 4D scanner

8-3-8-1 Tools

Blunt instrument for removing Vivid S60/S70 label from the Operating Panel.

8-3-8-2 Operating Panel Label Removal Procedure

1.) Using a blunt instrument carefully remove the existing label from the OPIO panel.

2.) Clean the area from where the label was removed and prepare the surface for adhering the replacement label.

8-3-8-3 Operating Panel Label Installation Procedure

1) Prior to adhering the label, ensure the surface of the Operating Panel is clean, dry, and free of particles.

2) Remove the self-adhesive label from it's packing.

3) Peel back the plastic protective outer layer from the label and remove it to expose the adhesive surface.

4) Carefully place the label in position on the Operating Panel ensuring that it is correctly oriented (upright), straight and parallel to the inlaid impression on the Operating Panel - see Figure 8-56.

Figure 8-56 Location of Operating Panel Label

5.) Using a soft, clean cloth, gently press out any air bubbles that might be trapped behind the label.

8-3-9 Probe Cup Holders Replacement Procedure

8-3-9-1 Tools

No special requirements

8-3-9-2 Probe Cup Holders Removal Procedure

The probe cup-holders are located on either side of the operator's panel - see - Figure 8-57.

Figure 8-57 Probe Cup Holders

- From beneath the operator's panel, press the gel-cups upwards and remove them.

8-3-9-3 Probe Cup Holders Installation Procedure

- Place a new set of probe-cup holders in their respective positions on the operator's panel.

8-3-10 Alphanumeric Keyboard Replacement Procedure

NOTE: The Alphanumeric Keyboard is supplied as an integral part of the OPIO Bottom Cover. In the event that a Vivid S60N/Vivid S70N ultrasound scanner that previously did not have the Alphanumeric Keyboard option fitted and now requires replacement of the OPIO bottom cover, it is necessary to order and fit the Alphanumeric Keyboard complete with OPIO bottom cover (supplied as one FRU part).

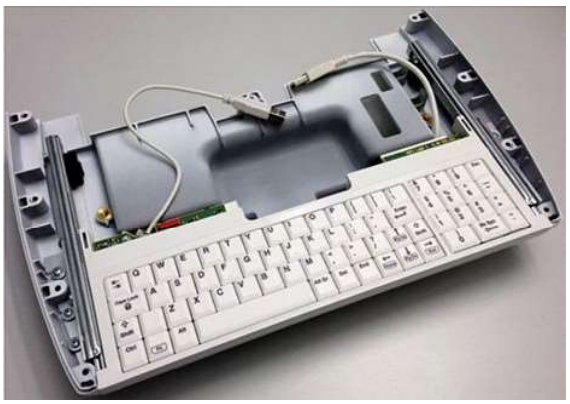
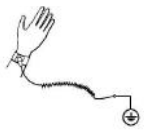


Figure 8-58 Alphanumeric Keyboard/OPIO Bottom Cover Assembly

When performing these procedures, take precautions to avoid damage of electrostatic-sensitive components. Always have the ESD wrist strap connected either to the DIB chassis or to the GND plug at the rear of the scanner, and to your hand.

If a battery is present, first remove the battery as it contains stored energy.

.



8-3-10-1 Tools

- Phillips screwdriver
- Calibrated Torque tool, 0.56 Nm +/- 5% for M3 screws.

8-3-10-2 Time Required

30 min

8-3-10-3 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in Power Shut Down on page 4 - 8.

8-3-10-4 Alphanumeric Keyboard Removal Procedure

1.) Remove the Operating Panel Keyboard Assembly.

2.) Carefully place the Operating Panel Keyboard Assembly upside-down on a flat, clean, stable surface.

8-3-10-4 Alphanumeric Keyboard Removal Procedure (cont'd)

3.) Loosen and remove the 9 Phillips screws that secure the bottom cover in place - see Figure 8-59

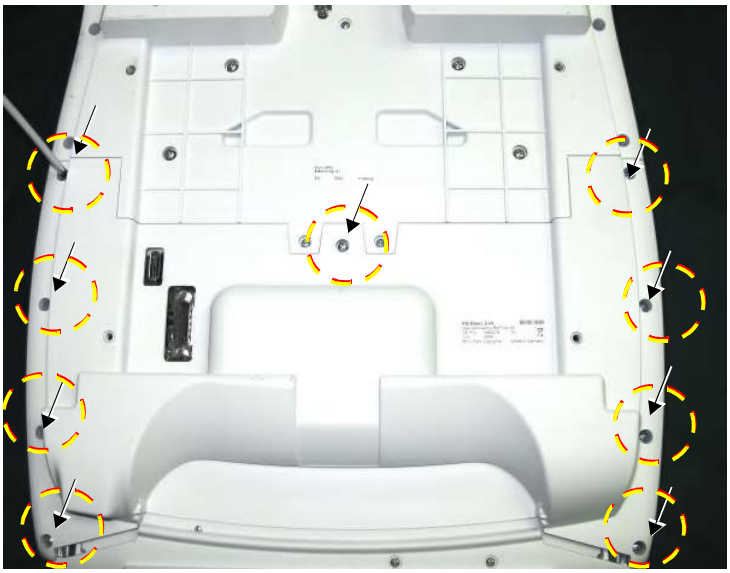


Figure 8-59 Operating Panel Keyboard Assembly - Bottom Cover Securing Screws

4.) Gently lift the bottom cover (see note below) and disconnect the two USB cables from the side of the trackball, as shown in Figure 8-60 (see additional note below).

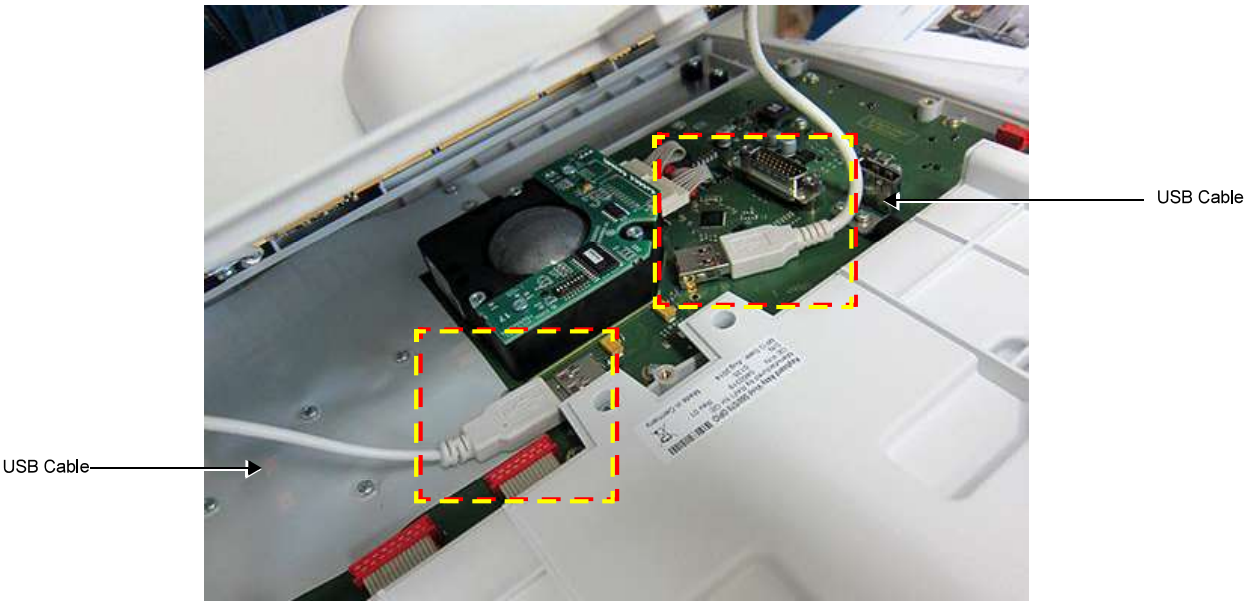


Figure 8-60 Location of USB Cables

Note: For systems previously fitted with the Alphanumeric Keyboard option, the AN Keyboard is attached to the bottom cover (integral part).

Note: For systems without the Alphanumeric Keyboard option currently installed, there is only one USB cable connected.

8-3-10-4 Alphanumeric Keyboard Removal Procedure (cont'd)

5.) Remove the Operating Panel Bottom Cover (with attached AN Keyboard) from the Operating Panel.

Figure 8-61 Operating Panel Keyboard Assembly with AN Keyboard/Bottom Cover Removed

8-3-10-5 Alphanumeric Keyboard Installation Procedure

Note: Extend the Alphanumeric Keyboard to the *maximum OUT* position before commencing this procedure.

1.) Holding the Alphanumeric Keyboard/Bottom Cover close to the Operating Panel Keyboard Assembly, carefully reconnect the two USB cables to the side of the trackball as shown in Figure 8-62 below..

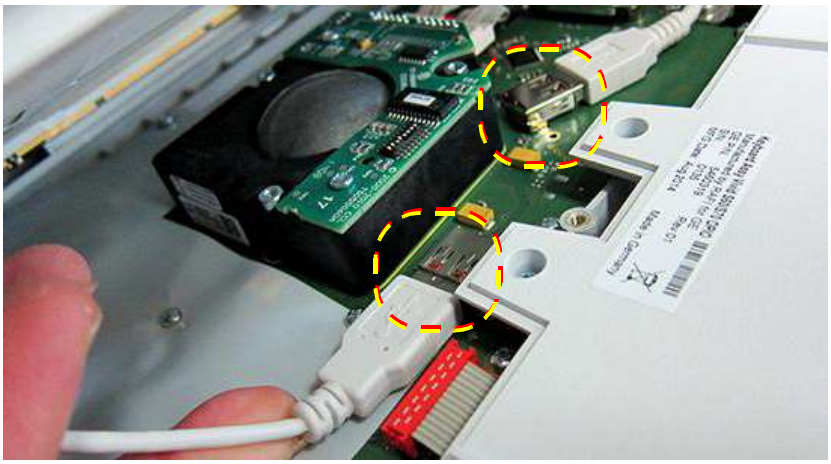


Figure 8-62 Installing Alphanumeric Keyboard/ Bottom Cover on Operating Panel Keyboard Assembly

2.) Place the Bottom Cover in position on the base of the Operating Panel Keyboard Assembly, aligning each of the screw holes.

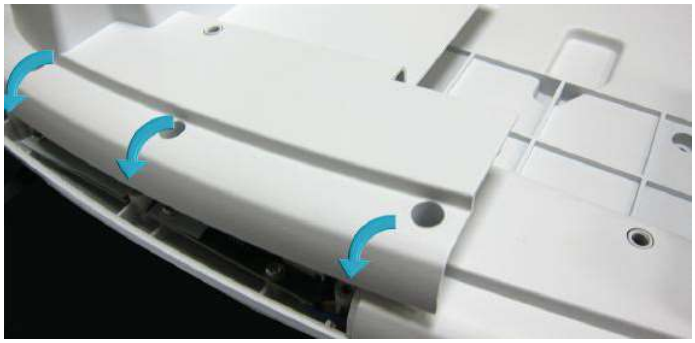


Figure 8-63 Fitting the Bottom Cover onto the Operating Panel Keyboard Assembly Base

3.) Return and fasten the 9 Phillips screws (previously removed) to secure the bottom cover to the keyboard assembly - see Figure 8-59.

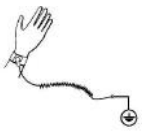
Torque: 0.56 [Nm.] +/- 5%.

4.) Carefully turn the Operating Panel Keyboard Assembly over (right-way-up), then install it on the system.

8-3-11 Mechanical Trackball and Housing Replacement Procedure

When performing these procedures, take precautions to avoid damage of electrostatic-sensitive components. Always have the ESD wrist strap connected either to the DIB chassis or to the GND plug at the rear of the scanner, and to your hand.

If a battery is present, first remove the battery as it contains stored energy.



NOTE: Before performing this procedure, clean the trackball and bowl (since dirt may be the cause of the current fault). Refer to the instructions described in Cleaning the Trackball on page 4 - 18.

8-3-11-1 Tools

Phillips screwdriver and 5.5 mm nut driver/box spanner.

8-3-11-2 Time Required

25 min

8-3-11-3 Preparation

Shut down the Vivid S60N/Vivid S70N ultrasound system, as described in Power Shut Down on page 4 - 8.

8-3-11-4 Mechanical Trackball and Housing Removal Procedure

1.) Remove the Keyboard Assembly and place on a flat, clean, stable surface:

2.) Working from the top, remove the trackball ring by turning it *counter-clockwise* (1/4 turn), then lift.

Figure 8-64 Removing the Mechanical Trackball Ring

8-3-11-4 Mechanical Trackball and Housing Removal Procedure (cont'd)

3.) With one hand, tilt the Keyboard Assembly forward until the trackball falls out into the other hand.

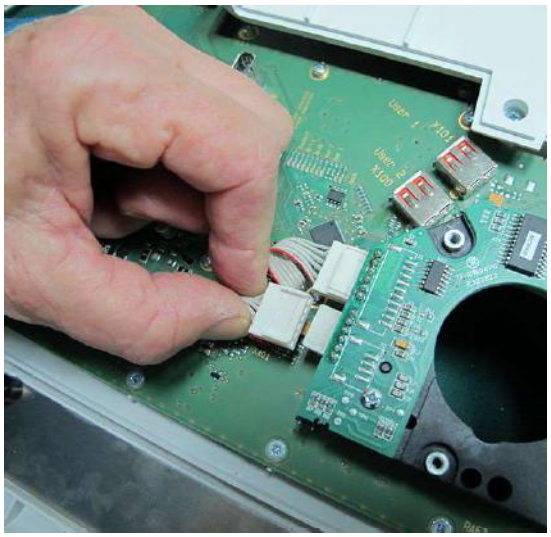
Figure 8-65 Removing the Mechanical Trackball

4.) Carefully turn the Keyboard Assembly over (upside-down).

5.) Remove the Keyboard Bottom Cover:

6.) Disconnect the 2 flex cables - Figure 8-66, left.

7.) Remove each of the 3 hex nuts (5.5 mm) from the Trackball Board and housing - Figure 8-66, right.



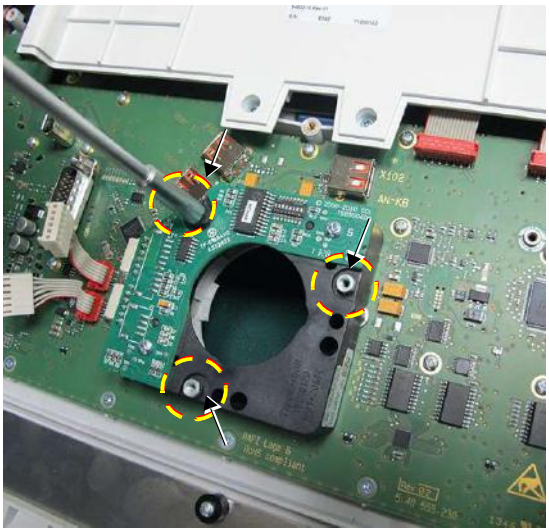


Figure 8-66 Trackball Board and Housing Removal

8-3-11-4 Mechanical Trackball and Housing Removal Procedure (cont'd)

8.) Lift the Trackball Board and Housing assembly up and remove - Figure 8-67.

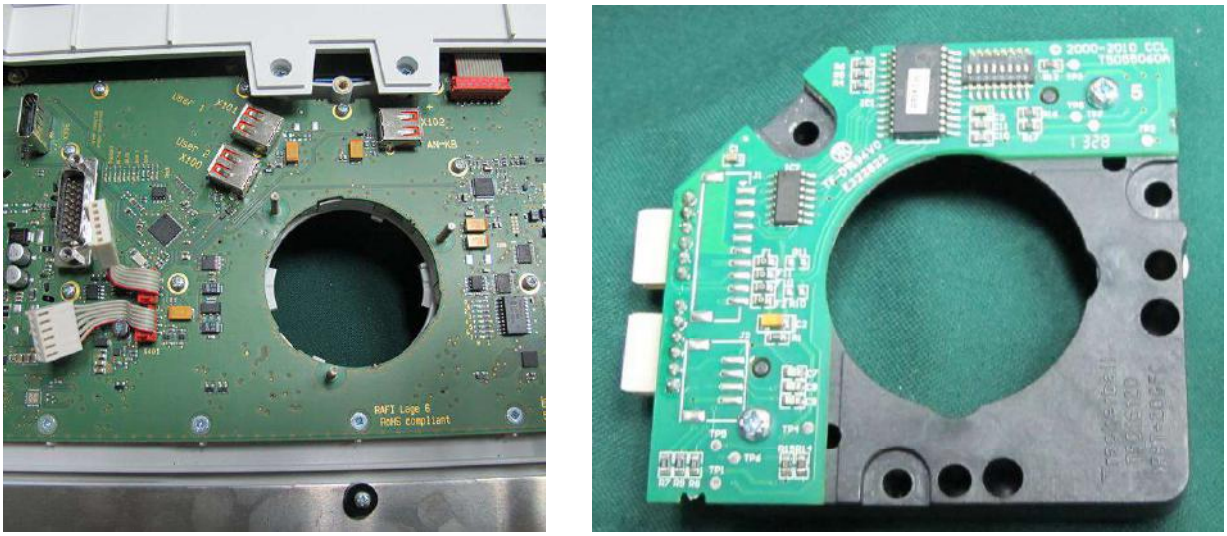


Figure 8-67 Trackball Board and Housing Removed

8-3-11-5 Mechanical Trackball and Housing Installation Procedure

1.) Place a flat washer on each of the three retaining screws extending from the base board.
2.) Carefully place the new Mechanical Trackball Board and Housing in position on the keyboard assembly (refer to Figure 8-66).
3.) Secure the Trackball Housing using the 3 **new** nuts supplied with the kit.
4.) Carefully re-connect the 2 cables (previously disconnected) - Figure 8-66, left.
5.) Re-fit the Keyboard Bottom Cover:
6.) Install the Keyboard Assembly on the system. .
7.) Place the trackball into position in the Operating Panel.
8.) Return the trackball ring and turn to secure the trackball in its housing - Figure 8-64.
9.) Turn ON power to the system.

8-3-12 Rotary Knob Replacement Procedure

NOTE: The following instructions are applicable to replacement of Rotary Knobs on either on the Operating Panel, or on the Touch Screen. The Knobs Kit contains Rotary Knobs for both.

8-3-12-1 Tools

None.

8-3-12-2 Time Required

5 min

8-3-12-3 Preparation

None

8-3-12-4 Rotary Knob Removal Procedure

1.) Grip the defective knob between your finger and thumb

2.) Lift straight up and remove from the control shaft - see Figure 8-68 below.

Figure 8-68 Removing a Rotary Knob

8-3-12-5 Rotary Knob Installation Procedure

1.) Carefully place a new Rotary Knob in position on the Operating Panel (or Touch Screen), taking care to place the plastic alignment pin in the correct location.

2.) Gently push the Rotary Knob down until it snaps into position.

8-3-13 Operating Panel Keycaps Replacement Procedure

8-3-13-1 Tools

Use the appropriate flat screwdriver, as indicated in the Keycap replacement procedure.

8-3-13-2 Time Required

5 min

8-3-13-3 Preparation

None

8-3-13-4 Operating Panel Keycap Removal Procedure

1.) Carefully insert the end of a small flat screwdriver in the gap between the Keycap you wish to remove and the surface of the Operating Panel.

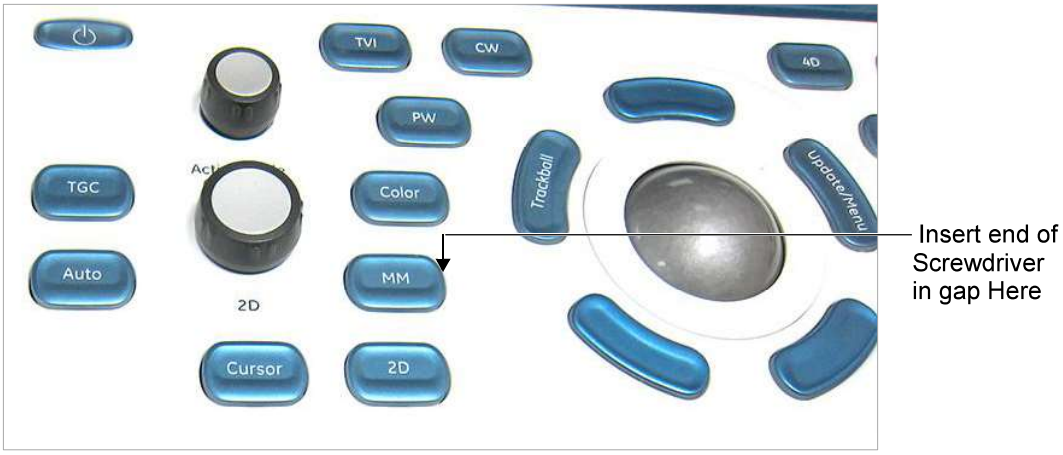


Figure 8-69 Removing Keycap from Operating Panel

2.) Gently lever off the defective Keycap, until it is completely loosened from its base.

3.) Remove the defective Keycap.

8-3-13-5 Operating Panel KeyCap Installation Procedure

1.) Carefully place the appropriate new Keycap in position on the Operating Panel, taking care to place the plastic alignment pin in the correct position so that the Keycap is the right way up and reads correctly.

2.) Gently push the Keycap down until it snaps into position.

8-3-14 Alphanumeric Keycaps Replacement Procedure

The Alphanumeric Keyboard is shown in Figure 8-70.

Figure 8-70 Alphanumeric Keyboard

8-3-14-1 Tools

Appropriate flat screwdriver.

FRU Part # *Refer to Table 9-6 on page 9-12.*

8-3-14-2 Time Required

5 min

8-3-14-3 Preparations

None

8-3-14-4 Alphanumeric Keycap Removal Procedure

- Using a flat screwdriver gently release the defective keycap as shown in Figure 8-71.

Figure 8-71 Alphanumeric Keyboard

8-3-14-5 Keycaps for Operating Panel Installation Procedure

- Return each replacement keycap to its appropriate position on the keyboard by gently pressing the keycap into position ensuring that it is firmly engaged.

Section 8-4
Cables - Replacement Procedures

8-4-1 Replace the HDD Power Cable

Figure 8-72 HDD Power Cable for V204

8-4-1-1 Tools

- Cable tie

8-4-1-2 Removal Procedure

NOTE: The replacement procedure for HDD Power Cable is included in the replacement procedure below.

Table 8-2 Removal Procedure, sheet 1 of 3

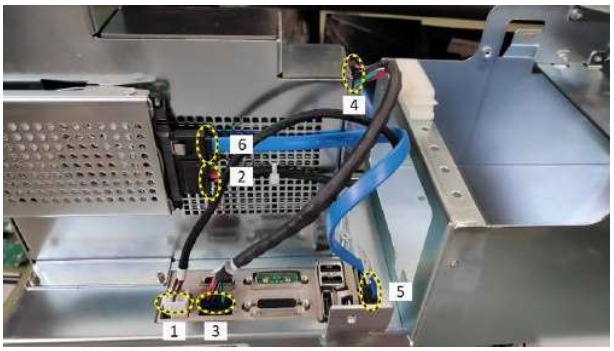
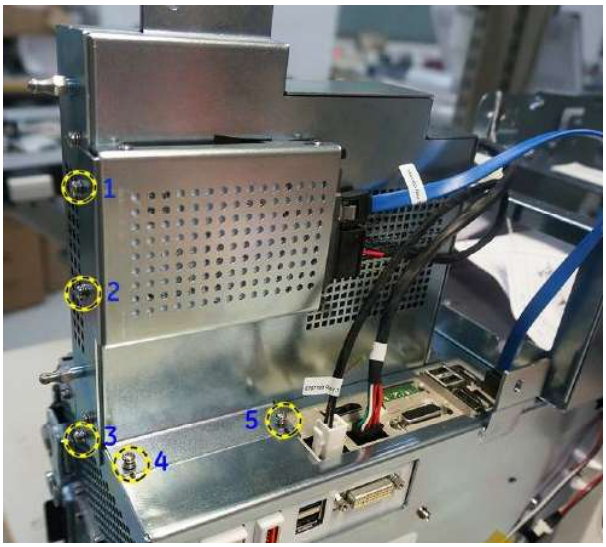
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear.	
2.	• Remove the two screws marked as 1 and 2 in the illustration for step 3. • Disconnect the two cables marked 2 and 6 in the illustration for this step. • Remove the Hard Disk module. • Cut and remove the cable tie that is used for fixing the HDD Power Cable to the FEPS module.	
3.	Loosen and remove the 5 screws (3~5) and loosen the captive screws (6, 7). Then remove the cable (b).	

Table 8-2 Removal Procedure, sheet 2 of 3

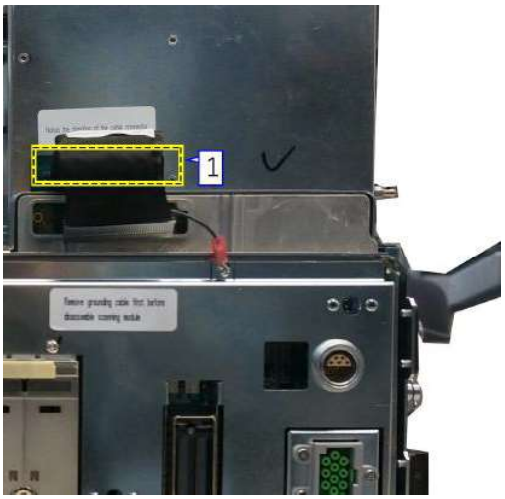
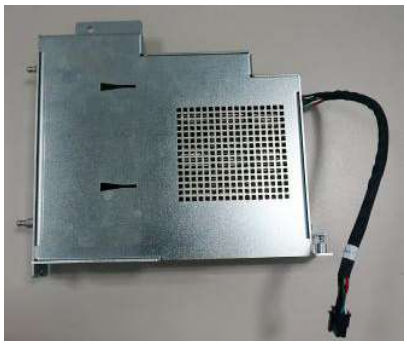
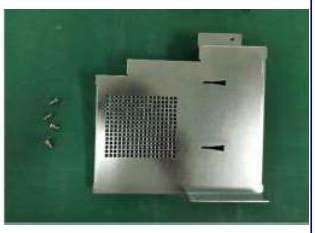
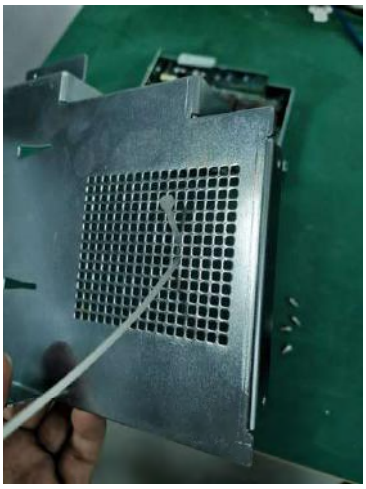
No.	Steps	Corresponding Graphic
4.	Disconnect the connector.	
5.	Carefully remove the FEPS module.	
6.	FEPS Module.	
7.	Remove four screws on both sides of FEPS module and remove the top cover.	 

Table 8-2 Removal Procedure, sheet 3 of 3

No.	Steps	Corresponding Graphic
8.	Mount the cable tie to the specific grid of the metal cover as the illustration indicates.	

8-4-1-3 Mounting Procedure

1.) Install the new parts in the reverse order of removal.

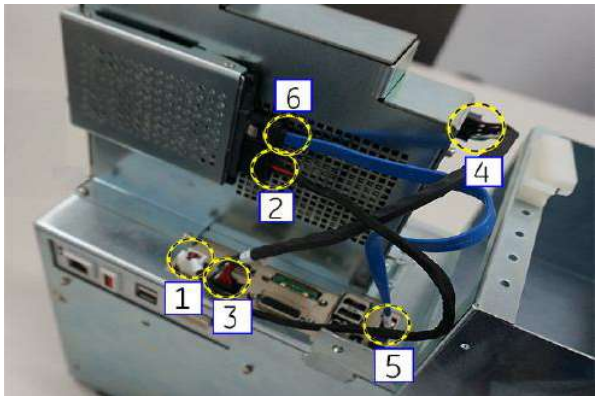
2.) After connecting all the cables, please tie the HDD power cable to the grid of the sheet metal.

8-4-2 Replace the FEPS to BIF cable

Figure 8-73 FEPS to BIF cable

8-4-2-1 Removal Procedure for FEPS to BIF cable

Table 8-3 Removal Procedure for FEPS to BIF cable

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear, right rear.	
2.	Loosen cable connectors (3 and 4 in the illustration) to remove FEPS to BIF cable.	

8-4-2-2 Mounting Procedure

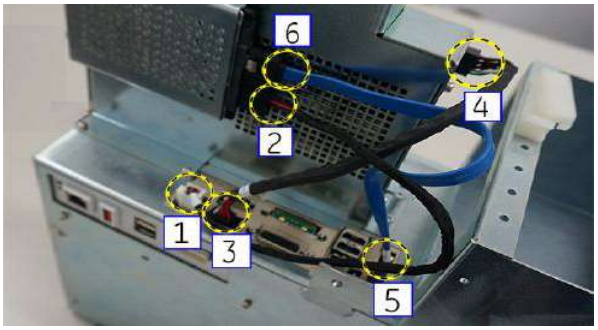
Install the new parts in the reverse order of removal.

8-4-3 Replace the STD cable

Figure 8-74 STD cable

8-4-3-1 Removal Procedure for STD cable

Table 8-4 Removal Procedure for STD cable

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear, right rear.	
2.	Loosen cable connectors (5 and 6 in the illustration) to remove STD cable.	

8-4-3-2 Mounting Procedure

Install the new parts in the reverse order of removal.

8-4-4 Replace the FEPS to MST cable

Figure 8-75 FEPS to MST cable

8-4-4-1 Removal Procedure for FEPS to MST cable

Table 8-5 Removal Procedure for FEPS to MST cable

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear, right rear.	
2.	Unscrew the two screws to remove FEPS to MST cable	

8-4-4-2 Mounting Procedure

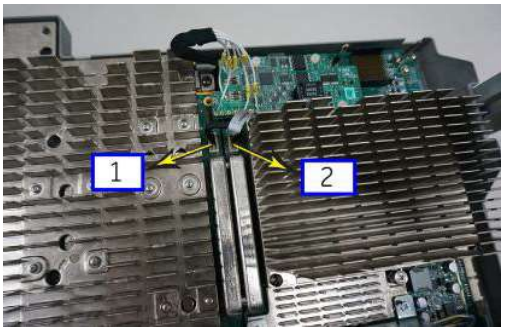
Install the new parts in the reverse order of removal.

8-4-5 Replace the ALTON R2 PATIO BEP2CMST cable

Figure 8-76 ALTON R2 PATIO BEP2CMST cable

8-4-5-1 Removal Procedure for ALTON R2 PATIO BEP2CMST cable

Table 8-6 Removal Procedure for ALTON R2 PATIO BEP2CMST cable

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear, right rear.	
2.	Remove the scanning module assy from the Ecage, refer to step 2 and step 3 in BEP&CPU Module Replacement on page 8 - 82.	
3.	Loosen two cable connectors to remove ALTON R2 PATIO BEP2CMST cable.	
4.	ALTON R2 PATIO BEP2CMST cable.	

8-4-5-2 Mounting Procedure for ALTON R2 PATIO BEP2CMST cable

Install the new parts in the reverse order of removal.

Section 8-5
Electronic Cage Parts Replacement Procedures

NOTE: When replacing Vivid S60N/Vivid S70N lower section components, after removal of the system covers (left and right sides; front), the Front End door assembly should be removed from the main assembly (to gain access to the internal components) and placed on a stable surface. These steps are described in the procedure below.

CAUTION

When performing these procedures, take precautions to avoid damage of electrostatic-sensitive components. Always have the ESD wrist strap connected either to the DIB chassis or to the GND plug at the rear of the scanner, and to your hand.

If a battery is present, first remove the battery as it contains stored energy.

.

8-5-1 Scanner Electronic Cage (Ecage) Replacement

8-5-1-1 Preparation

- Shut down the system and disconnect the power cord.

8-5-1-2 Removal Procedure

Table 8-7 Removal Procedure for Scanner Electronic Cage, sheet 1 of 2

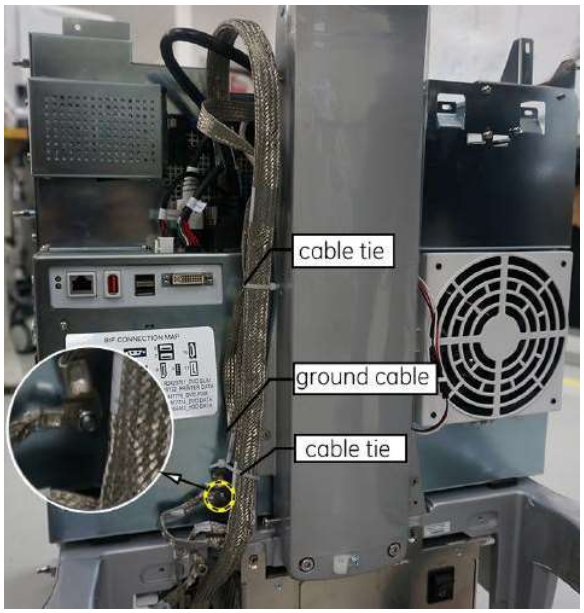
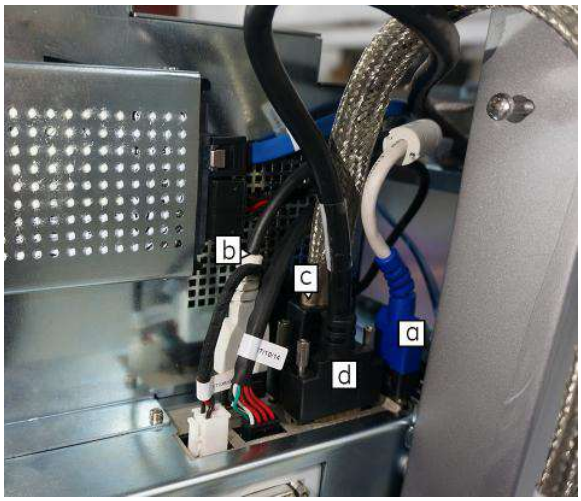
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers.	
2.	• Cut and remove the cable tie. • Then unscrew the M4 nut to disconnect the ground cable (Column to Electronic Cage GND Copper Strap). Save the nut, the two serrated washers and the flat washer for use during installation.	

Table 8-7 Removal Procedure for Scanner Electronic Cage, sheet 2 of 2

No.	Steps	Corresponding Graphic
3.	Disconnect the four cables from the Ecage. a. Main display (blue) b. Touch panel c. AC power cable d. D-SUB cable	
4.	Using a 3mm Hex key, release the four securing screws at the rear of the system. Then release the screw in the front.	 
5.	Remove the Ecage module from the system.	

8-5-1-3 Ecage Mounting Procedure

Follow these steps to install the Ecage:

1.) Position the Ecage in the position where the old Card Cage used to be.

2.) Install the screw on the front side of the Ecage (Phillips Pan Head M4×10mm).

Torque: 1.3 Nm ± 5%.

Figure 8-1. Install screw on front side

3.) Install the four screws at the rear side of the Ecage. (Hexagon Socket C-Sunk Head Screw, M5×16mm)

Torque:1.3 Nm ± 5%.

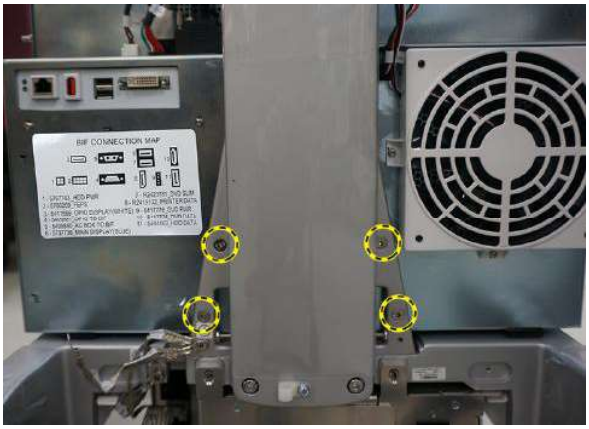


Figure 8-2. Install four screws at rear side

8-5-1-3 Ecage Mounting Procedure (cont'd)

4.) Plug in the four cables from the Ecage, the two HDD cables and the blue Main Display Cable.

NOTE: The cables have labels that match the BIF Connection Map.

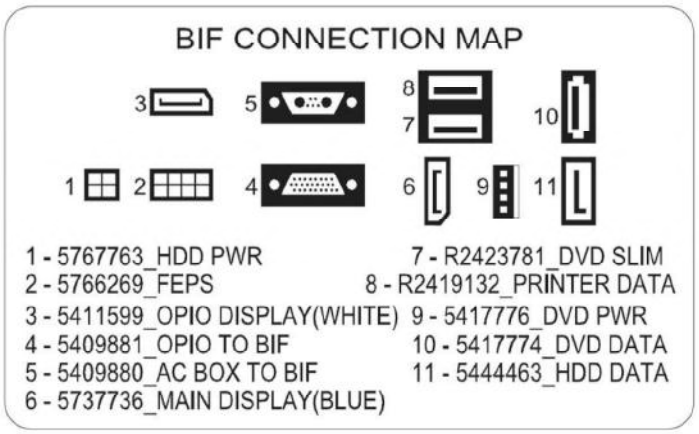
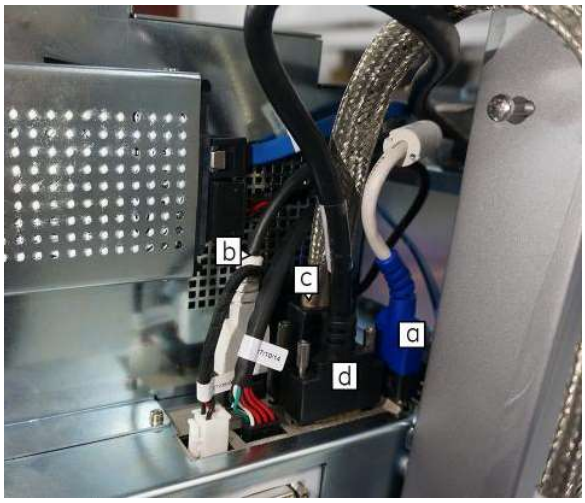


Figure 8-3. BIF Connection Map

Figure 8-4. BIF Connectors

8-5-1-3 Ecage Mounting Procedure (cont'd)



- Main display (blue) [a]
- AC power cable [c]
- D-SUB cable [d]
- Touch panel [b]

Figure 8-5. Connect cables

5.) If a DVD/CD-RW drive is installed:

The old Power to DVD cable is too short, so it must be replaced:

a.) Remove the installed Power to DVD cable.

b.) Install the Power to DVD cable included in the kit.

For detailed instructions, refer to:
8-8-1 "DVD/CD-RW Drive Replacement Procedure" on page 8-202

6.) Install the B/W Printer (if removed earlier).

For detailed instructions, refer to:
8-8-2 "Black and White Printer Replacement Procedure" on page 8-205

8-5-1-3 Ecage Mounting Procedure (cont'd)

7.) Install the earth cables.

Figure 8-6. Earth cables

Attach the cable and star washers like the original layout (see illustration below).

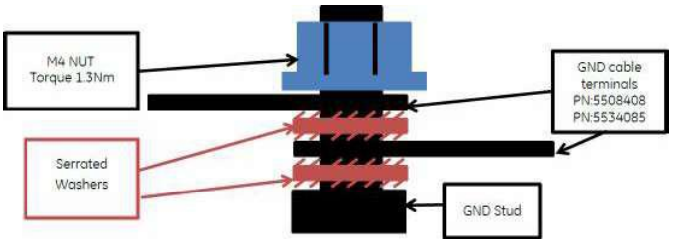


Figure 8-7. GND Cables and washers

Torque for the nut: 1.3 Nm ± 5%.

8.) Add a new cable tie as illustrated below.

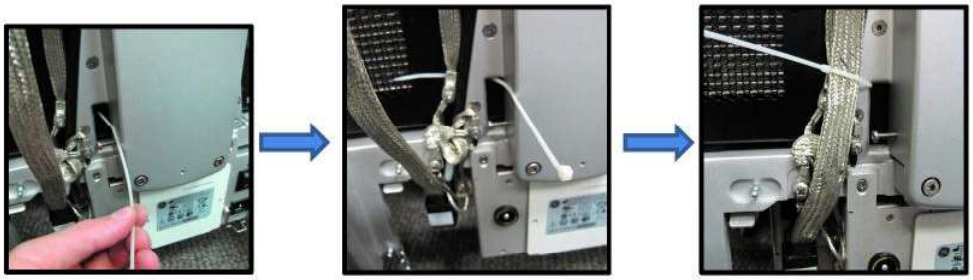


Figure 8-8. Add lower cable tie

8-5-1-3 Ecage Mounting Procedure (cont'd)

9.) Add another cable tie midway between the Upper Plastic Cover screw (1) and the cage edge (2), refer illustration to the left below.

The final result is illustrated in the illustration to the right below.

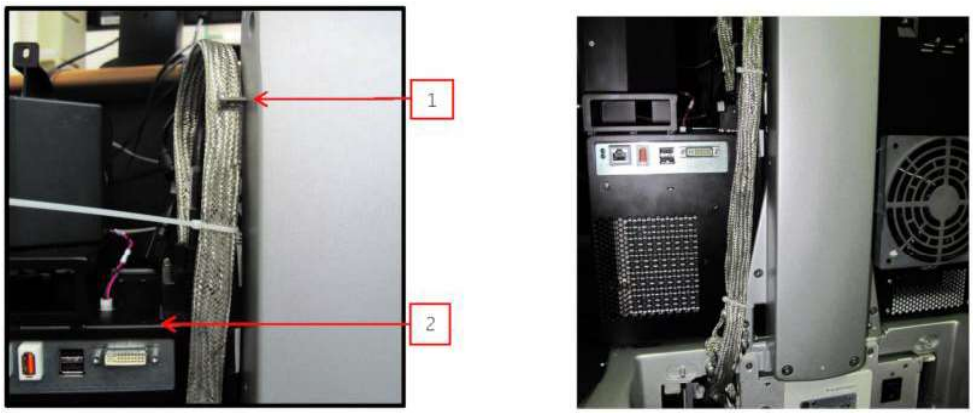


Figure 8-9. Add upper cable tie

10.) Ensure that the FEPS to CMST Cable is installed and firmely seated.

Figure 8-10. FEPS to CMST Cable

1. Install the covers you removed earlier: left rear, right rear, front, DVD and Printer (cover), right side and left side.

8-5-2 BEP&CPU Module Replacement

Purpose: This is a description on how to remove and replace the BEP&CPU module.

8-5-2-1 Tools

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for M3 Phillips screws

8-5-2-2 Preparation

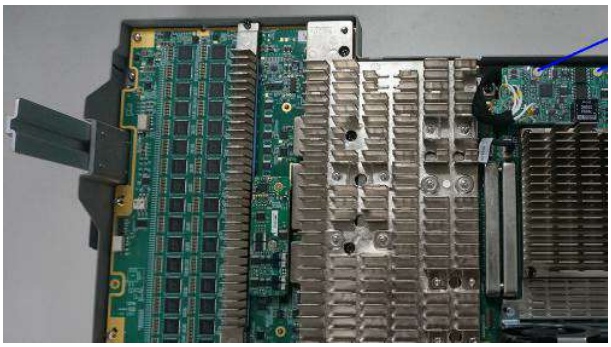
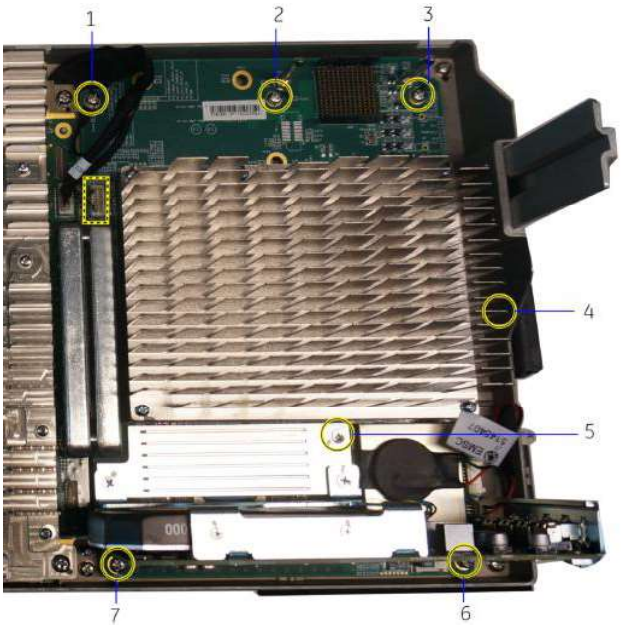
- Shut down the system and disconnect the power cord.

8-5-2-3 Removal Procedure

Table 8-8 Removal Procedure for BEP&CPU module

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Unscrew the two screws (1~2) and remove the cable. Then open the four fastening latches (3~6) and pull out the two spring plungers (7~8) on both side of the Ecage Box.	
3.	Carefully remove the scanning module assy from the Ecage and place it on a stable surface. Note: Always have the ESD wrist strap when performing these procedures.	

Table 8-8 Removal Procedure for BEP&CPU module

No.	Steps	Corresponding Graphic
4.	Unfasten the three plastic screws and remove ECG PWA.	
5.	Unscrew the seven screws. And disconnect the connector. Then carefully remove the BEP&CPU assembly. Note: Screw 5 is captive screw.	
6.	Remove the GPU module, refer to GPU Module Replacement on page 8 - 88.	
7.	BEP&CPU module.	

8-5-2-4 BEP&CPU Module Installation Procedure

Torque:

0.6 Nm +/- 5%

NOTE: The black hand-screw is used to fix assembly during transportation.

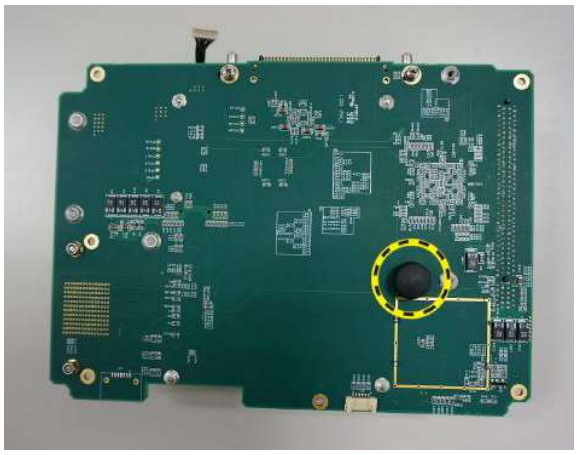


Figure 8-77 Remove the black hand-screw before installation

1.) Remove the hand-screw before installation.
2.) Install the GPU Module.
3.) Hold the BEP&CPU module by your hand as shown in the left-hand illustration in Figure 8-78 (below) during the installation.
4.) Push the BEP&CPU module in the arrow direction, as illustrated in the left-hand illustration in the figure below.

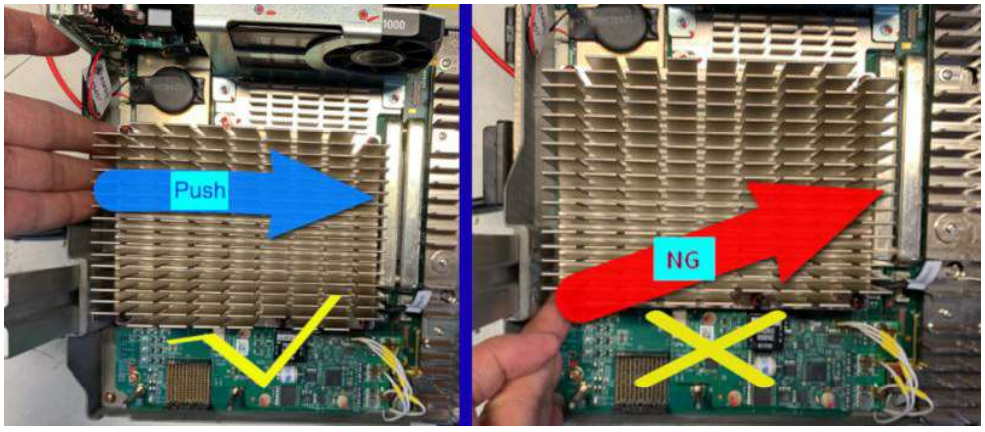


Figure 8-78 Push the BEP&CPU into the socket as illustrated in the left-side illustration

8-5-2-4 BEP&CPU Module Installation Procedure (cont'd)

5.) Install the new parts in the sequence illustrated in the figure below.

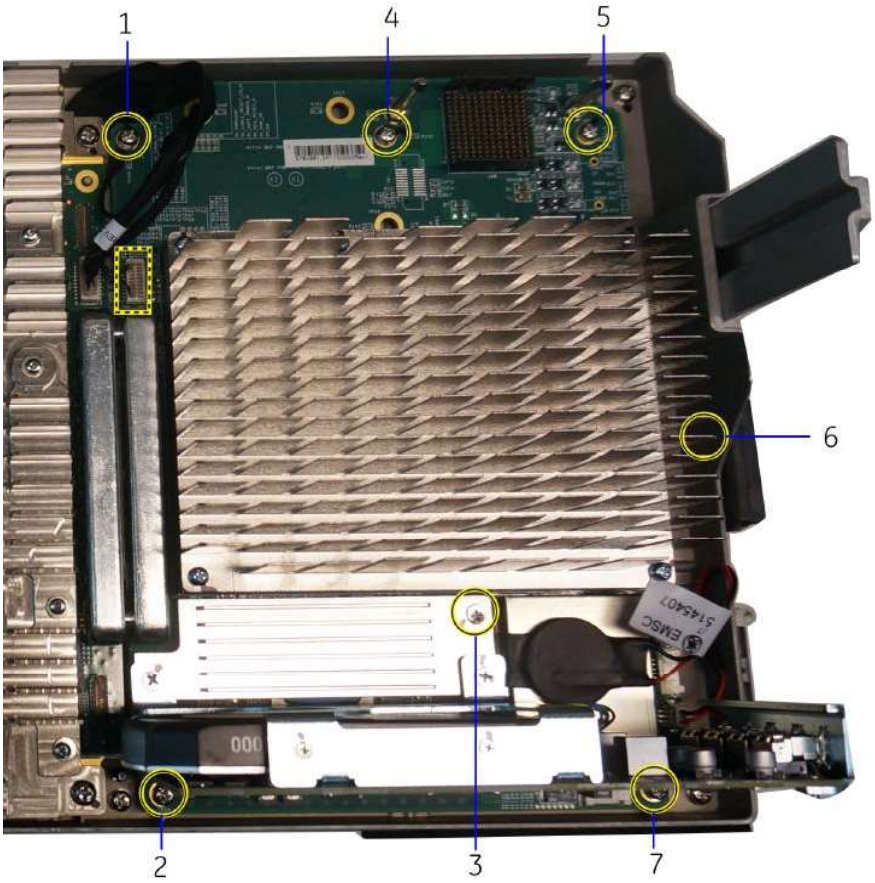


Figure 8-79 BEP&CPU Module Installation sequence

6.) Install the ECG PWA (three plastic screws).

7.) Reinstall the scanning module in the Ecage Box.

8.) Plug in the cable you removed earlier.

8-5-3 CMOS Battery Replacement

8-5-3-1 Preparation

NOTE: Always have the ESD wrist strap when performing this procedure.

1.) Shut down the system and disconnect the power cord.
2.) Lock the wheels, then remove the body covers: front, left side, right side.
3.) Carefully remove the scanning module assy from the Ecage and place it on a stable surface.

8-5-3-2 Remove the CMOS Battery

The CMOS battery is fixed to the BEP printed circuit board with adhesive and the wires are plugged into a connector on the BEP printed circuit board.

Figure 8-80 CMOS battery installed on BEP printed circuit board.

1.) Disconnect the CMOS battery plug from the connector.
2.) Carefully loosen and remove the CMOS battery from the adhesive tape.
Leave the adhesive tape in place, as it will be used for the new CMOS battery.

8-5-3-3 Install the new CMOS Battery

1.) Position the new CMOS battery on the adhesive tape.

Figure 8-81 CMOS battery installed on BEP printed circuit board.

2.) Connect the CMOS battery to the connector on the BEP printed circuit board.
3.) Carefully install the scanning module assy in the Ecage.
4.) Install the covers (left side, right side and front).
5.) Reinstall the scanning module in the Ecage Box.
6.) Plug in the cable you removed earlier.

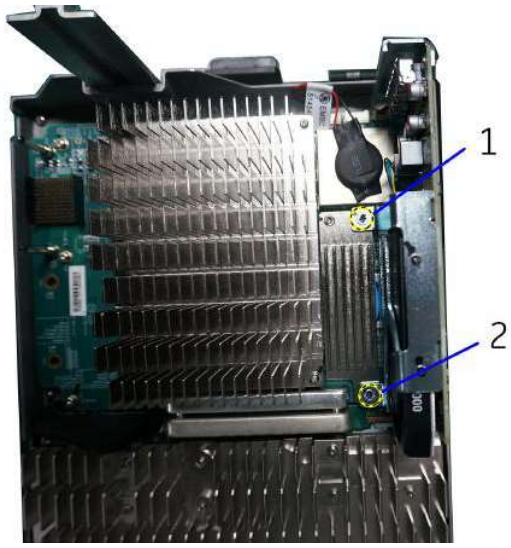
8-5-4 GPU Module Replacement

8-5-4-1 Preparation

- Shut down the system and disconnect the power cord.

8-5-4-2 Removal Procedure

Table 8-9 Removal Procedure for GPU module

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module from the Ecage - BEP&CPU Module Replacement on page 8 - 82.	
3.	Unscrew the two screws to remove the GPU module. Keep the screws for use during installation.	
4.	GPU module.	

8-5-4-3 Mounting Procedure

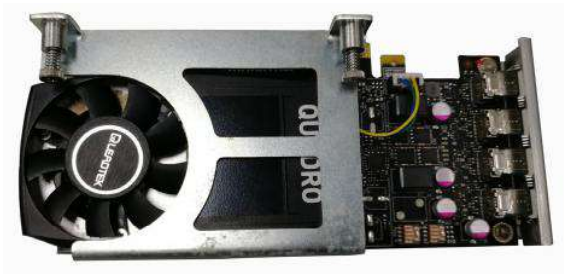
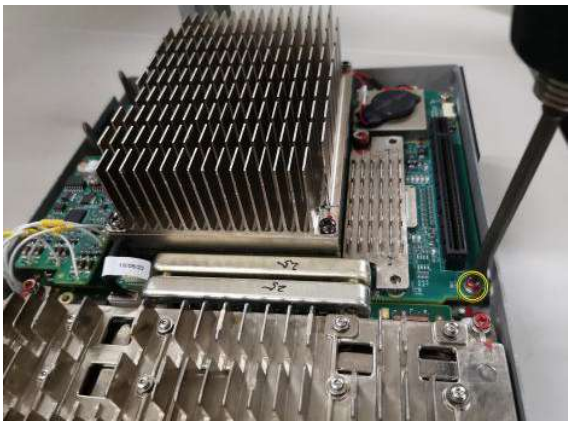
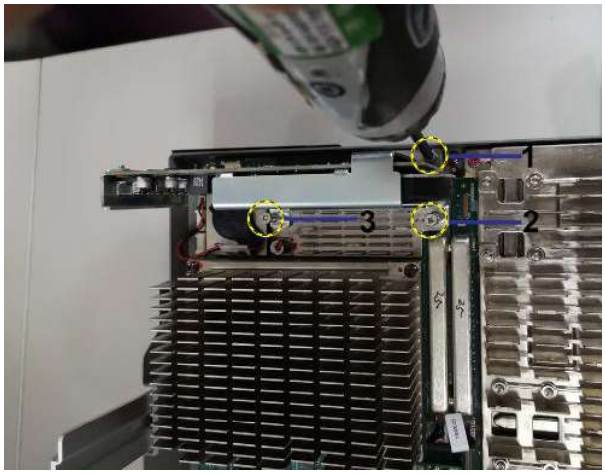
- If you replace with the old GPU module, please install it in the reverse order of removal described in Table 8-9.

  Torque:

  - 0.6 Nm +/- 5%

- If you replace with the new GPU module, please install it as per the procedures described in Table 8-10.

Table 8-10 Installation Procedure for New GPU module

No.	Steps	Corresponding Graphic
1.	Prepare a new GPU module.	
2.	Unscrew the screw.	
3.	Install the new GPU module and tighten the 3 screws to fix it. Torque: 0.6 Nm +/- 5%	

8-5-5 CMST Module Replacement

Purpose: This is a description on how to remove and replace the CMST module.

8-5-5-1 Tools

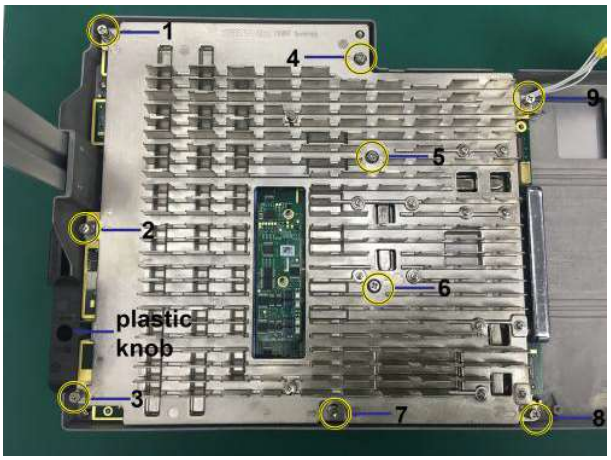
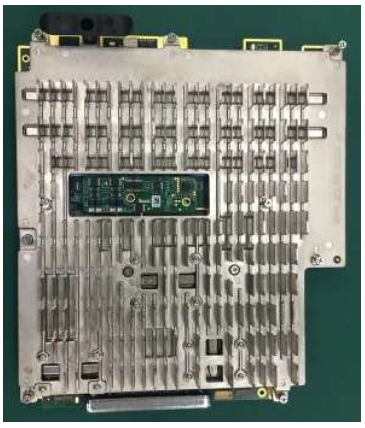
- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

8-5-5-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-5-3 Removal Procedure

Table 8-11 Removal Procedure for CMST module

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module from the Ecage, refer to step 2 and step 3 in BEP&CPU Module Replacement on page 8 - 82.	
3.	Remove the BEP&CPU module, refer to step 4 in BEP&CPU Module Replacement on page 8 - 82.	
4.	Remove the nine captive screws and disconnect the CMST to BEP cable, then pull the black plastic knob upwards to remove the CMST module from the ASSY.	 
5.	CMST module (include CWD).	

8-5-5-4 Mounting Procedure

1.) Install the new CMST in the reverse order of removal.

Torque:

- 0.6 Nm +/- 5%

NOTE: After the CMST module is placed on the frame, please press it on the location beside the plastic knob to ensure the connector under the module is connected.

Figure 8-82 Press the CMST module

2.) To install the BEP&CPU module, please refer to Figure 8-78 on page 8-84 and Figure 8-79 on page 8-85.

8-5-6 CWD Replacement

Purpose: This is a description on how to remove and replace the CWD.

8-5-6-1 Tools

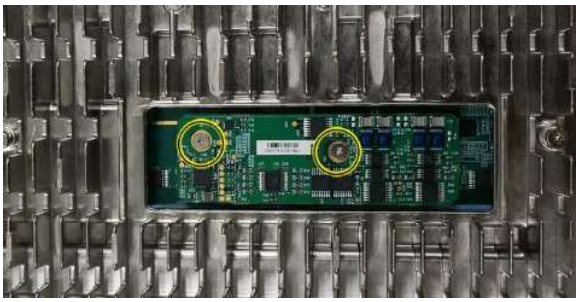
- Common Phillips screwdrivers
- Calibrated Torque tool, 0.4 Nm +/- 5% for M2.5 Phillips screws

8-5-6-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-6-3 Removal Procedure

Table 8-12 Removal Procedure for CWD module

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module from the Ecage, refer to step 2 and step 3 in BEP&CPU Module Replacement on page 8 - 82.	
3.	Unscrew two screws, and then carefully remove the CWD.	
4.	CWD	

8-5-6-4 Mounting Procedure

Install the new parts in the reverse order of removal.

Torque:

M2.5 x 5mm: 0.4 Nm +/- 5%

8-5-7 PSB Module Replacement

Purpose: This is a description on how to remove and replace the PSB Module.

8-5-7-1 Tools

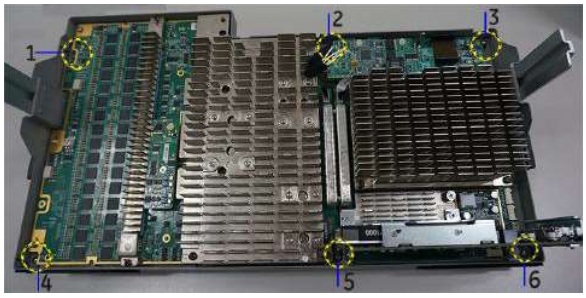
- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

8-5-7-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-7-3 Removal Procedure

Table 8-13 Removal Procedure for PSB Module

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module assy from the Ecage, refer to step 2 and step 3 in BEP&CPU Module Replacement on page 8 - 82.	
3.	Loosen and remove the six screws.	
4.	Carefully remove the PSB Module.	
5.	PSB Module (front side).	

8-5-7-4 Mounting Procedure

Install the new parts in the reverse order of removal.

NOTE: Before tightening the 6 screws, please press the CMST module on the location beside the plastic knob to ensure the connector under the module is connected.

Figure 8-83 Press the CMST module

Torque:

0.6 Nm +/- 5%

8-5-8 ECG Module Replacement

Purpose: This is a description on how to remove and replace the ECG module.

8-5-8-1 Tools

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws
- Calibrated Torque tool, 0.08 Nm +/- 5% for plastic screws

8-5-8-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-8-3 Removal Procedure

Table 8-14 Removal Procedure for ECG module

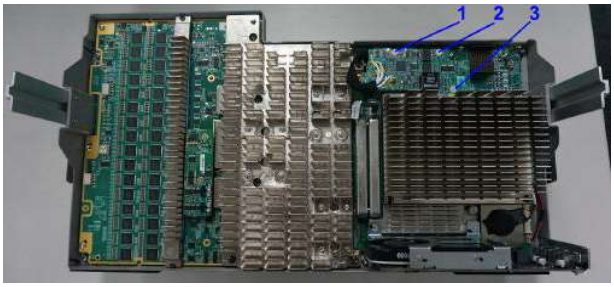
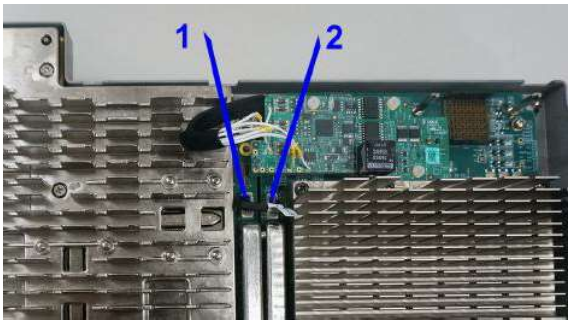
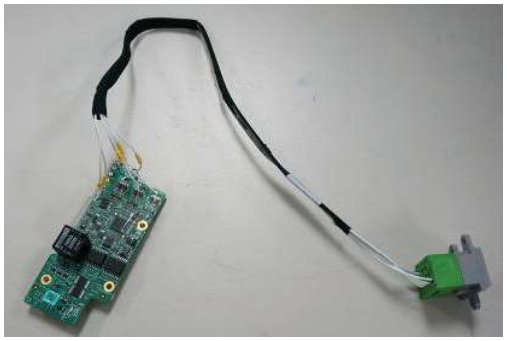
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side.	
2.	Remove the scanning module from the Ecage, refer to step 2 and step 3 in BEP&CPU Module Replacement on page 8 - 82.	
3.	Remove the PSB module from the Ecage, refer to step 3 and step 4 in PSB Module Replacement on page 8 - 94.	
4.	Unfasten the three plastic screws.	
5.	Disconnect one of the connectors (1 or 2).	
6.	Remove the BEP&CPU module assy. refer to step 4 in BEP&CPU Module Replacement on page 8 - 82.	
7.	Loosen and remove the seven screws that fix the ECG module.	
8.	Remove the ECG module.	

Table 8-14 Removal Procedure for ECG module (Cont'd)

No.	Steps	Corresponding Graphic
9.	ECG Module.	

8-5-8-4 Mounting Procedure

Install the new parts in the reverse order of removal.

Torque:

- Seven screws (for ECG Connector and ECG Support): 0.6 Nm +/- 5%
- Three plastic screws: 0.08-0.10 Nm

NOTE: To install the three plastic screws follow the replacement procedure in reverse order, use torque 0.08-0.1 Nm.

NOTE: When you install the PSB module, please press the CMST module on the location beside the plastic knob to ensure the connector under the module is connected.

Figure 8-84 Press the CMST module

8-5-8-4 Mounting Procedure (cont'd)

Installation Details:

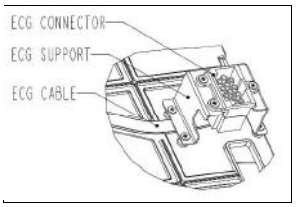
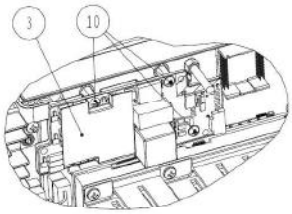


Figure 8-85 Routing of ECG Cable



3 - ECG Module

10 - Plastic Screws

Figure 8-86 ECG mounting details

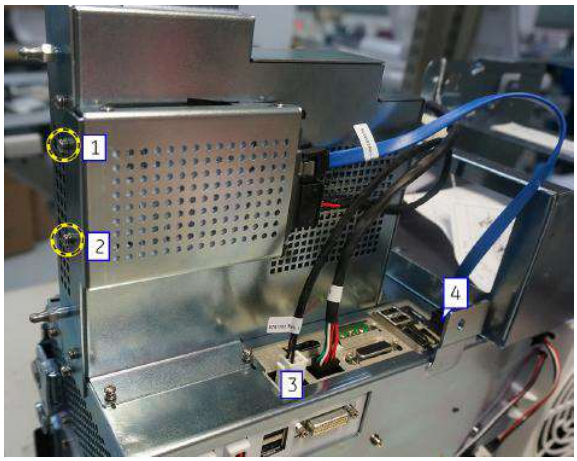
8-5-9 Hard Disk Module Replacement

8-5-9-1 Preparation

- Shut down the system and disconnect the power cord.

8-5-9-2 Removal Procedure

Table 8-15 Removal Procedure for Hard Disk Module

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear.	
2.	Remove the two screws (1 and 2), and disconnect the two cables (3 and 4).	
3.	Carefully remove the Hard Disk Module from the Ecage.	
4.	Hard Disk Module.	

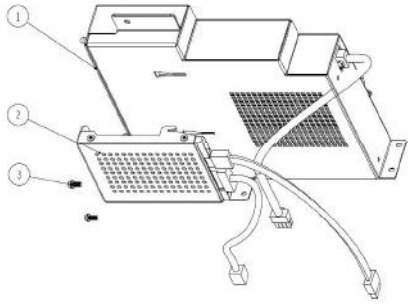
8-5-9-3 Mounting Procedure

Install the new parts in the reverse order of removal.

Torque:

0.6 Nm +/- 5%

Installation Details:



1 - FEPS

2 - Hard Disk Module

3 - Screw M3x6 (2x), 0.6 Nm +/- 5%

Figure 8-87 HDD and FEPS - Exploded view

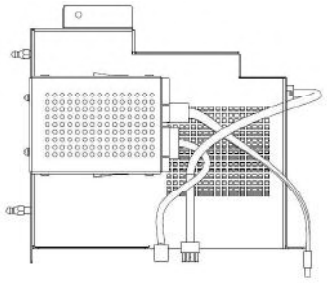


Figure 8-88 Routing of HDD Cables

8-5-10 FEPS Module Replacement

Purpose: This is a description on how to remove and replace the FEPS Module.

Figure 8-89 FEPS module

8-5-10-1 Tools

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws
- Cable tie

8-5-10-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-10-3 Removal Procedure

Table 8-16 Removal Procedure for FEPS Module, sheet 1 of 2

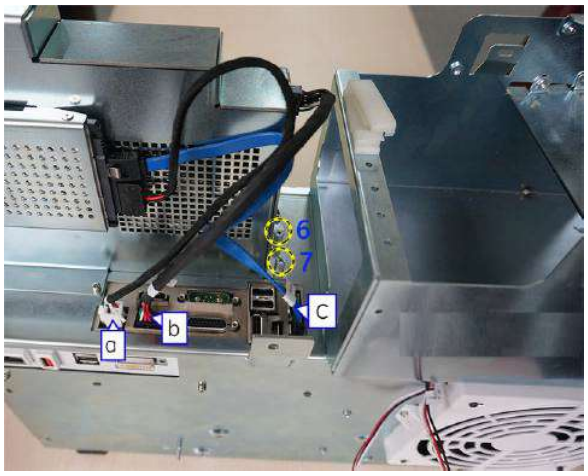
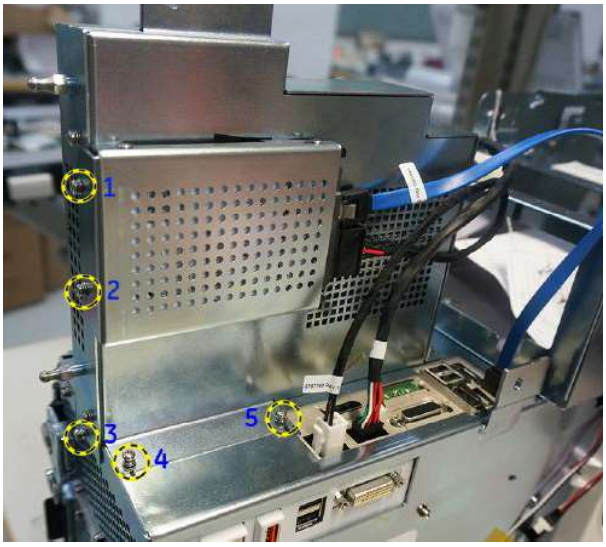
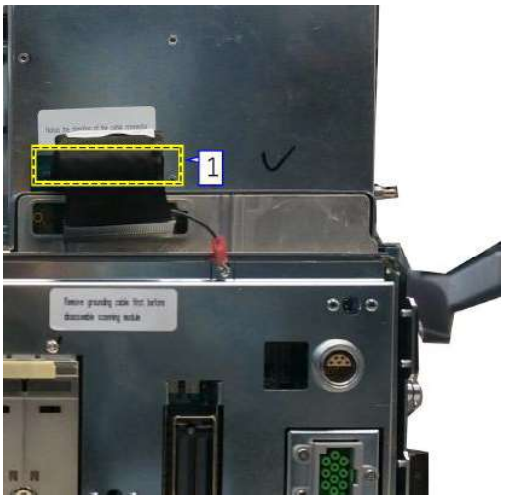
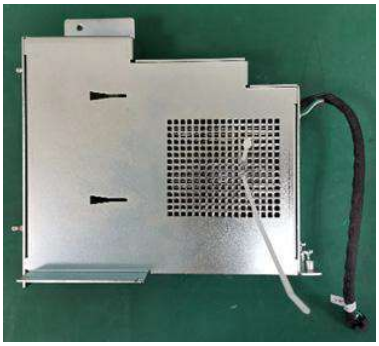
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear.	
2.	a. Remove the two screws (1 and 2 in the lower illustration). b. Disconnect the two cables (a and c). c. Remove the Hard Disk module. For new-designed FEPS module, there is a cable tie on the HDD power cable. Ensure the cable tie is disconnected before you go to step 3.	
3.	Loosen and remove the 5 screws (3~5) and loosen the captive screws (6, 7). Then remove the cable (b).	

Table 8-16 Removal Procedure for FEPS Module, sheet 2 of 2

No.	Steps	Corresponding Graphic
4.	Disconnect the connector.	
5.	Carefully remove the FEPS module.	
6.	FEPS Module.	

8-5-10-4 Mounting Procedure

Install the new parts in the reverse order of removal.

NOTE: After connecting all the cables, please tie the HDD power cable on the grid of the sheet metal.

Torque:

0.6 Nm +/- 5% for Phillips screws.

8-5-11 Fan Module Replacement

Purpose: This is a description on how to remove and replace the Fan Module.

8-5-11-1 Tools

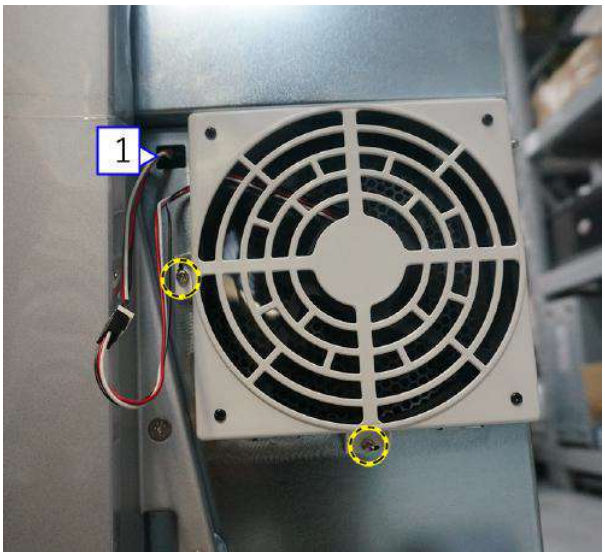
- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

8-5-11-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-11-3 Removal Procedure

Table 8-17 Removal Procedure for Fan ASSY

No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear, right rear.	
2.	Loosen and remove the two screws, and then disconnect the cable (1).	
3.	Fan assy.	

8-5-11-4 Mounting Procedure

Install the new parts in the reverse order of removal.

Torque:

0.6 Nm +/- 5%

8-5-12 BIF Module Replacement

Purpose: This is a description on how to remove and replace the BIF module.

Figure 8-90 BIF module

8-5-12-1 Tools

- Common Phillips screwdrivers
- Calibrated Torque tool, 0.6 Nm +/- 5% for Phillips screws

8-5-12-2 Preparation

- Shut down the system and disconnect the power cord.

8-5-12-3 Needed Manpower

- 1 person, 35 minutes

8-5-12-4 Removal Procedure

Table 8-18 Removal Procedure for BIF module

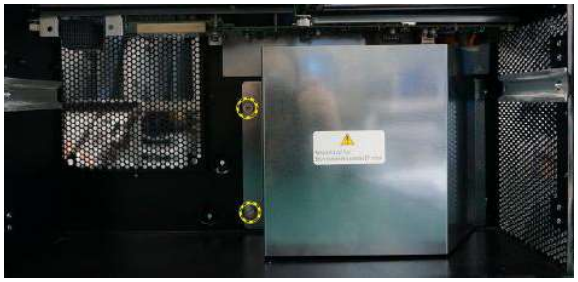
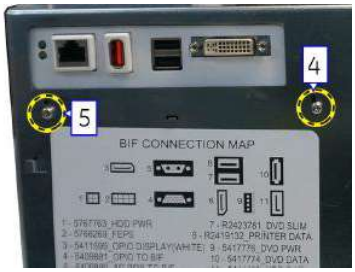
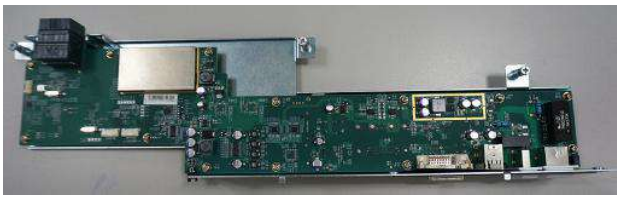
No.	Steps	Corresponding Graphic
1.	Lock the wheels, then remove the body covers: front, left side, right side, left rear, right rear.	
2.	Disconnect the four cables from the internal distribution panel, refer to step 3 in Scanner Electronic Cage (Ecage) Replacement on page 8 - 75.	
3.	Disconnect the three cables (a, b, c) from the internal distribution panel, refer to step 2 and step 3 in FEPS Module Replacement on page 8 - 103.	
4.	Remove the scanning module from the Ecage, refer to step 2 and step 3 in BEP&CPU Module Replacement on page 8 - 82.	
5.	Loosen and remove the two captives screws, then remove the metal board.	
6.	Disconnect the cable (1), refer to step 2 in Fan Module Replacement on page 8 - 106.	
7.	Unscrew the three internal captive screws (1-3), and then remove the two external screws (4-5).	 

Table 8-18 Removal Procedure for BIF module

No.	Steps	Corresponding Graphic
8.	BIF Module.	

8-5-12-5 Mounting Procedure

Install the new parts in the reverse order of removal.

Torque:

0.6 Nm +/- 5%

8-5-13 AC Distribution Box Replacement Procedure

8-5-13-1 Tools

- Phillips screwdriver.
- Driver or BIT # TX-30 for M6 screws
- Calibrated Torque tool, 1.3 Nm +/- 5%, for Phillips screws
- Calibrated Torque tool, 5.8 Nm +/- 5%, for M6 screws (TX-30)
- Loctite 243

8-5-13-2 Preparation

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-5-13-3 AC Distribution Box Removal Procedure

NOTE: The AC Distribution Box is located at the rear of the system - Figure 8-91.

Figure 8-91 AC Distribution Box Located at Rear of System

1.) Remove the AC Distribution Box cover, then the battery:

8-5-13-3 AC Distribution Box Removal Procedure (cont'd)

2.) Disconnect the "AC Unit to BIF Cable" (5409880) from the AC Box by squeezing the plastic retainer clips inwards as shown in on the left and pull the connector outwards.

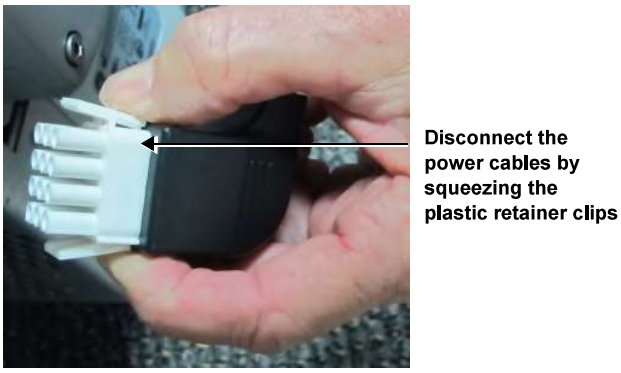


Figure 8-92 Plastic Securing Clips on Power Cables

3.) Disconnect "Peripheral Power Output Cable" (5409882) from the AC Box.

4.) Disconnect "AC Box to Base GND Copper Strap" (5508405) from the AC Box.

Keep the M6 bolt and washers for use during the replacement of the AC Distribution Box.

5.) To remove the AC Box, unscrew the two supporting screws (shown in Figure 8-93 below).

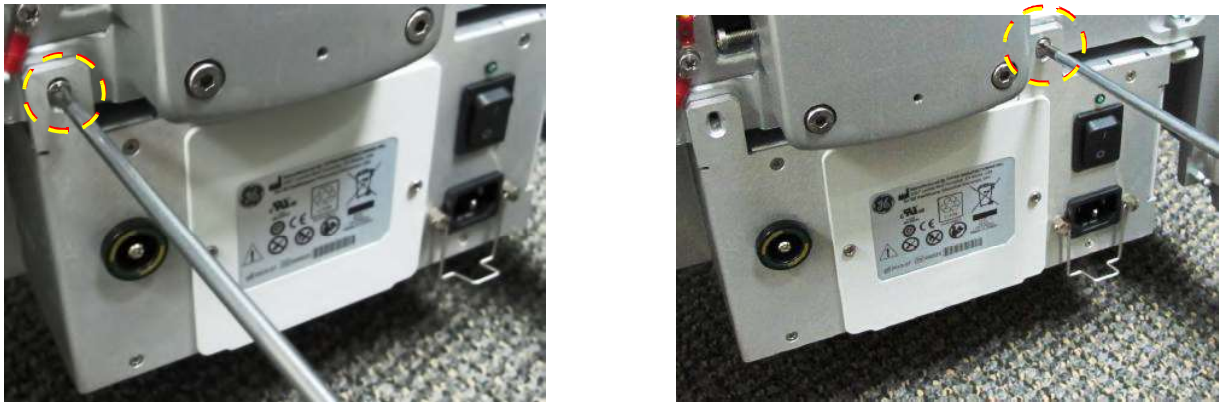


Figure 8-93 AC Box Supporting Screws

8-5-13-3 AC Distribution Box Removal Procedure (cont'd)

6.) Pull (slide) the AC Box all the way out until it is completely removed from the system as shown in Figure 8-94 below.

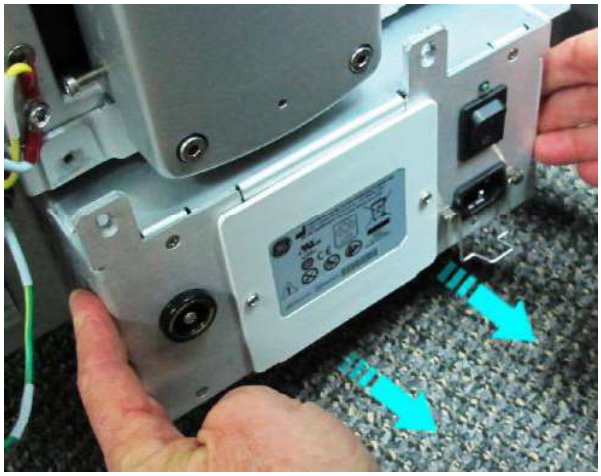


Figure 8-94 Removing the AC Distribution Box

8-5-13-4 AC Distribution Box Installation Procedure

1.) Slide the (new) AC Distribution Box on to the base console rails from the back side of on the system.
2.) Install and tighten the screws. (Tightening torque: 1.3 Nm +/- 5%.)
3.) Install the cables as described below the illustration.

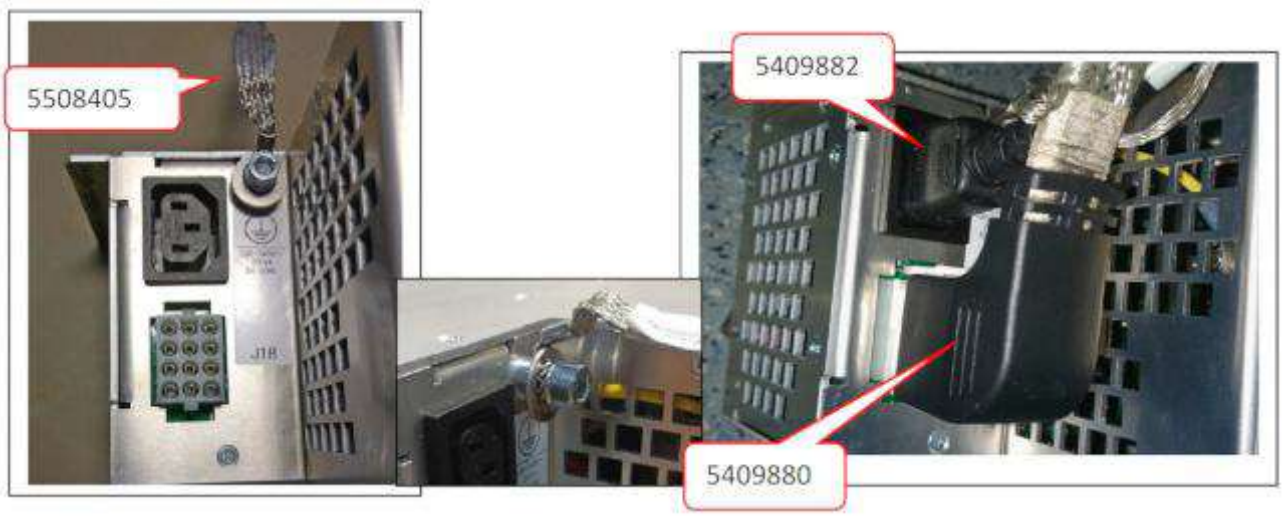


Figure 8-95 Install the cables to the AC Distribution Box

a.) Connect "Base to Column GND Copper Strap" (5508405) using M6 screw, serrated and flat washers to the base. (Torque 5.8 Nm.)

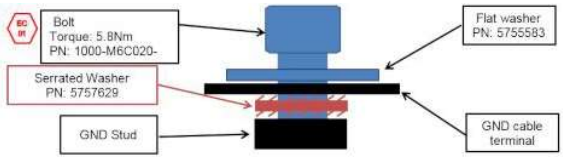


Figure 8-96 M6 screw with GND strap and washers

b.) Connect "Peripheral Power Output Cable" (5409882) to the AC Box.
c.) Connect the "AC Unit to BIF Cable" (5409880) to the AC Box.

4.) Install the Battery, then refit the AC Distribution Box cover.

5) If installed: Install the DVD/CD-RW drive.

Section 8-6
Mechanical Platform Components - Replacement Procedures

8-6-1 Touch Screen Chassis Replacement Procedure

NOTE: The Touch Screen Chassis complete with brackets are shown in Figure 8-97.

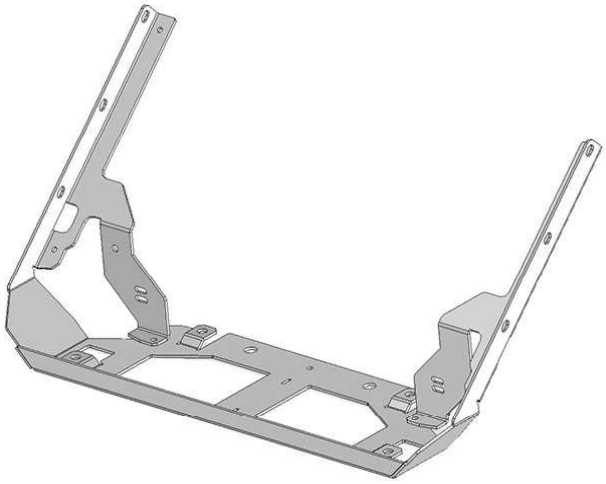


Figure 8-97 Touch Screen Chassis

8-6-1-1 Tools

Phillips screwdriver.

8-6-1-2 Preparation

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-6-1-3 Touch Screen Chassis Removal Procedure

1.) Remove the Touch Screen:

2) Unscrew and remove the two securing screws fastening the chassis to the top of the keyboard assembly - shown in Figure 8-98.

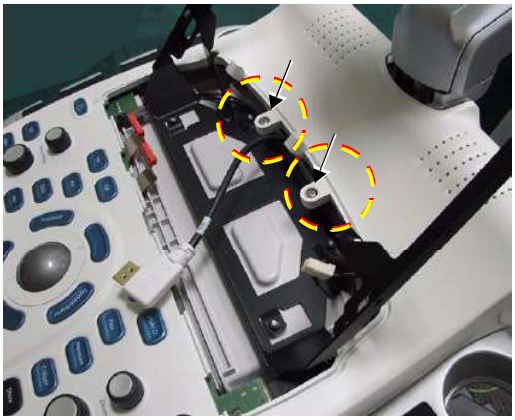


Figure 8-98 Removing Securing Screws

3.) Cut the cable securing tie-wraps.

4.) Remove the Operating Panel Keyboard Assembly.

5.) From the bottom of the keyboard assembly, unscrew the four screws shown in Figure 8-99.

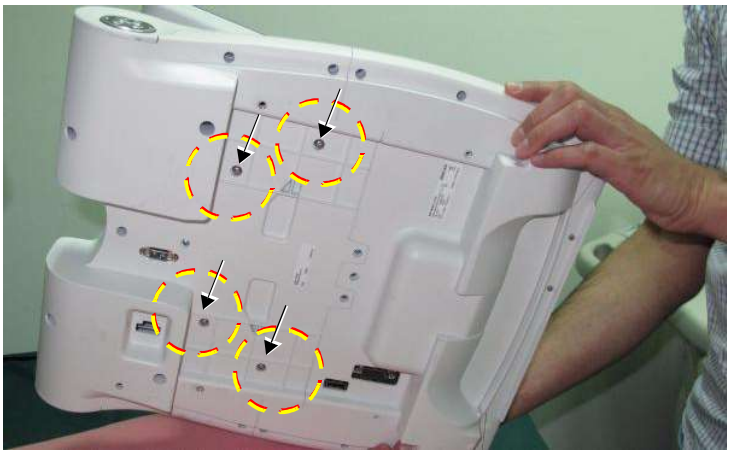


Figure 8-99 Four Screws Securing the Touch Screen Chassis

6.) From the top of the keyboard assembly, carefully slide the Touch Screen Chassis Panel out from beneath the two screw plastic flanges (shown in Figure 8-98) and lift the chassis upwards to release it from its location.

8-6-1-4 Touch Screen Chassis Installation Procedure

1.) Using the replacement Touch Screen Chassis, perform the procedures previously described in reverse sequence.

2.) Secure cables with new tie wraps.

3.) Turn ON power to the Vivid S60N/Vivid S70N ultrasound scanner.

8-6-2 LCD Arm Alton 21.5in Wide Replacement Procedure

8-6-2-1 Tools

- Flat type screwdrivers
- Phillips type screwdrivers
- Side cutting pliers
- 5 mm Hex key (or driver)
- Calibrated Torque tool, 0.35 Nm +/- 5% for M3 Phillips screws
- Calibrated Torque tool, 1.3 Nm +/- 5% for M3 Phillips screws
- Calibrated Torque tool, 5.8 Nm +/- 5%, for M6 Hex screws (5 mm Hex)

8-6-2-2 Preparation

1.) Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

2.) Remove the 21.5in Monitor as described in Remove the 21.5 inch Monitor on page 8 - 35.

8-6-2-3 LCD Arm Alton 21.5in Wide Monitor Removal Procedure

1.) Remove the two screws then remove the two Upper Service Covers, one on each side of the upper part of the LCD Arm.

Figure 8-100 Remove the screw and the Upper Service Cover (one side illustrated)

2.) Remove the Vertical Service Cover. It is clipped on, so it can be removed by applying some force.

8-6-2-3 LCD Arm Alton 21.5in Wide Monitor Removal Procedure (cont'd)

Figure 8-101 Remove the Vertical Service Cover

3.) Remove the screw and the Lower Service Cover.

Figure 8-102 Remove the Lower Service Cover

4.) Using side cutting pliers, cut the following tie-wraps:

- three tie-wraps in the monitor end of the monitor cable
- two tie-wraps on each side of the Upper Arm
- two tie-wraps on each side of the Lower Arm

8-6-2-3 LCD Arm Alton 21.5in Wide Monitor Removal Procedure (cont'd)

5.) Remove the cables from the Arm.

Figure 8-103 Remove cables

Lift the Arm a little, as illustrated below to ease the removing of the cables from the base of the Arm.

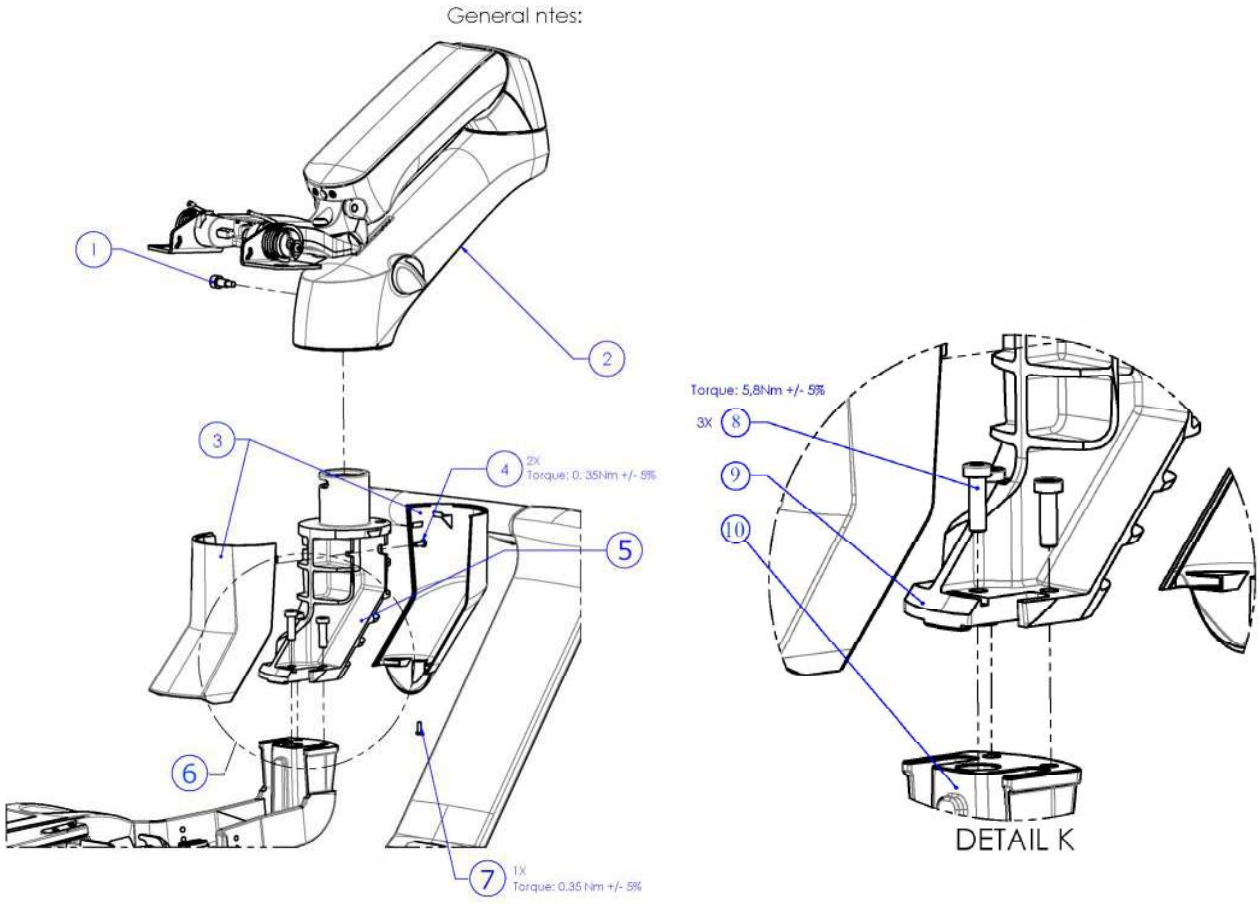
Figure 8-104 Lift the Arm

6.) Remove the Arm.

8-6-2-4 LCD Arm Alton 21.5in Wide Monitor Installation Procedure

- Install the Arm by performing the LCD Arm Alton 21.5in Wide Monitor Removal Procedure on page 8 - 118 in reverse sequence.

Torque: See illustration below:



1 - Arm Mounting Screw, 1x (Torque 5.8NM +/- 5%)

2 - LCD Arm Alton 21.5in Wide

3 - Riser Covers

4 - Riser Front Cover Mounting Screw, 2x (Torque 0.35 Nm +/- 5%)

5 - LCD Arm Riser Alton

6 - See: 'DETAIL K' (above to the right)

7 - Riser Rear Cover Mounting Screw, 1x (Torque 0.35 Nm +/- 5%)

8 - Hex Screw, M6X20mm, 3x (Torque 5.8NM +/- 5%)

9 - LCD Arm Riser Alton

10 - Base Console

Figure 8-105 LCD Arm Riser and Arm Exploded view

8-6-3 LCD Arm Riser for 21.5 inch monitor replacement procedure

Figure 8-106 LCD Arm Riser for 21.5 inch monitor

8-6-3-1 Tools

- Phillips type screwdrivers
- Side cutting pliers
- 5 mm Hex key (or driver)
- Calibrated Torque tool, 0.35 Nm +/- 5% for M3 Phillips screws
- Calibrated Torque tool, 5 mm Hex, 5.8 Nm +/- 5%, for M6 Hex screws

8-6-3-2 Preparations

1.) Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.
2.) Remove the **21.5in Monitor** as described in Remove the 21.5 inch Monitor on page 8 - 35.
3.) Unscrew and remove the **three fastening screws** used for the covers. See the illustration below.
4.) Remove the **two covers** from the LCD Arm Riser. See the illustration below.

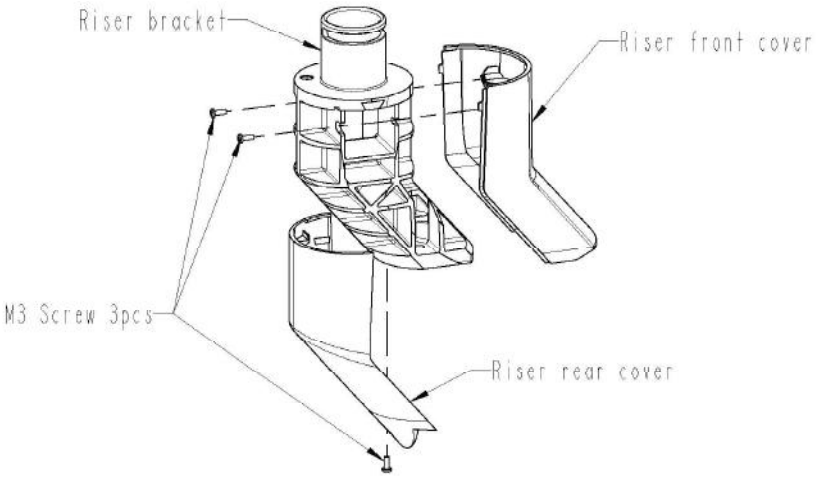


Figure 8-107 Remove the covers from the LCD Arm Riser

5.) Remove the **LCD Arm Alton 21.5in Wide** as described in LCD Arm Alton 21.5in Wide Monitor Removal Procedure on page 8 - 118.

8-6-3-3 Removing the LCD Arm Riser

1.) Remove **the cables** one by one.
2.) Unscrew **three screws** and remove the **LCD Arm Riser**.

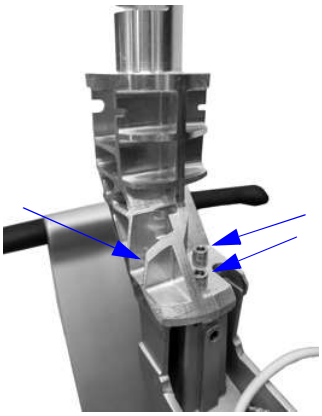


Figure 8-108 Unscrew three screws and remove the LCD Arm Riser

8-6-3-4 Install the LCD Arm Riser

Install the **LCD Arm Riser** by performing Removing the LCD Arm Riser on page 8 - 123 in reverse sequence.

Torque:

- The tree M5 screws for the LCD Arm Riser shall be tightened with Torque: 5.8 Nm +/- 5%.
- The tree M3 screws for the two covers shall be tightened with Torque: 0.35 Nm +/- 5%.

8-6-4 Swivel and Up-Down Handle Replacement Procedure

8-6-4-1 Preparation

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-6-4-2 Swivel and Up-Down Handle Removal Procedure

1) Remove the Operating Panel as described in the Operating Panel Keyboard Assembly Removal Procedure on page 8 - 50.

2) Remove the Probe Shelf as described in the Probe Shelf Removal Procedure on page 8 - 160.

3.) Unscrew the handle shaft support. Rotate it upwards 90 degrees to remove the support by sliding it to the left or right side.

Figure 8-109 Protective Metal Plate Rotated 90 Degrees

8-6-4-2 Swivel and Up-Down Handle Removal Procedure (cont'd)

4.) Unscrew the cable clip securing the up-down and swivel cables.

Figure 8-110 Unscrew cable clip

8-6-4-2 Swivel and Up-Down Handle Removal Procedure (cont'd)

5.) Remove the spring clips securing the particular handle to be removed.

Figure 8-111 Remove spring clips

8-6-4-2 Swivel and Up-Down Handle Removal Procedure (cont'd)

6.) Release the small spring hook that presses on the handle to be replaced.

Figure 8-112 Release small spring hook

8-6-4-2 Swivel and Up-Down Handle Removal Procedure (cont'd)

7.) Unscrew the screw securing the handle shaft and pull out the shaft.

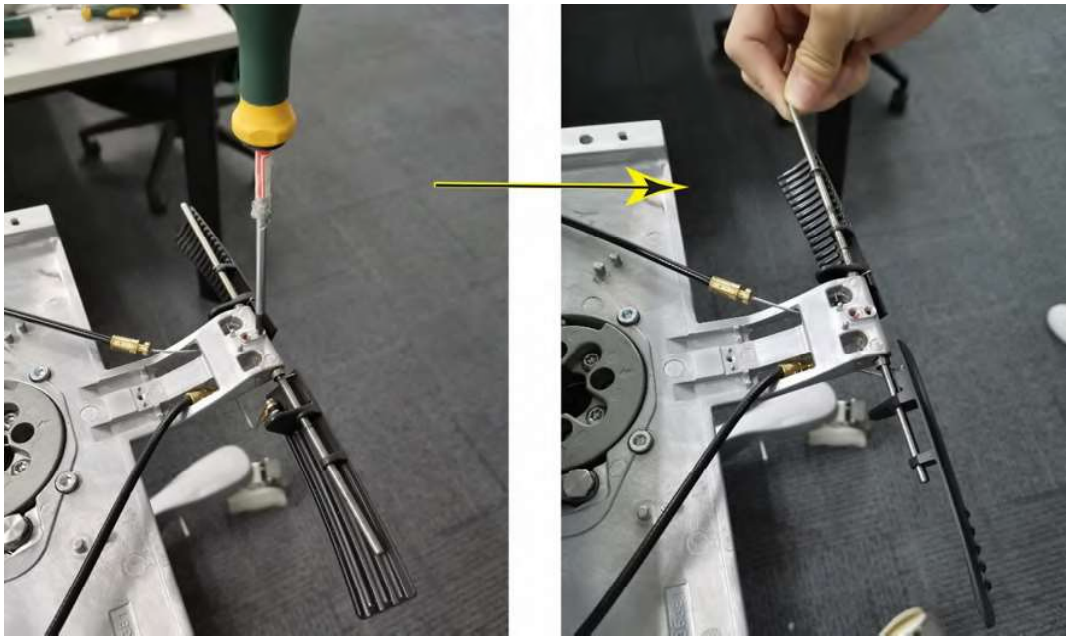


Figure 8-113 Unscrew screw and pull out shaft

8.) Use a plier to stabilize the nut and unscrew the screw to disconnect the handle with the cable.

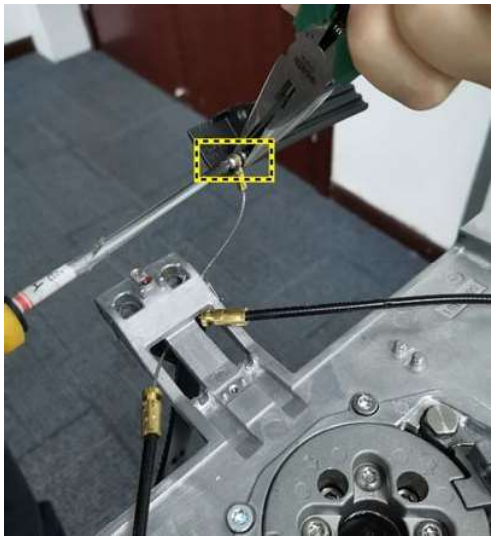


Figure 8-114 Disconnect handle with cable

8-6-4-2 Swivel and Up-Down Handle Removal Procedure (cont'd)

9.) Unscrew the bracket to remove the swivel cable.

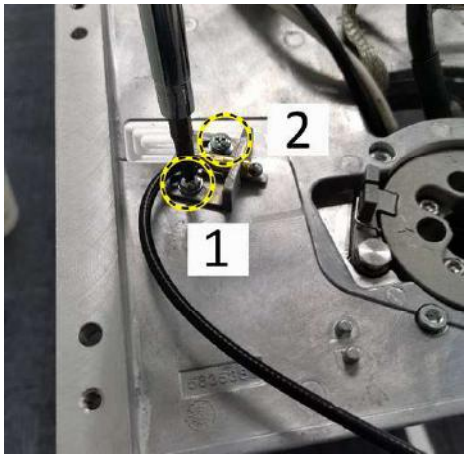


Figure 8-115 Remove swivel cable

10.) Unscrew the two screws to remove the harness bracket.

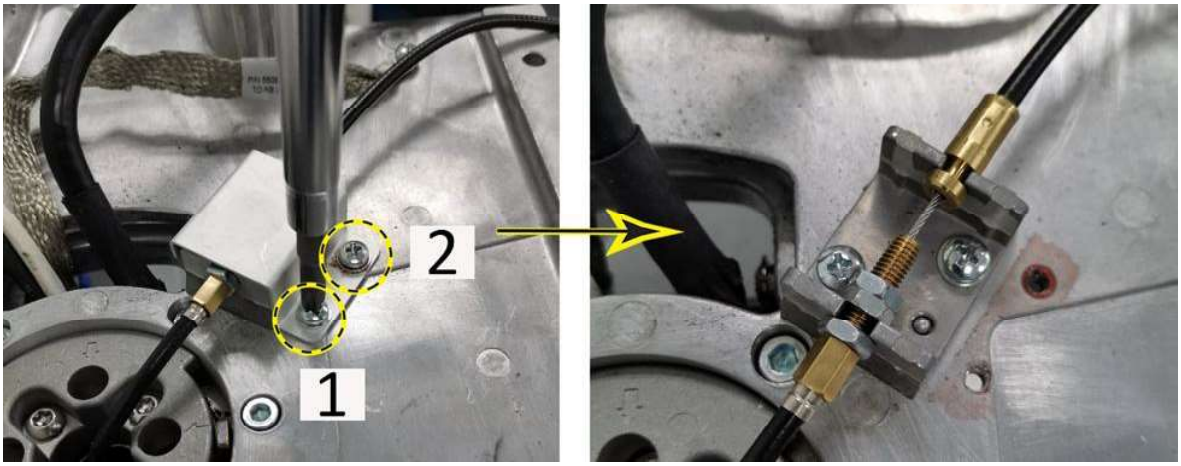


Figure 8-116 Remove harness bracket

8-6-4-2 Swivel and Up-Down Handle Removal Procedure (cont'd)

11.) Using a plier to stabilize the nut 3 and loosen the nut 1 and nut 2 in sequence to pull the cable out.

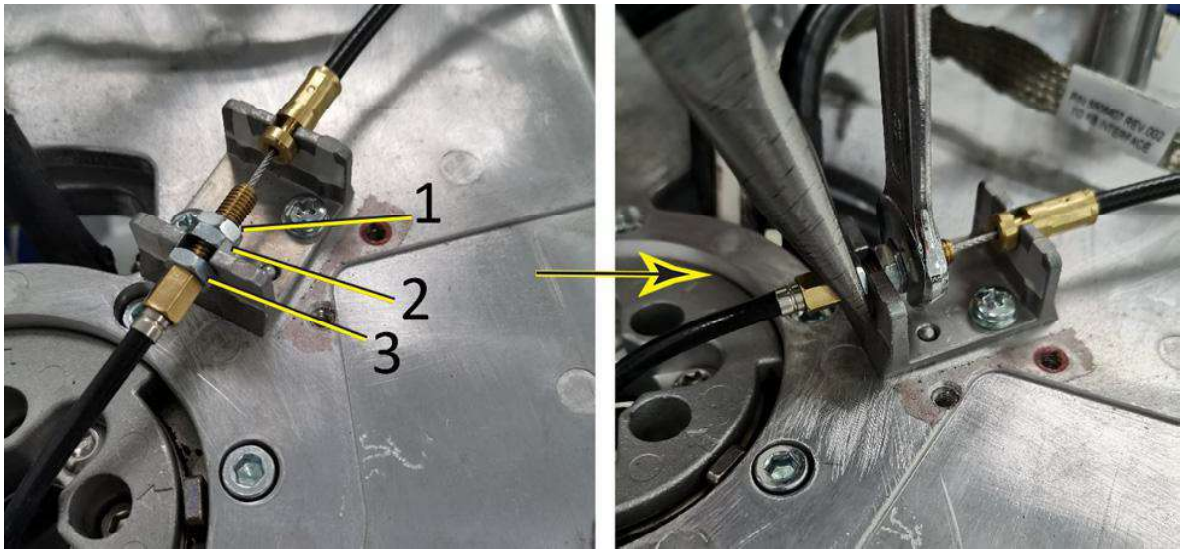


Figure 8-117 Losen nut 1 and nut 2 in sequence to pull the cable out

12.) Unscrew the screw from one side of the up-down arm and push the pin out from where the screw is unscrewed.

Figure 8-118 Unscrew screw

8-6-4-2 Swivel and Up-Down Handle Removal Procedure (cont'd)

NOTE: It is recommended to keep the up-down arm on the horizontal level to ensure easy pull-out of the pin.

13.) Lay down lower arm and unscrew the screw at the center.

Figure 8-119 Remove screw from center

14.) Remove the black screw covers at both sides and push out the pin from the place where the covers are removed.

Figure 8-120 Remove screw covers and push out pins

8-6-4-2 Swivel and Up-Down Handle Removal Procedure (cont'd)

15.) Use a flat screwdriver to get out the cable. Then the up-down cable can be pulled out from the system.

Figure 8-121 Remove up-down cable

8-6-4-3 Swivel and Up-Down Handle Installation Procedure

1.) Install the appropriate handle on the support shaft.

2.) Return spring/s and securing clip/s to secure the handle/s.

NOTE: When installing the cable, please ensure that the copper head shoulder is solidly located in the slot. Otherwise the up-down mechanism will be disabled.

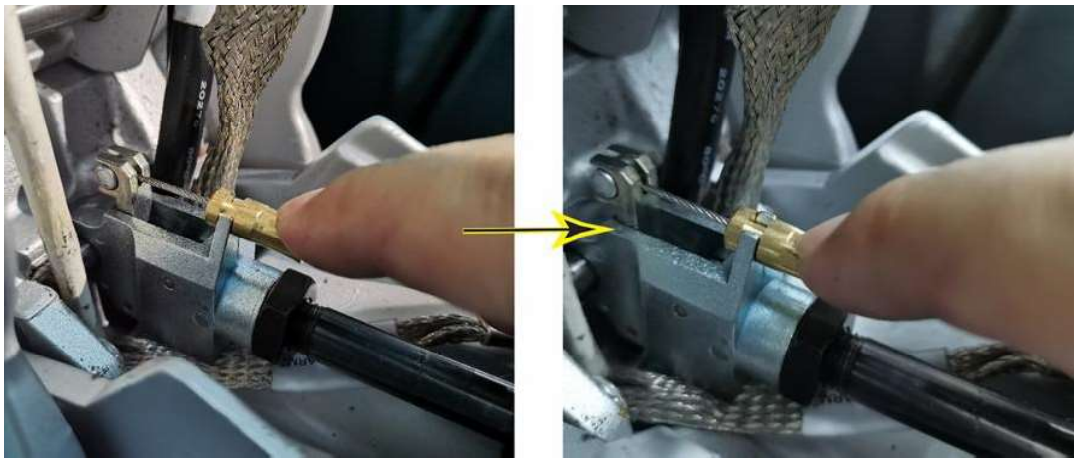


Figure 8-122 Ensure that copper head shoulder is located in the slot.

3.) Return the protective metal plate and secure it with the retaining screw (previously removed).

4) Install the Probe Shelf as described in the Probe Shelf Installation Procedure on page 8 - 160.

5.) Install the Operating Panel as described in the Operating Panel Keyboard Assembly Installation Procedure on page 8 - 53.

6) Lower the console to the *maximum down* position.

7.) Turn ON power to the system.

8-6-5 KB Base Interface ASSY Replacement

The “KB Base Interface ASSY” is also known as the “Mechanical Assembly Interface Base for the Operating Panel”.

8-6-5-1 Preparation

1.) Power down the ultrasound system as described in 4-2-2-2 "Power Shut Down" on page 4-8.

2.) Disconnect and remove all probes and external cables.

8-6-5-2 Mechanical Assembly Interface Base for the Operating Panel Removal Procedure

1.) Remove the monitor.

- For 21.5” monitor, refer to: 8-3-1 "21.5" Monitor Replacement Procedure" on page 8-35

2.) Remove the Operating Panel as described in the Operating Panel Keyboard Assembly Removal Procedure on page 8 - 50.

3) Remove the Probe Shelf as described in the Probe Shelf Removal Procedure on page 8 - 160.

4.) Disconnect the Ground lead.

8-6-5-2 Mechanical Assembly Interface Base for the Operating Panel Removal Procedure (cont'd)

5.) Unscrew the handle shaft support. Rotate it upwards 90 degrees to remove the support by sliding it to the left or right side.

Figure 8-123 Protective Metal Plate Rotated 90 Degrees

8-6-5-2 Mechanical Assembly Interface Base for the Operating Panel Removal Procedure (cont'd)

6.) Unscrew the cable clip securing the up-down and swivel cables.

Figure 8-124 Unscrew cable clip

7.) Use a plier to stabilize the shaft and unscrew the cable by a screwdriver.

Figure 8-125 Stabilize the shaft and unscrew the cable

8-6-5-2 Mechanical Assembly Interface Base for the Operating Panel Removal Procedure (cont'd)

8.) Unscrew the two screws to remove the harness bracket.

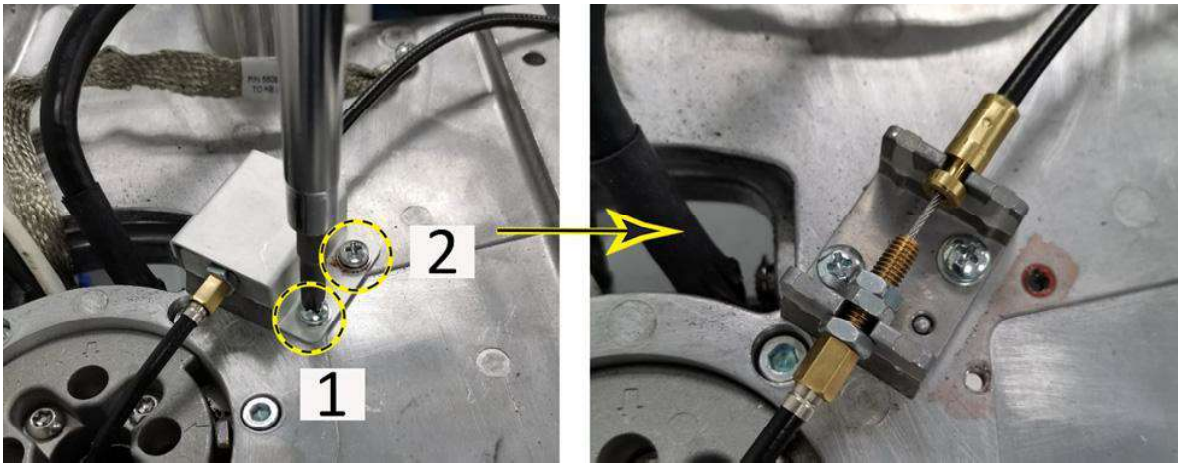


Figure 8-126 Remove harness bracket

9.) Using a plier to stabilize the nut 3 and loosen the nut 1 and nut 2 in sequence to pull the cable out.

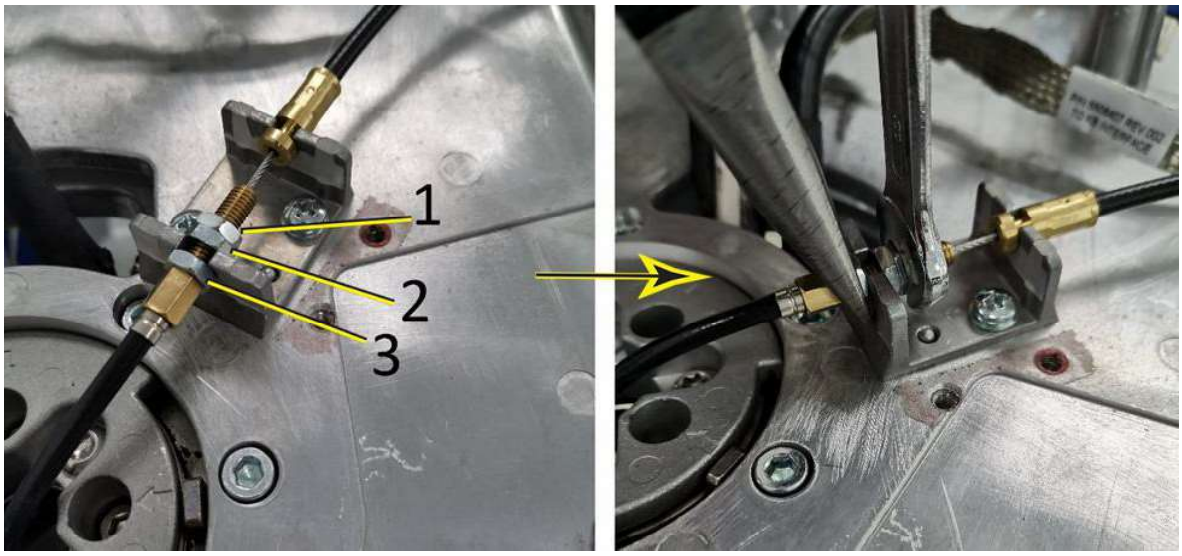


Figure 8-127 Losen nut 1 and nut 2 in sequence to pull the cable out

8-6-5-2 Mechanical Assembly Interface Base for the Operating Panel Removal Procedure (cont'd)

10.) Rotate the hook until you can get the steel ball out using another hand.

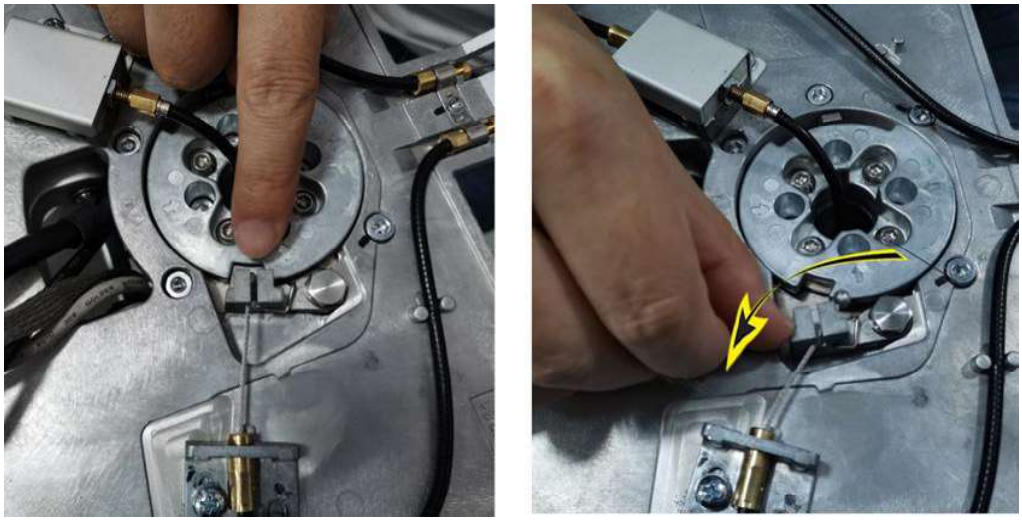


Figure 8-128 Remove the steel ball

11.) Unscrew the 4 screws and then the KB Base Interface Assy can be removed.

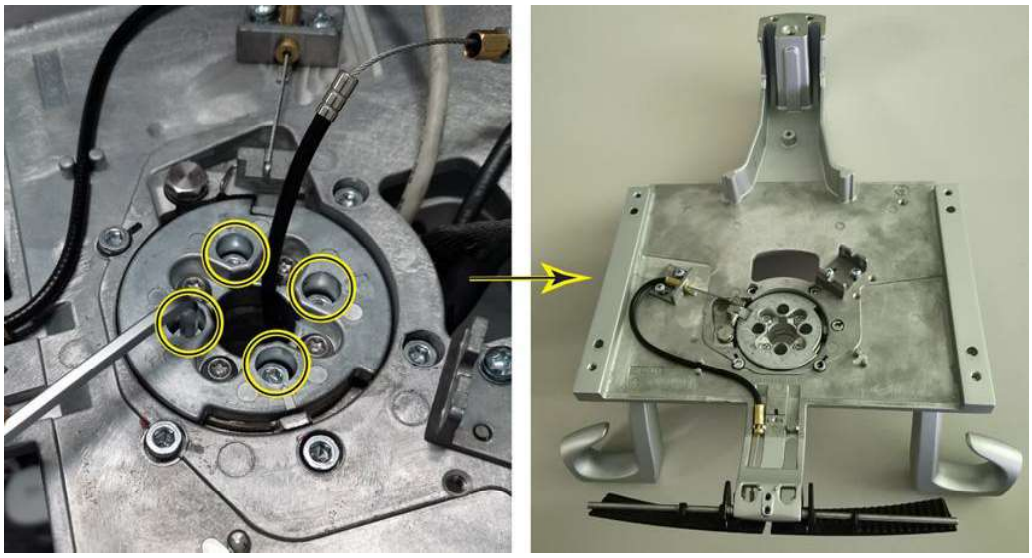


Figure 8-129 Unscrew screws - remove KB Base Interface Assy

8-6-5-3 Mechanical Assembly Interface Base for the Operating Panel Installation Procedure

Perform the steps described in the removal procedure, in the reverse order.

8-6-6 Rear Handle Replacement Procedure

NOTE: When replacing a rear handle, make sure the rear handle kit has been ordered, the contents of which are listed in Table 8-19, below.

Table 8-19 Rear Handle Kit - PN S2424091

P/N	Description	Quantity
5392679	HANDLE LEFT	1
5392680	HANDLE RIGHT	1
1041-M4C006-37	Hexagon Socket Set Screws with Flat Point, ISO 4026, M4-0.7, X6mm Long, A2-21H Stainless Steel, Passivate, RoHS Fastener	2

8-6-6-1 Tools

Hex key 2mm

8-6-6-2 Preparation

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-6-6-3 Rear Handle Removal Procedure

NOTE: The rear handles are secured to the aluminum bars with a mounting screw and a small amount of glue. The screw is first released, then a twisting of the handles is required to release the glue before sliding the handle off the aluminum bar. See the instructions below.

1.) Using the Socket Set Screw Flat Point, loosen and remove the mounting screw from one of the rear handle.

2.) Gently twist the handle to release the glue, then remove the handle from the aluminum bar.

3.) Repeat step 1 and step 2 to remove the second handle.

8-6-6-4 Rear Handle Installation Procedure

1.) Identify the left and right handle before starting the procedure.

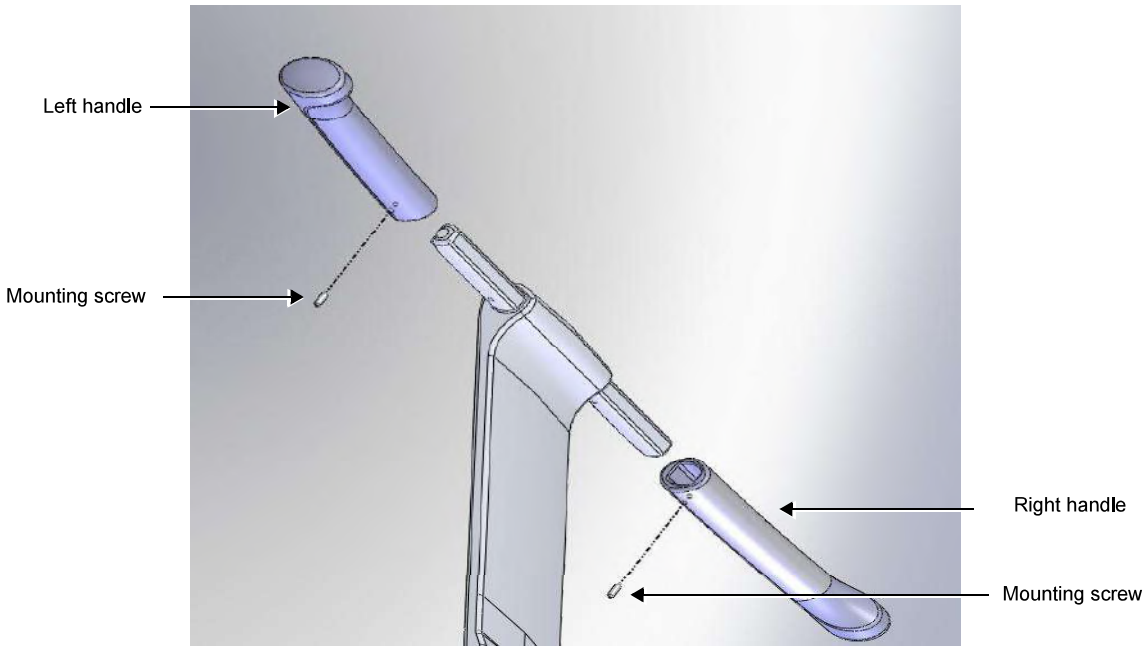


Figure 8-130 Exploded View Showing Rear Handles

2.) Slide the left handle onto the aluminum support bar and then secure it by replacing the mounting screw (previously removed).

3.) Repeat step 2 to install the right handle.

8-6-7 Upper Arm Replacement Procedure

8-6-7-1 Upper Arm Removal Procedure

1) If the rear tray is attached to the system, remove it before starting the procedure.
2) Remove the Monitor.
3) Remove the Keyboard Interface Assembly.
4.) Remove the Lower Arm Assembly.
5.) Remove the Joint Assembly.
6.) Remove the Gas Spring.
7.) Remove the cables from the Upper Arm.
8.) Release the locking screw securing the Upper Arm support pin.

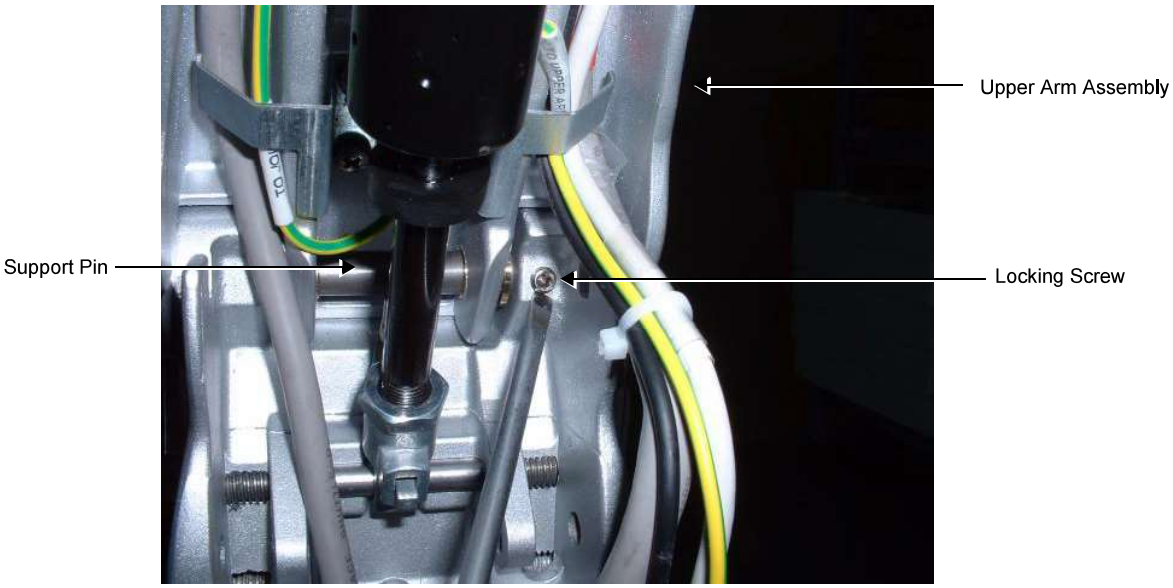


Figure 8-131 Locking Screw Securing Support Pin on Lower Section of Upper Arm

8-6-7-1 Upper Arm Removal Procedure (cont'd)

9.) Using a screwdriver, tap out the support pin - Figure 8-132 on page 8-143.

Figure 8-132 Tapping Out the Upper Arm Support Pin

10.)Remove the Upper Arm.

8-6-7-2 Upper Arm Installation Procedure

NOTE: Before installing the Upper Arm, care must be taken when restoring the cables to the Upper Arm assembly. The cables must protrude on either side of the Upper Arm in a specified manner as described below.

1.) Prepare the required cable lengths for installation in the Upper Arm, as described above.

2.) Install the cables in the Upper arm securing them with the appropriate cable holders and clips - see Figure 8-133.

Figure 8-133 Positioning of Cable in Upper Arm

3.) Position the upper Arm in its location on the central column and insert the supporting pin.

4.) Secure the supporting pin with the locking screw.

5.) Install the Gas Spring.

6.) Install the Joint Assembly.

7.) Install the Lower Arm Assembly.

8) Install the Keyboard Interface Assembly.

9.) Install the Monitor.

10.) Install the Rear Tray, if applicable.

11) Lower the console to the *maximum down* position.

12.) Turn ON power to the system.

8-6-8 Lower Arm Replacement Procedure

8-6-8-1 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-6-8-2 Lower Arm Removal Procedure

1) Working from the front of the system, raise the console to the *maximum up* position.
2) Make sure that the console is *aligned* in the central position (not pulled to one side or the other).
3.) Loosen and remove the screw that is located at the base of the Operating Panel (below the keyboard), as shown in Figure 8-134 below.

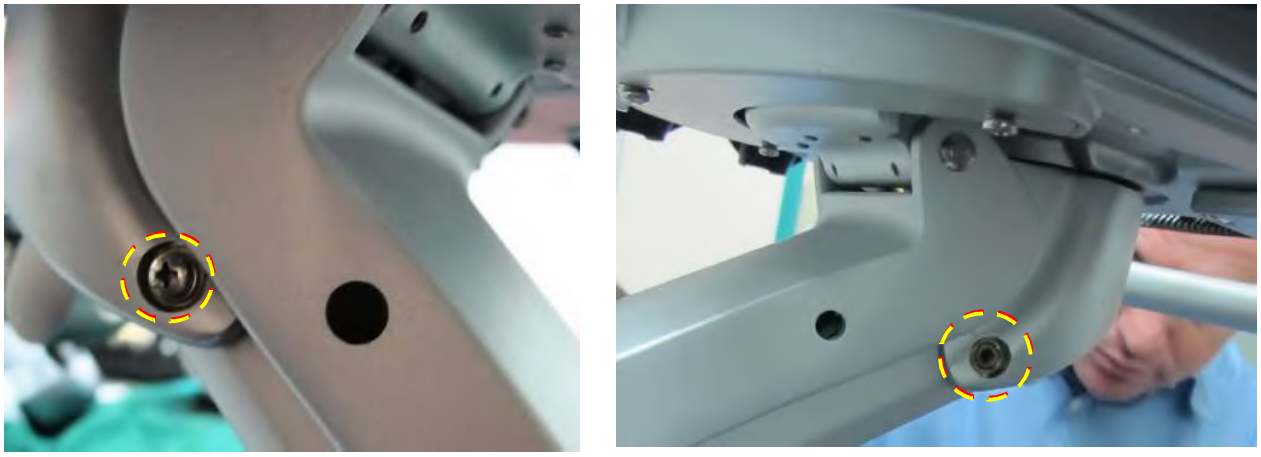


Figure 8-134 Removing Screw on Left Side of Lower Arm

8-6-8-2 Lower Arm Removal Procedure (cont'd)

4.) Using a punch and light hammer, tap out the center pin located below the base of the Operating Panel and remove completely releasing upper section of the lower arm - Figure 8-135.

Figure 8-135 Remove Securing Pin

5.) Supporting the OPIO platform, place some protective sponge on the system's handle and gently lower the platform down onto the handle - see Figure 8-136 on page 8-146.

Figure 8-136 Protective Sponge Between Articulated Arm and System Handle

8-6-8-2 Lower Arm Removal Procedure (cont'd)

6.) Lower the Lower Arm as shown in Figure 8-137 below.

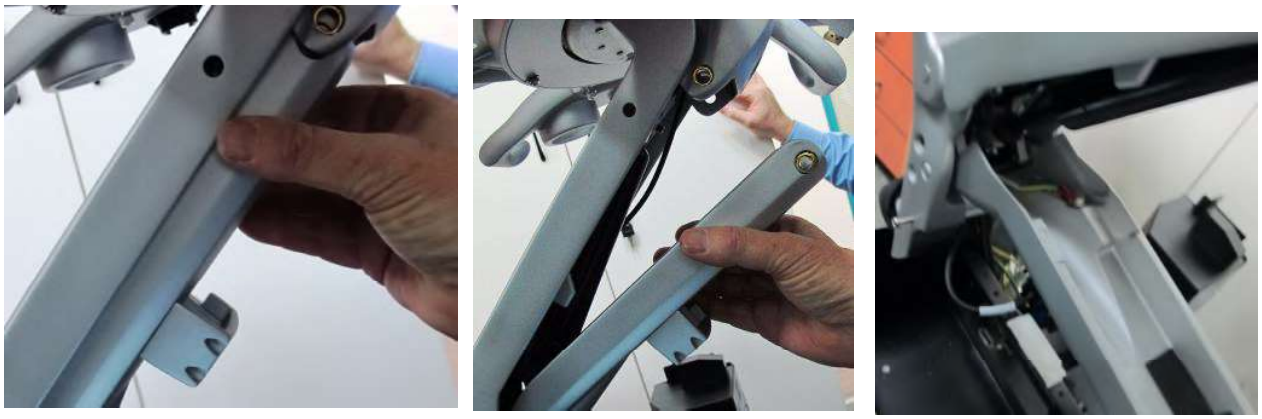


Figure 8-137 Upper Section of Lower Arm

7) Remove the cir-clips on either side of the lower arm.

Figure 8-138 Removing Left Securing Clip from Securing Pin

8) Using a screwdriver, tap out the first securing pin and support the lower arm with the screwdriver in place of the pin.

9.) Remove the second securing pin and similarly support the other side of the lower arm with a screwdriver.

8-6-8-2 Lower Arm Removal Procedure (cont'd)

10.) While supporting the Lower Arm with one hand, use a Phillips screwdriver to disconnect the Ground lead - Figure 8-139.

Figure 8-139 Removing Securing Pin and Disconnecting Ground Lead

11) Remove the Lower Arm from the system, as shown in Figure 8-140.

Figure 8-140 Removing the Lower Arm

8-6-8-3 Lower Arm Installation Procedure

1) Working from the front of the system, return a new Lower Arm to the appropriate position as shown in Figure 8-140 on page 8-148.

2.) While supporting the Lower Arm with one hand, connect the Ground lead.

3) Return and fasten the Lower Arm securing pin (previously removed) on the *right* side of the lower arm - Figure 8-139 on page 8-148.

4) Return and fasten the Lower Arm securing pin (previously removed) on the *left* side of the Lower Arm - Figure 8-139 on page 8-148.

5) Lower the console and raise the Lower Arm to insert the upper support pin previously removed - Figure 8-141.

Figure 8-141 Raising Lower Arm to Reconnect with Upper Arm (Console not shown)

6.) While moving the console slightly up and down with one hand, insert the securing pin (previously removed) - refer to Figure 8-137 "Upper Section of Lower Arm" on page 8-147.

7.) Return and fasten the screws (previously removed from the base of the Operating Panel - below the keyboard, as shown in Figure 8-134 "Removing Screw on Left Side of Lower Arm" on page 8-145).

8) Make sure that the console is *aligned* in the central position (not pulled to one side or the other).

9) Lower the console to the *maximum down* position.

10.) Turn ON power to the system.

8-6-9 Joint Assembly Replacement Procedure

8-6-9-1 Preparation

Power down the ultrasound system.

8-6-9-2 Joint Assembly Removal Procedure

1) Remove the Monitor.
2.) Remove the Keyboard Assembly.
3) Remove the Probe shelf.
4.) Remove the Lower Arm.
5.) Remove the Keyboard Assembly.
6.) Remove the KB Base Interface Assy.
7.) Unscrew the screw from one side of the up-down arm and push the pin out from where the screw is unscrewed.

Figure 8-142 Unscrew the screw from one side

NOTE: It is recommended to keep the up-down arm on the horizontal level to ensure easy pull-out of the pin.

8.) Disconnect the Ground lead.

8-6-9-2 Joint Assembly Removal Procedure (cont'd)

9.) Release the two locking screws that secure the two Joint Assembly supporting pins.

Figure 8-143 Locking Screws Securing the Joint Assembly Supporting Pins

10.) Release the ring clips securing the supporting pins.

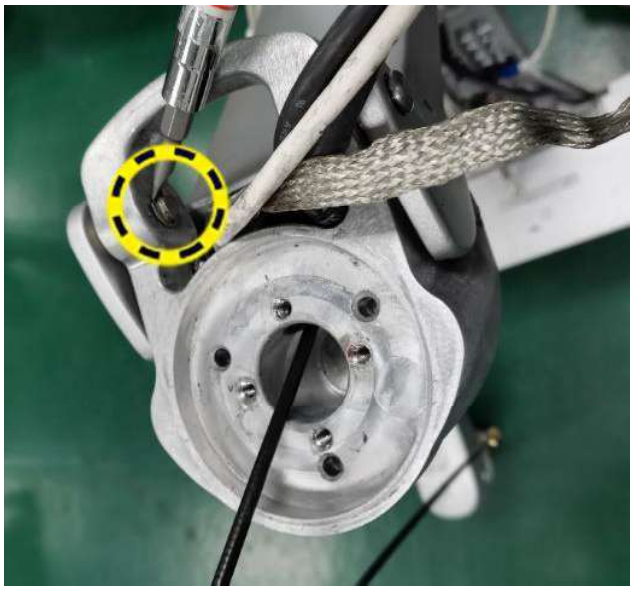


Figure 8-144 Ring Clips Securing Supporting Pins

8-6-9-2 Joint Assembly Removal Procedure (cont'd)

11.) Using a screwdriver, tap out the supporting pins to release the Joint Assembly - Figure 8-145.

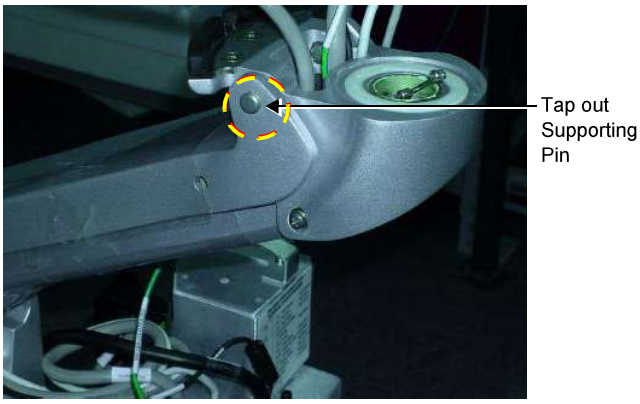


Figure 8-145 Removing the Joint Assembly

12.) Release the communication cables from the arm.

13.) Remove the cables by passing them through the Joint Assembly aperture.

14.) Remove the Joint Assembly.

8-6-9-3 Joint Assembly Installation Procedure

1.) Return the Joint Assembly to its location on the Upper Arm and insert the supporting pins.
2.) Secure the support pins by tightening the two locking screws.
3.) Return the ring clips to their positions on the supporting pins.
4.) Return the communication cables by passing them through the Joint Assembly aperture.
5.) Return the gas spring cable to its position with its bracket - the slot in the bracket must face upwards.

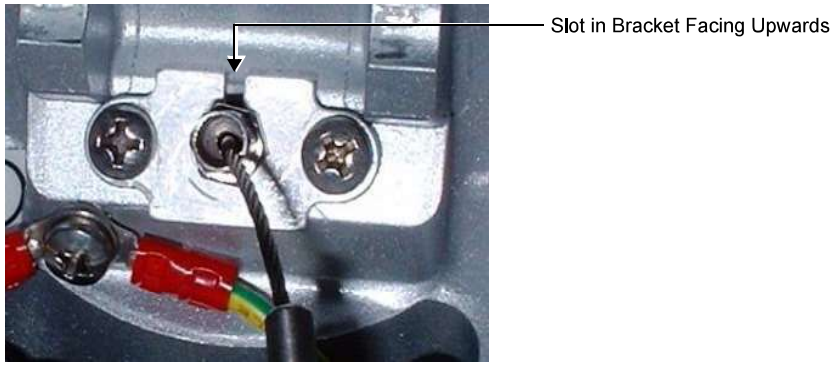


Figure 8-146 Gas Spring Cable Bracket showing Cable Slot

6.) Reconnect the Ground lead.
7.) Return the Keyboard Assembly to its position.
8.) Install the Lower Arm.
9.) Install the Probe Shelf.
10.) Install the Keyboard Assembly.
11.) Return the Monitor to its position
12.) Lower the console to the *maximum down* position.
13.) Turn ON power to the system.

8-6-10 Gas Spring Replacement Procedure

8-6-10-1 Preparation

Shut down the ultrasound system.

8-6-10-2 Gas Spring Removal Procedure

1) Perform the following removal procedures:
   a.) Monitor Removal
   b.) Operating Panel Assembly Removal
   c.) OPIO Basket Removal
   d.) Lower Arm Removal
2) Unscrew the shaft covering screws located on either side of the main column. .

Figure 8-147 Shaft Covering Screws

8-6-10-2 Gas Spring Removal Procedure (cont'd)

3.) Using the 5 mm Hex key, unscrew each locking screw on either side of the support arm - Figure 8-148.

Figure 8-148 Releasing the Securing Screws on Either Side of the Support Arm

4.) Tap out the internal supporting pin using a punch - Figure 8-149.

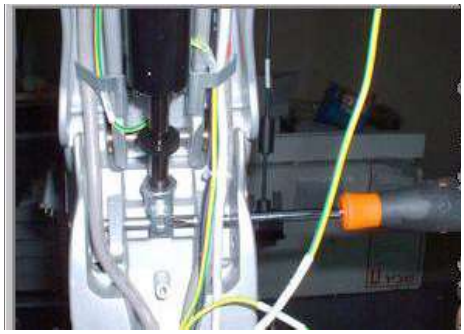


Figure 8-149 Tapping out the Lower Support Pin using a Punch

5.) Similarly, tap out the upper gas spring securing pin and use a screwdriver to support the joint - Figure 8-150.

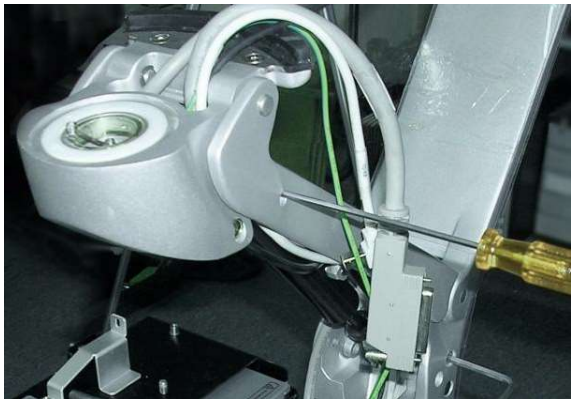


Figure 8-150 Supporting the Upper Gas Spring Bracket with a Screwdriver

6.) Carefully release the upper end of the gas spring, then the lower end of the gas spring to withdraw the gas spring from its location.

7.) Remove the gas spring cable from its holder on the gas spring.

8-6-10-3 Gas Spring Installation Procedure

*NOTE: The gas spring is supplied **without** the top connecting bracket - see Figure 8-151.*

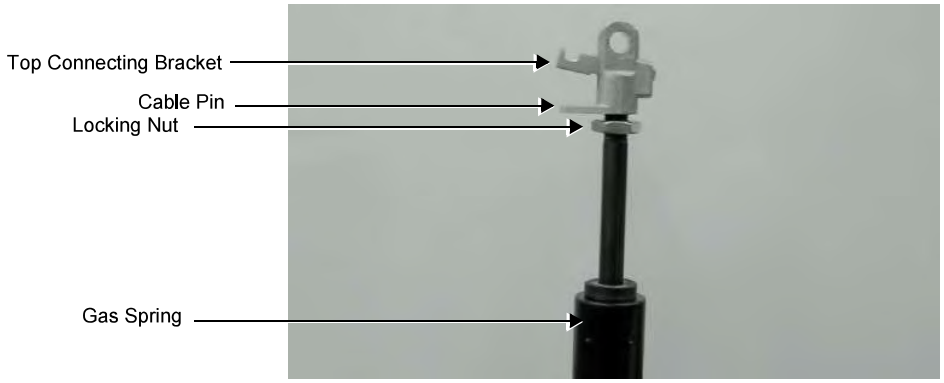


Figure 8-151 Gas Spring with Top Connecting Bracket

1.) Screw the top connecting bracket (previously removed) onto the gas spring turning it a few turns only.
2.) Insert the cable pin into the top connecting bracket and screw the gas spring inwards until it touches the pin.
3.) Tighten the locking nut until it firmly locks against the top connecting bracket.
4.) Return the gas spring, connecting the top part of the gas spring to the Upper Support Arm and insert the connecting pin previously removed.

NOTE: When placing the gas spring cable in the upper arm, be sure to first place the cable uppermost in the Upper Support Arm before returning the gas spring.

5.) Position the gas spring cable in the Upper Support arm and connect the lower part of the gas spring at the base of the upper support arm - Figure 8-152.

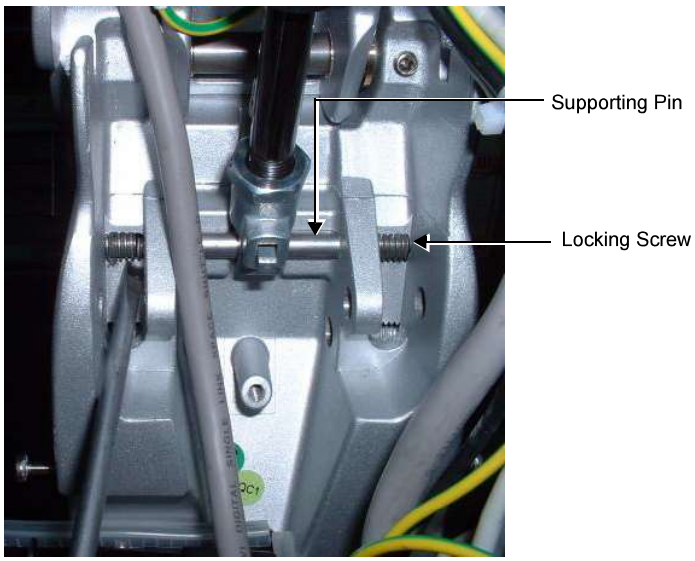


Figure 8-152 Lower Section of Gas Spring showing Connecting Pin and Locking Screws

8-6-10-3 Gas Spring Installation Procedure (cont'd)

6.) Insert the supporting pin, threading it through the brackets and the lower gas spring holder, as shown in Figure 8-152.

7.) Applying Locktite, insert the first locking screw previously removed and screw it in until it just touches the supporting pin.

8.) Applying Locktite, return the second screw and tighten firmly - both the screws will now be locked against the supporting pin.

9) Perform the following installation procedures:

a.) LCD Arm Installation

b.) Operating Panel Keyboard Installation

c.) OPIO Basket Installation

d.) Monitor installation

10.) Turn ON power to the system.

8-6-11 Peripherals Console Replacement Procedure

8-6-11-1 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-6-11-2 Peripherals Console Removal Procedure

1) Remove the following covers: *left* side, *right* side, *front, right* rear, *left* rear.
2.) Remove the *DVD/CD-RW drive* and the *B&W Printer*.
3) Loosen the 4 retaining screws that secure the peripherals console in position, as shown in Figure 8-153.

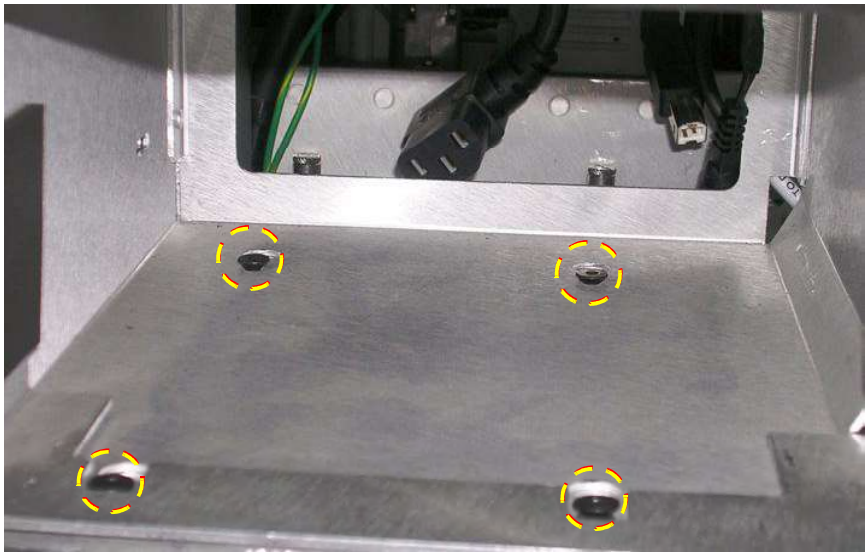


Figure 8-153 Location of Peripherals Console Retaining Screws

4.) Gently slide the peripherals console forward, lift it slightly and then remove it.

8-6-11-3 Peripherals Console Installation Procedure

1.) Place the new peripherals console in its position on the system and secure with securing screws previously released - Figure 8-153.

2) Re-install the B&W printer and the DVD/CD-RW drive.

3) Refit the covers, previously removed.

4.) Turn ON power to the system.

8-6-12 Probe Shelf Replacement Procedure

8-6-12-1 Tools

Use the appropriate screwdriver.

8-6-12-2 Preparation

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-6-12-3 Probe Shelf Removal Procedure

1) Remove the Keyboard Assembly as described in the Operating Panel Keyboard Assembly Removal Procedure on page 8 - 50.

2) Working from below, and while carefully supporting the Probe Shelf Holder, remove the 4 retaining screws - two on either side - as seen in Figure 8-154.

Figure 8-154 Probe Shelf - Viewed from Below indicating Retaining Screws

3.) Remove the Probe Shelf.

8-6-12-4 Probe Shelf Installation Procedure

1.) Return the Probe Shelf to its location on the Keyboard Interface Assembly and secure it with the 4 retaining screws (previously removed).

2.) Install the Keyboard Assembly as described in the Operating Panel Keyboard Assembly Installation Procedure on page 8 - 53.

3) Lower the console to the *maximum down* position.

4.) Turn ON power to the system.

8-6-13 Brake and Locking Wheels Replacement Procedure

8-6-13-1 Introduction

Two different wheel configurations have been delivered on the Vivid S60N/Vivid S70N, depending on when it was produced.

- Initially, the ultrasound systems were delivered with two Brake Locking wheels at the front side of the ultrasound system.and two Swivel Locking wheels at the rear side of the ultrasound system.
- Later, a new set of wheels were introduced:
  - one Lock Caster (VS60 and VS70 Lock Caster) on the rear, left side of the Ultrasound system (when viewed from the front of the system)

Figure 8-155 Lock Caster

  - three Brake Casters (VS60 and VS70 Swivel Rear right Caster), two installed on the front of the Ultrasound system and one installed on the rear, right side of the Ultrasound system (when viewed from the front of the system)

Figure 8-156 Brake Caster

NOTE: The procedure below is the same whether replacing a Front Wheel or a Rear Wheel.

8-6-13-2 Tools

- appropriate flat screwdriver
- 6 mm Hex key
- LOCTITE 243
- Calibrated Torque tool, 12.5 Nm +/- 5% for 6 mm Hex tool

8-6-13-3 Preparations

Make sure the system is standing securely on a level surface, with the wheels in the locked position.

8-6-13-4 Brake and Locking Wheels Removal Procedure

1) Using a flat screwdriver, carefully remove the plastic screw cap covering the securing screw on the inner side of the wheel housing, as shown in Figure 8-157.

Figure 8-157 Removing the Screw Cap

2) Using a 6mm Hex key, loosen and remove the screw that secures the wheel shaft in the wheel securing socket.

Figure 8-158 Removing the Securing Screw

3.) Lift the chassis sufficiently to allow the wheel to drop down out of the wheel securing socket.

4.) Remove the wheel.

8-6-13-5 Brake and Locking Wheels Installation Procedure

1) Carefully lift the chassis sufficiently to allow insertion of the replacement wheel shaft into the wheel securing socket.
2) Push the wheel shaft all the way up into the socket, then gently lower the chassis to the ground.
3.) Apply LOCTITE 243 on screws before tightening.
4.) Return and fasten the Hex screw (previously removed - see Figure 8-158). Remember the washer. Tightening Torque: 12.5 Nm +/-5%
5) Return the screw cap (previously removed) by snapping it back into position (refer to Figure 8-157)

8-6-14 Column Main Support Assembly Replacement

NOTE: In the event that the Column Main Support Assembly requires replacement, contact the OnLine Center for instructions.

8-6-15 Mechanical Assembly Base Console Replacement

NOTE: In the event that the Mechanical Base Console requires replacement, contact the OnLine Center for instructions.

Section 8-7
Loading the software

8-7-1 Purpose of this section

This section describes how to reinstall and/or install software on Vivid S60N/Vivid S70N. Depending on the actual situation, you may have one or more choices when doing the software load. This will be discussed later in this section.

8-7-2 Customer provided prerequisite

- server sollution or formatted and labelled media for Image storage
- formatted and labelled media for Patient Archive and Presets (User Defined Settings)
- password for the user ADM (see below)

8-7-2-1 Password for the user ADM

The default password for the user ADM is **ulsadm**.

If the password for the user ADM has been changed:

The customer must type in the password when needed.

8-7-3 Tools provided with the system at delivery or after an upgrade

- Vivid S60N/Vivid S70N system software (base software)
- Application software

If present:

- Patch(es) for Vivid S60N/Vivid S70N

Verify that the software is current. Updated software may be available.

NOTE: If installing a new software revision, ensure that you have the previous software version available, in case the software load fails, and you have to reload the 'old' software.

8-7-4 Space management - moving all images

CAUTION **In order to complete a successful restore of the Patient Database, if needed, the images must be moved away from Vivid S60N/Vivid S70N before doing backup of the Patient Database.**

Depending on the location set-up, either move the images to a remote server or to removable media. As the images are moved, the database will point to the new location.

If the backup procedure is not completed correctly, the images and database information could be lost.

Speak with the personnel at the site to determine which patient images need to be backed up prior to starting.

- Move the images to a remote server or to removable media.

  For instructions, see “Disk management” in the User Manual/User Guide.

CAUTION **Before loading Software, CONFIRM WITH THE CUSTOMER OR SITE ADMINISTRATOR, if the patient archive has been encrypted and if the customer has the password or the Key to unlock the data. Failure to obtain those items, will cause permanent DATA LOSS!**

8-7-5 Backing up the Patient Archive and System Configurations

CAUTION **An error, or a power loss may occur during the software loading.**

Always backup the Patient Images, Patient Archive and the System Configurations before starting a software loading!

In order to complete a successful restore of the Patient Database, if needed, the images must be moved away from the Vivid S60N/Vivid S70N before doing backup of Patient Database. Depending on the location set-up, either move the images to a remote server or to removable media. If the backup procedure is not completed correctly, the images and database information could be lost.

- Backup the Patient Archive and System Configurations.

  For instructions, please see “Data Backup and Restore” in the User Manual/User Guide.

8-7-6 Software Loading

8-7-6-1 Introduction

There are several sources to choose from when installing the software:

- **Software Package Download via eDelivery portal**

  With this method, the User may download and update the software.

  For instructions see:
  8-7-6-3 "Software update via End-User Portal" on page 8-174

- **From the Factory UFD (software UFD) - Overwrite the HDD**

  This is the only method to install software on a new hard drive.

  For instruction, see:
  8-7-6-4 "Install the Software from Factory UFD - Overwrite HDD" on page 8-181.

- **From the Factory UFD (software UFD) - Overwrite the content on the software partition (C:)**

  This method may be used when updating the Base Image (System Software) to a new revision.

  For instruction, see:
  8-7-6-5 "Install the Software from Factory UFD - Overwrite C:" on page 8-188.

- **From the Factory UFD (software UFD) - Load the Application Software**

  For instruction, see:
  8-7-6-6 "Install the Application Software from Factory UFD" on page 8-192.

- **Software Rollback**

  Software Rollback installs the previous software from compressed files stored on the repository partition on the hard disk.

  An automatic Software Rollback is initiated if any of the tests after the software upgrade fails.

8-7-6-2 eDelivery - Software update

8-7-6-2-1 Introduction

The user can update to the latest software in either of two ways:

- Through the GE service platform on the ultrasound system. This requires RSvP connectivity.
  See: 8-7-6-2-2 "Software Package Download via GE Service Platform" on page 8-167.
- Download the latest software from an end-user portal to a local storage location and install it on the ultrasound system.
  See: 8-7-6-3 "Software update via End-User Portal" on page 8-174.

8-7-6-2-2 Software Package Download via GE Service Platform

This procedure/method requires that the RSvP/InSite platform has been configured. This configuration usually take place during setup of the ultrasound system.

8-7-6-2-3 Software update via RSvP

Software update for the system may become available for download and installation through the GE Service platform.

Users must have administrator rights to perform the software download and installation. A user who is not logged in as ADM (administrator) will see the notification of an available update, but not be allowed to initiate the download.

CAUTION **Please backup up presets and database before installation of the software (For instructions, please see "Data Backup and Restore" in the User Manual).**

Remote software download should not change user presets or affect customer database; however, it is always best practice to ensure patient data and preset are backed up before proceeding with any software installation.

CAUTION **Before loading Software, CONFIRM WITH THE CUSTOMER OR SITE ADMINISTRATOR, if the patient archive has been encrypted and if the customer has the password or the Key to unlock the data. Failure to obtain those items, will cause permanent DATA LOSS!**

NOTE: Please allow approximately one hour for complete software download and installation. (the download time may vary due to network connection speed). Please allow approximately one hour for complete installation.

NOTE: Software upgrade through the GE service platform may not be available in all markets.

8-7-6-2-4 Software download and installation

1.) Log on as ADM.

2.) Press the **Download** button (or) at the bottom of the display screen.

NOTE: The system automatically queries if new SW is available. There is an icon on the bottom left corner of the title bar to illustrate the download connection status.

The icon indicates the last query was negative. You may press it to initiate another query.

The icon indicates that new software is available for download currently.

Figure 8-159 Press Download Button

3.) Available software updates are displayed in the list. If you want to refresh the query for available updates, press **Refresh**.

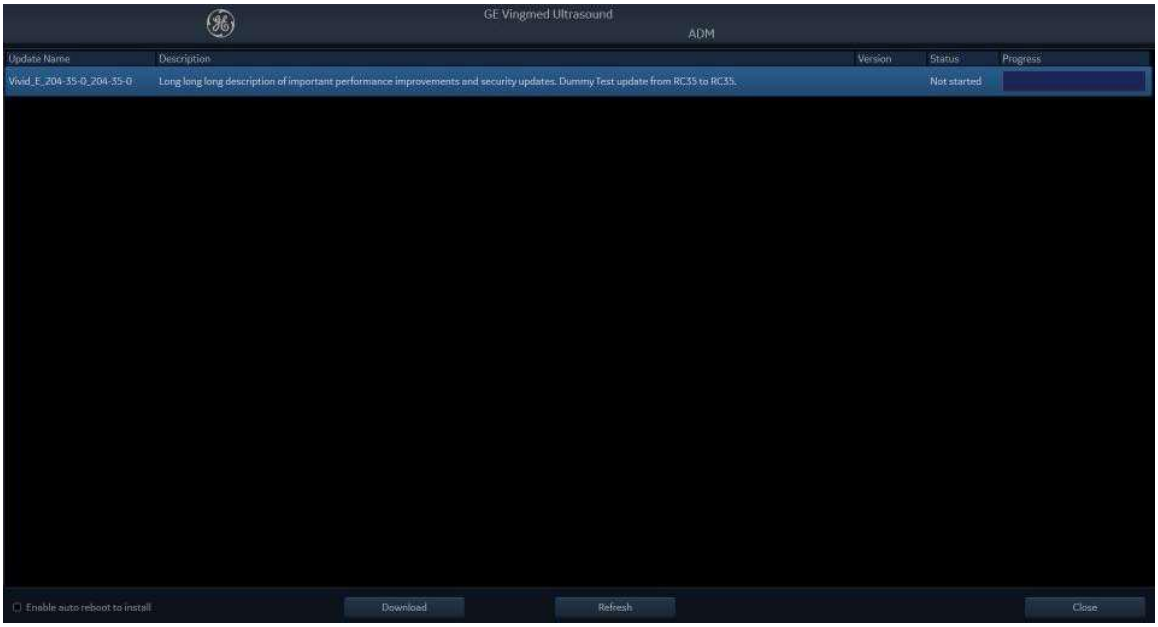


Figure 8-160 Software List

8-7-6-2-4 Software download and installation (cont'd)

4.) A window will pop up and ask for confirmation of refresh.
Press **Yes**.

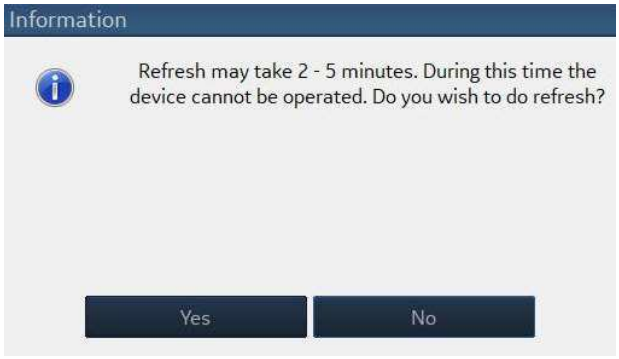


Figure 8-161 Refresh Confirmation

5.) A dialogue informs that the refreshed list of available updates is being queried.

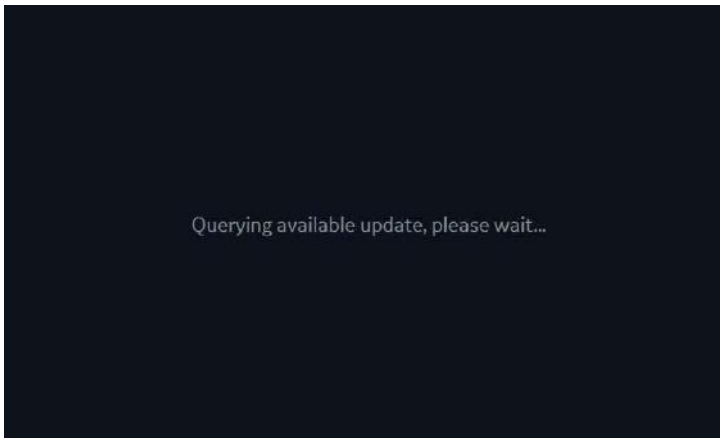


Figure 8-162 Receiving List

8-7-6-2-4 Software download and installation (cont'd)

6.) Select the desired software.
It is possible to check the **Reboot** box in the lower left corner of the screen. See the table below for detailes.

Table 8-20 Comparison between unchecked and checked Reboot box

Step	If the Reboot box is un-checked	If the Reboot box is checked
1	The software download completes.	The software download completes.
2	Click Reboot to install. The ultrasound system is turned off.	The ultrasound system is turned off without any human interaction.
3	Switch on the ultrasound system.	Switch on the ultrasound system.
4	The software installation starts.	The software installation starts.

Click **Download** to start to download the software, or press **Close** to exit the window.

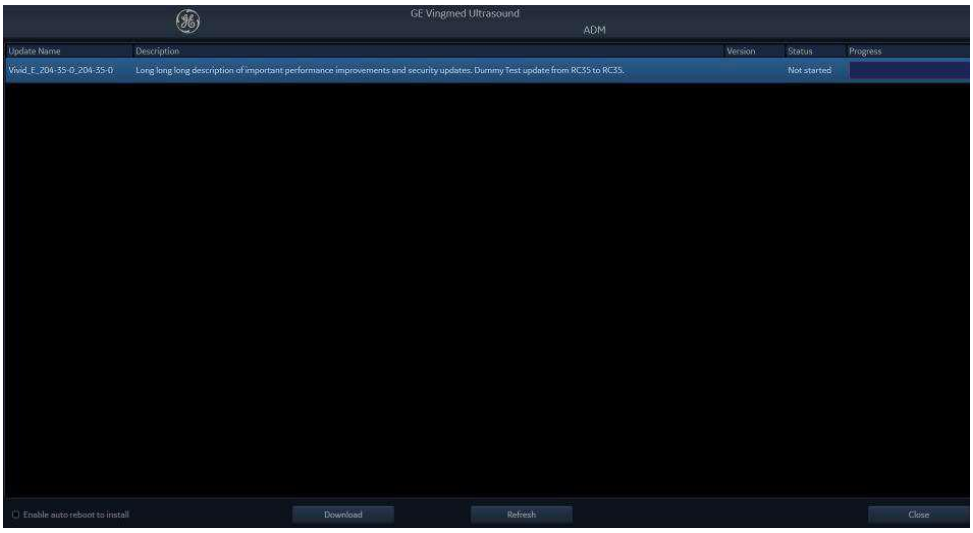


Figure 8-163 Software List

8-7-6-2-4 Software download and installation (cont'd)

7.) During the software download process, the status will be displayed as "In-progress". You can press **Pause** to suspend the download or press **Cancel** to exit the download.

- If the download process is suspended, press the **Resume** button to recover the download process from the point where it is stopped.
- If there is an error during the downloading process, press the **Retry** button to recover the download process from the beginning.

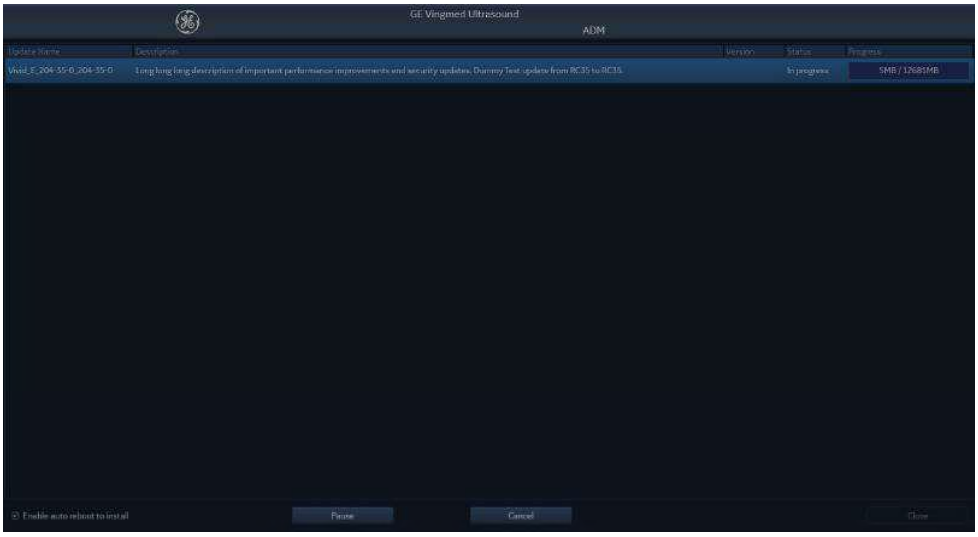


Figure 8-164 Software Download 'In-Progress'

8-7-6-2-4 Software download and installation (cont'd)

8.) When the download process finishes, the software is ready to be installed in the ultrasound system.

NOTE: Please make sure system power plug is connected before you press the Reboot to install button to avoid installation failures due to power loss.

If you did not check the Reboot check-box earlier, you must press the **Reboot to install** button to start the installation.

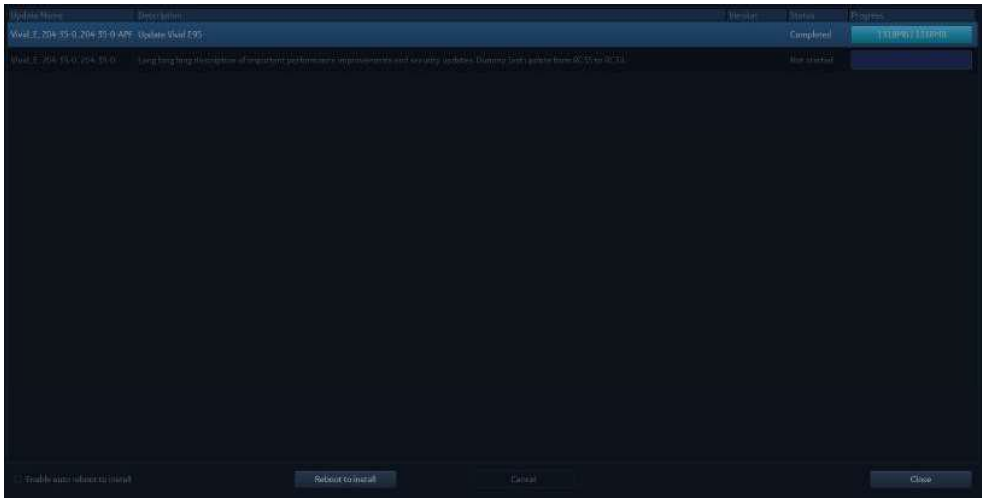


Figure 8-165 Press Reboot to install button

9.) Switch on the ultrasound system.
The system will start the software installation.
The system will reboot several times to complete the installation.

NOTE: Do not power off the system during the software installation.

NOTE: A typical full installation may take up to 60 minutes.

NOTE: A typical application software installation may take up to 20 to 30 minutes.

8-7-6-2-4 Software download and installation (cont'd)

10.) When the software installation is complete and the system is rebooted, a *New Software Verification* window is displayed.

Figure 8-166 Software verification

11.) Perform a check for all features listed. Press ? to get information on how to check each feature.

NOTE: You can press << to minimize the Software verification window and move it out of the way when testing.

Select **Passed** or **Failed** for each feature. If all features are "Passed" the signature field is enabled.

CAUTION If for any reason you select "Failed" for one of the features tested, the system will roll back to the software version that has passed the verification checks last time. Please call your local service immediately.

Figure 8-167 Signature field enabled

12.) Enter your signature (minimum three characters) and press **OK**.

8-7-6-3 Software update via End-User Portal

Introduction

Customers entitled to eDelivery updates get a customer account to download software within the End-User Portal.

Users are created for the account based on e-mail addresses provided by the customer at the point of sale. These e-mail addresses are the log-in credential for the End-User Portal along with a temporary password provided to the user through e-mail. When logging in to the End-User Portal the first time, the user is prompted to change the password and enter a secret question and answer for password retrieval.

Prerequisite

USB memory stick, NTFS or exFAT format.

Preparations

CAUTION **Please backup up presets and database before installation of the software (For instructions, please see "Data Backup and Restore" in the User Manual).**

Remote software download should not change user presets or affect customer database; however, it is always best practice to ensure patient data and presets are backed up before proceeding with any software installation.

Ensure that the following information is available (recorded) on paper:

- Wireless configuration
- Windows OS password (if changed from factory default)
- Trusted Certificates (for Dicom server with TLS)
- Detailed printer configurations

Download and Installation Instructions

CAUTION **Before loading Software, CONFIRM WITH THE CUSTOMER OR SITE ADMINISTRATOR, if the patient archive has been encrypted and if the customer has the password or the Key to unlock the data. Failure to obtain those items, will cause permanent DATA LOSS!**

Follow the below instructions to download software from the portal:

1.) Log on to the portal website which is provided to end user via a welcome email:

https://gehealthcare.flexnetoperations.com/flexnet/operationsportal

8-7-6-3 Software update via End-User Portal (cont'd)

2.) Log in using the user name (e-mail) and password.

Figure 8-168 Login Window

3.) The Software and License Delivery dashboard is displayed. Downloads can be found by browsing the products under "Your Downloads".

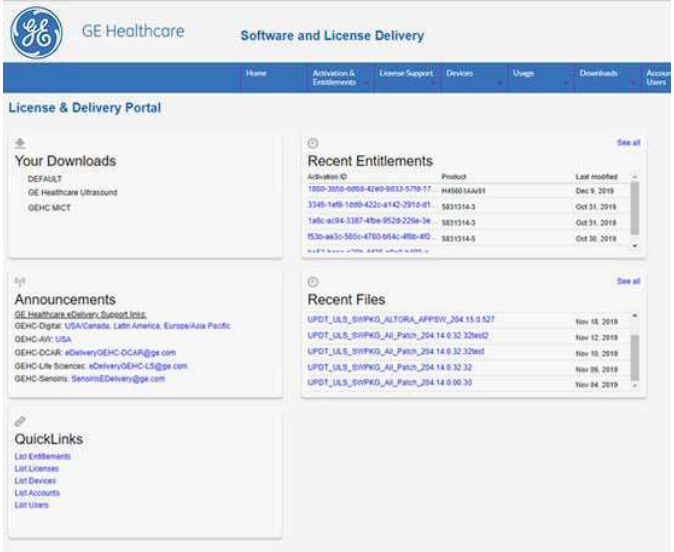


Figure 8-169 Software and License Delivery Page

8-7-6-3 Software update via End-User Portal (cont'd)

4.) Select the desired software to enter the Downloads page.

Figure 8-170 Download Packages

5.) To start the download, click the blue file name link and save the file to a local storage location (i.e. USB flash drive).

NOTE: At this point, you may be asked to download and install 'Download manager'. Follow the on-screen instructions to download and install it. When done, return to this procedure and continue.

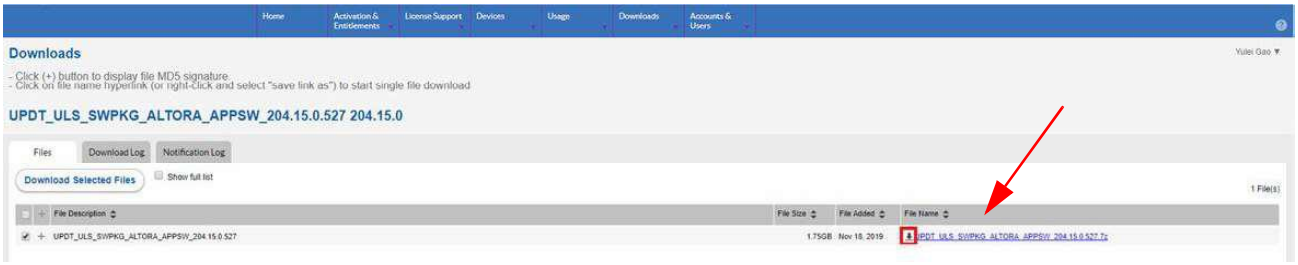


Figure 8-171 Downloads Page

6.) Power down the ultrasound system.

7.) Insert the USB stick with the copied software into the ultrasound system.

8.) Power on the ultrasound system and wait for the dialog below.

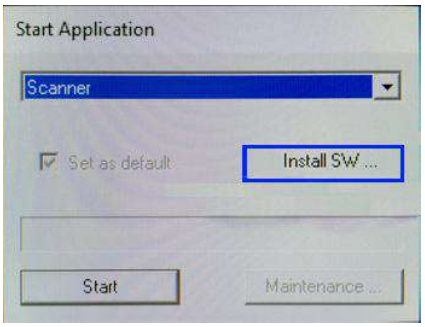


Figure 8-172 Select 'Install SW ...'

9.) Select **Install SW ...**

8-7-6-3 Software update via End-User Portal (cont'd)

10.) Select **OK** to proceed with installation or **Cancel** to cancel installation.

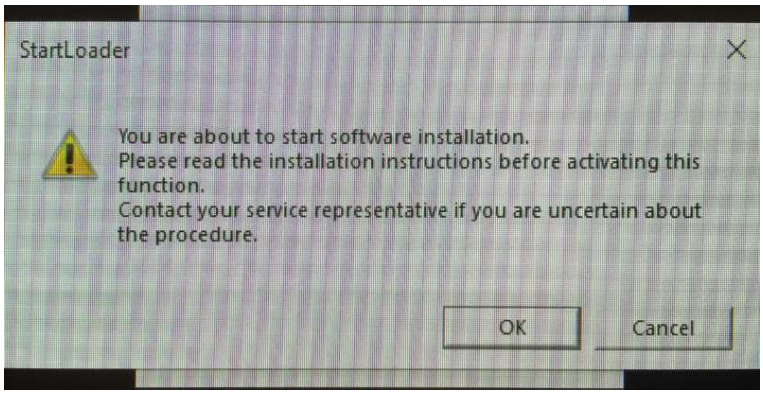


Figure 8-173 You are about to start software installation

11.) Select the file in the list and click **Install.**

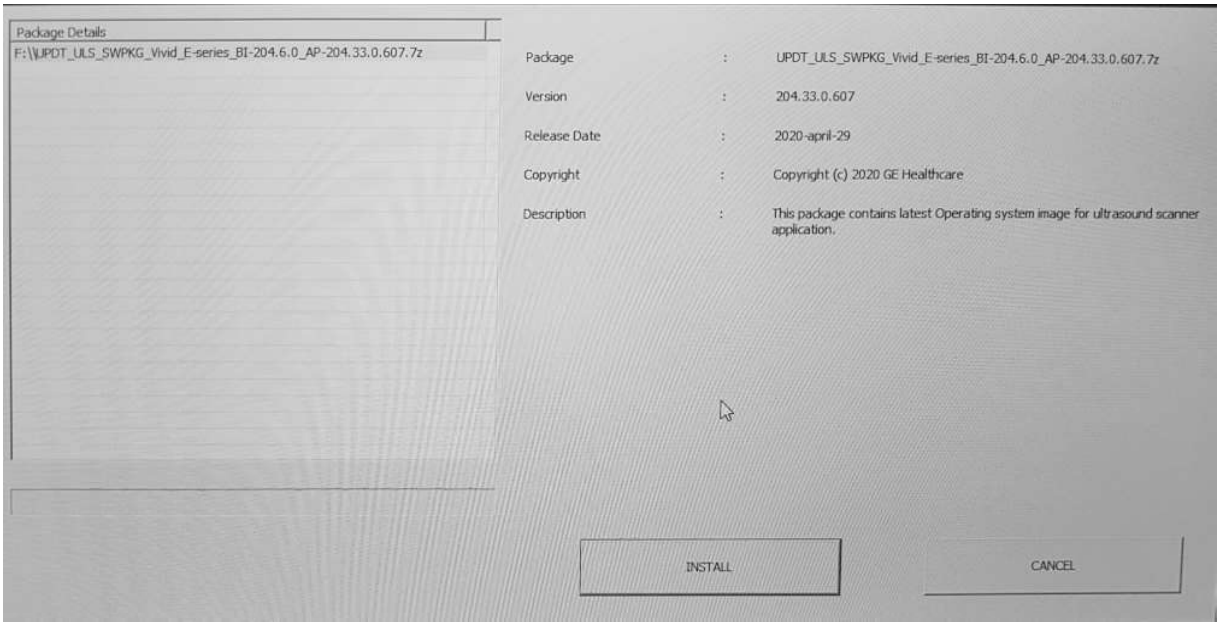


Figure 8-174 Select File - Click Install

8-7-6-3 Software update via End-User Portal (cont'd)

The software installation commences.

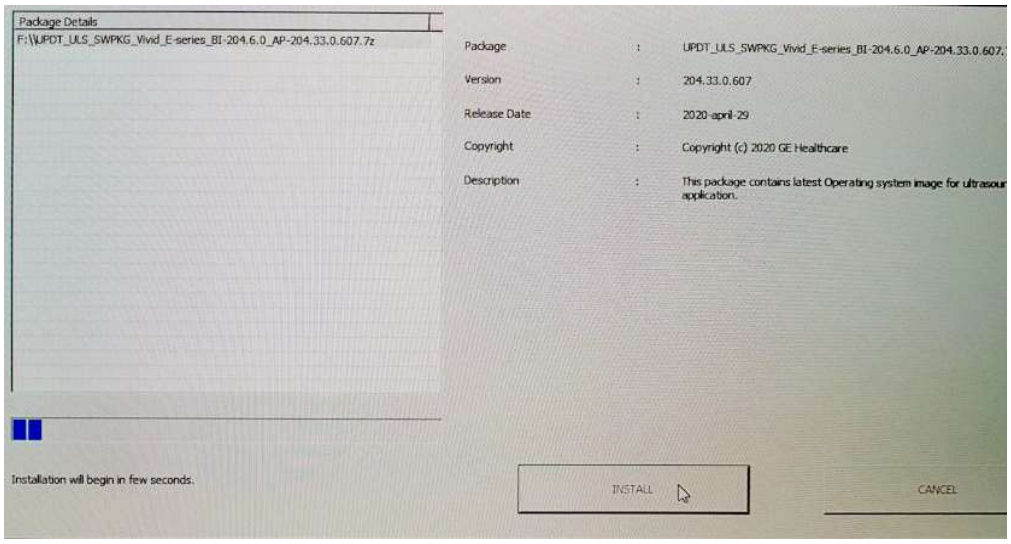


Figure 8-175 Installation starts

The progress bar will fill up multiple times and the system will automatically restart multiple times.

*NOTE: **Do not power off the system** during the software installation.*

NOTE: A typical full installation may take up to 60 minutes.

NOTE: A typical application software installation may take up to 20 to 30 minutes.

12.) When the software installation is complete, the **Install SW** dialogue appears again.

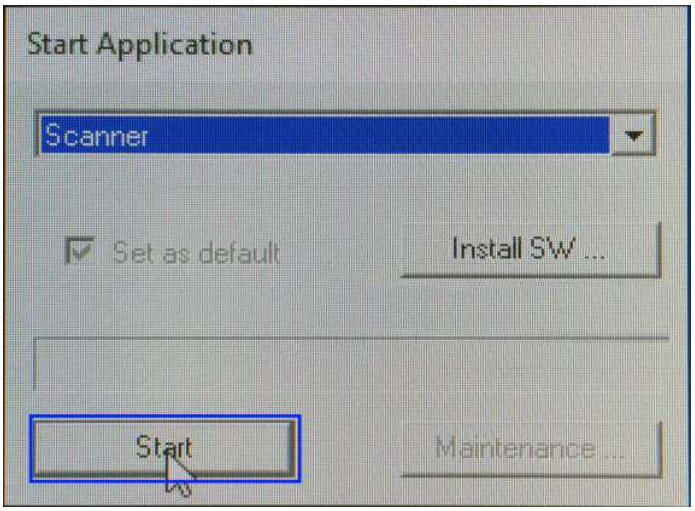


Figure 8-176 Select 'Start'.

13.) Remove the USB stick and press **Start** to continue starting the ultrasound system.

8-7-6-3 Software update via End-User Portal (cont'd)

When the ultrasound system has booted, the *New Software Verification* window is displayed.

Figure 8-177 New Software Verification window

14.) Perform a check for all features listed.

Press ? to get information on how to check each feature.

NOTE: You can press << to minimize the Software verification window and move it out of the way when testing.

Select **Passed** or **Failed** for each feature. If all features are "Passed" the signature field is enabled.

8-7-6-3 Software update via End-User Portal (cont'd)

CAUTION **If for any reason you select "Failed" for one of the features tested, the system will roll back to the software version that has passed the verification checks last time. Please call your local service immediately.**

Figure 8-178 Signature field enabled

15.) Enter your signature (minimum three characters) and press **OK**.

8-7-6-4 Install the Software from Factory UFD - Overwrite HDD

The following information is needed during this procedure, and you may want to have it available to you need it:

- The System's Serial Number.
- The System's license (Software Option Key)

When installing the Base Image from the UFD, the ultrasound system must boot from the UFD. For security reasons, the UFD is not a standard boot device, so the UFD must be selected when booting the system.

The built-in keyboard does not have the needed function keys, so an external alphanumeric keyboard with function keys must be connected to one of the USB ports on the ultrasound system, as described below.

NOTE: The USB Flash Drive with the software is often called the Factory UFD, since it is also used when setting up new systems at the factory.

8-7-6-4-1 Preparing the Ultrasound System for the software installation

NOTE: The system is delivered with a default UEFI (BIOS) password when shipped from the factory. This password can be obtained from GE on request. If the customer has changed the password, the customer is responsible to keep track of the customized password. There is no way for GE to restore or bypass a customized password.

1.) Disconnect all external USB devices.

2.) Connect an external keyboard (with function keys) to one of the USB ports on the ultrasound system.

8-7-6-4-2 Install the Base Image (System Software) and the Application Software

1.) With the ultrasound system running, plug in the Software UFD in one of the USB ports on the ultrasound system. A driver for the UFD starts to load. This may take some time. Wait to the driver has loaded before you continue.

2.) Restart the ultrasound system.

Press and hold **F7** on the external alphanumeric keyboard when the ultrasound system starts and until the Enter Password dialog is displayed on the screen

Figure 8-179 Enter the UEFI (BIOS) password

Enter the UEFI (BIOS) password, then press **Enter**.

In the next dialog, you can select the boot device.

NOTE: The manufacturer of the UFD may vary.

3.) Scroll down and select the UFD as boot device
(here: 'UEFI: Generic Mass Storage 1100, Partition 1'), and press **Enter**.

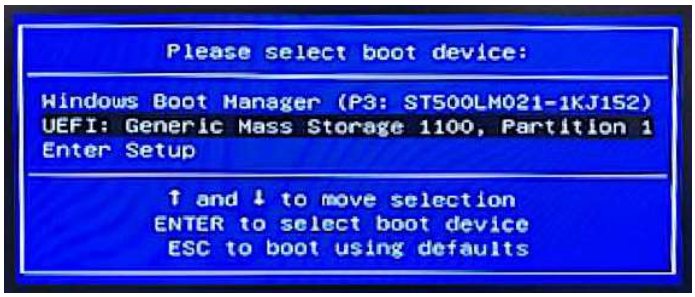


Figure 8-180 Select the Software UFD

The ultrasound system starts to boot from the selected UFD.

8-7-6-4-2 Install the Base Image (System Software) and the Application Software (cont'd)

4.) In the next dialog, select **Install System SW**.

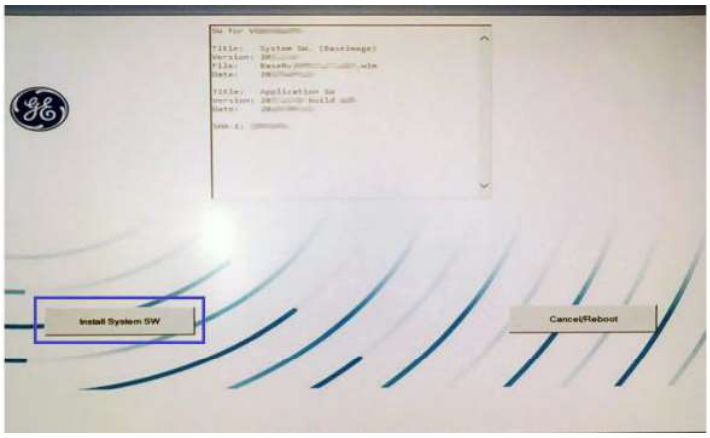


Figure 8-181 Select "Install System SW"

5.) Next, the "Do you want to perform a clean installation" warning is displayed.

Select **Yes** to perform a clean installation. This will overwrite all the content on the hard disk.

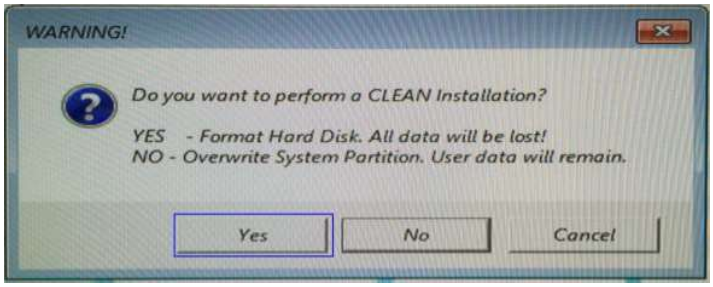


Figure 8-182 Select "Yes"

6.) A new warning is displayed.

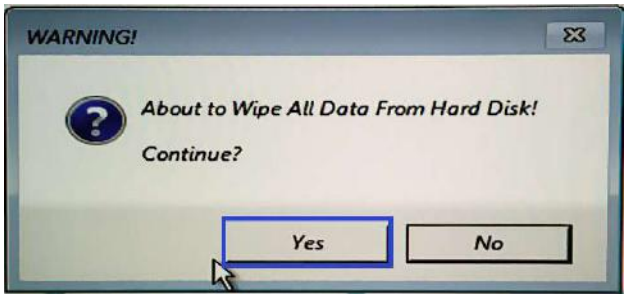


Figure 8-183 Select "Yes"

Select **Yes**.

8-7-6-4-2 Install the Base Image (System Software) and the Application Software (cont'd)

7.) The installation program starts and will:

a.) prepare the partitions

b.) copy the Base Image image-files from the UFD to the Repository partition

c.) deploy the Base Image to the C: partition

d.) copy the Application Software (7z-file) from the UFD to the Repository

These tasks may last for approximately 18 minutes.

After the tasks above have completed, a new dialog tells you to remove the installation media (UFD).

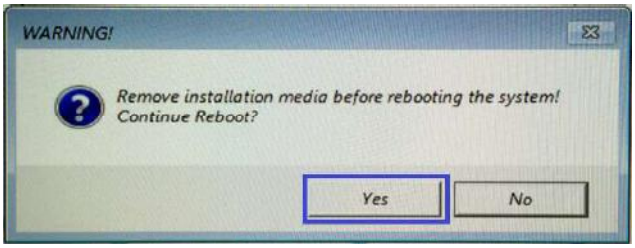


Figure 8-184 Remove the UFD, then select "Yes".

8.) Remove the UFD, then select **Yes**.

The software installation continues:

a.) The ultrasound system reboots, now starting from the new Windows software on the C: drive for the first time.

When asked, select the correct **Ultrasound System Model**, and type in the **Serial Number**.

b.) Select ultrasound model from the pull-down menu.

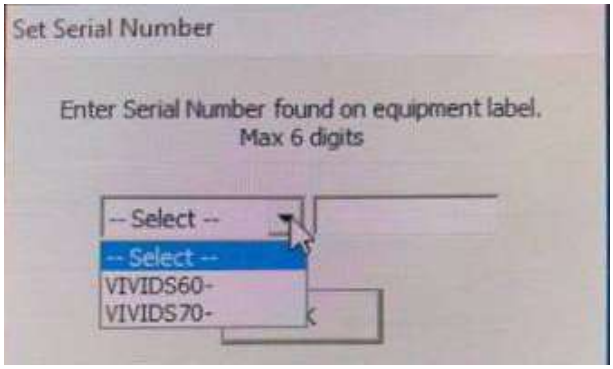


Figure 8-185 Select Model from the pull-down menu

8-7-6-4-2 Install the Base Image (System Software) and the Application Software (cont'd)

c.) Type in the ultrasound system's Serial Number.

NOTE: The Serial Number is available on the UDI label on the rear of the ultrasound system on the cover of the AC Box. The Serial Number is the digits after 'SN'. Leading zero(s) does not matter.

NOTE: It is not possible to change the Serial Number later, so ensure that you type in the correct serial number before you continue.

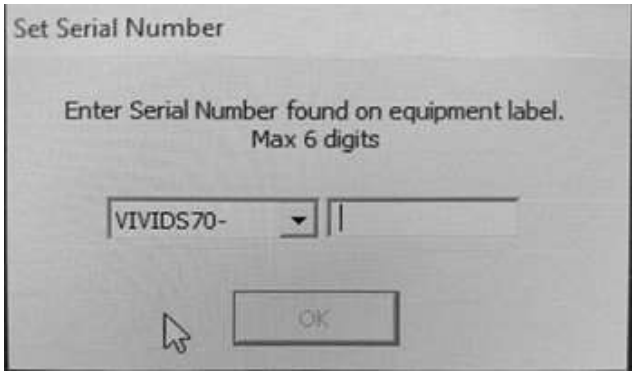


Figure 8-186 Type in the Serial Number

d.) Type the Serial Number.

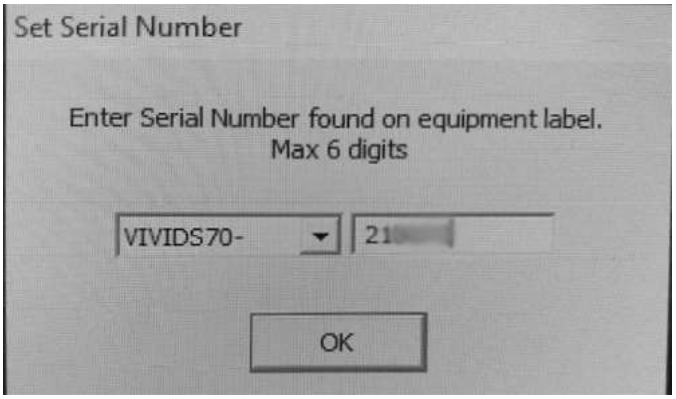


Figure 8-187 Type the Serial Number

Click **OK**.

8-7-6-4-2 Install the Base Image (System Software) and the Application Software (cont'd)

A new dialog is displayed. Verify that the Serial Number you typed is correct. This is the last chance to correct any error in the serial number.

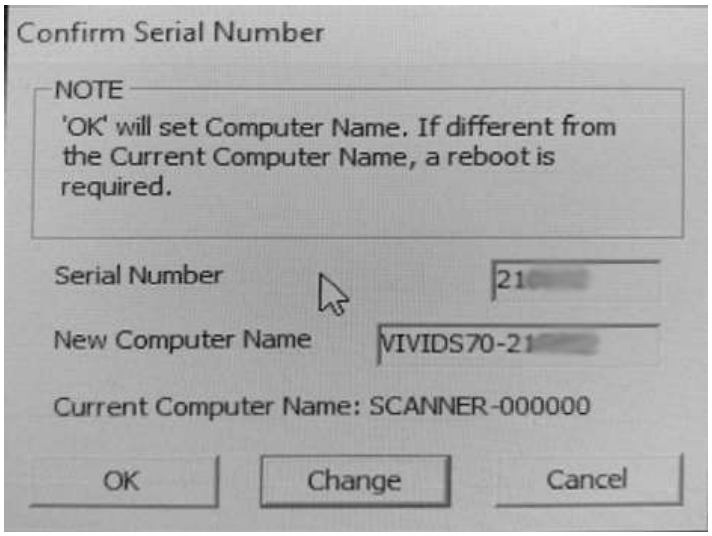


Figure 8-188 Last chance to set Correct Serial Number

Click **OK** to continue.

e.) The base image configuration continues on the targeted hardware.

Several restarts will occur before the setup is complete.

The warning "Disk encryption is not enabled" is displayed on the screen.

Figure 8-189 Disk encryption is not enabled

8-7-6-4-2 Install the Base Image (System Software) and the Application Software (cont'd)

f.) Select **OK** to continue.

A warning about the default password is displayed:

At least one of the build in users, ADM or USR still have the default passwords. Please set new passwords to increase the security on the system.

Figure 8-190 Built-in users have standard password

g.) Select **OK** to continue.

A warning about missing license is displayed.

Figure 8-191 Enter the software license.

h.) Type in the software license and click **OK**.

The systems completes the booting.

8-7-6-5 Install the Software from Factory UFD - Overwrite C:

When installing the Base Image from the UFD, the ultrasound system must boot from the UFD. For security reasons, the UFD is not a standard boot device, so the UFD must be selected when booting the system.

The built-in keyboard does not have the needed function keys, so an external alphanumeric keyboard with function keys must be connected to one of the USB ports on the ultrasound system, as described below.

NOTE: The USB Flash Drive with the software is often called the Factory UFD, since it is also used when setting up new systems at the factory.

8-7-6-5-1 Preparing the Ultrasound System for the software installation

NOTE: The system is delivered with a default UEFI (BIOS) password when shipped from the factory. This password can be obtained from GE on request. If the customer has changed the password, the customer is responsible to keep track of the customized password. There is no way for GE to restore or bypass a customized password.

1.) Disconnect all external USB devices.
2.) Connect an external keyboard (with function keys) to one of the USB ports on the ultrasound system.

8-7-6-5-2 Install the Base Image (System Software) and the Application Software

1.) Plug in the Software UFD in one of the USB ports on the ultrasound system.
2.) Restart the ultrasound system.
   a.) Press and hold **F7** on the alphanumeric keyboard when the ultrasound system starts and until the Enter Password dialog is displayed on the screen

Figure 8-192 Enter the UEFI (BIOS) password

   b.) Enter the UEFI (BIOS) password, then press **Enter**.
   In the next dialog, you can select the boot device.

NOTE: The manufacturer of the UFD may vary.

8-7-6-5-2 Install the Base Image (System Software) and the Application Software (cont'd)

3.) Scroll down and select the UFD as boot device (here: 'UEFI: Generic Mass Storage 1100, Partition 1'), and press **Enter**.

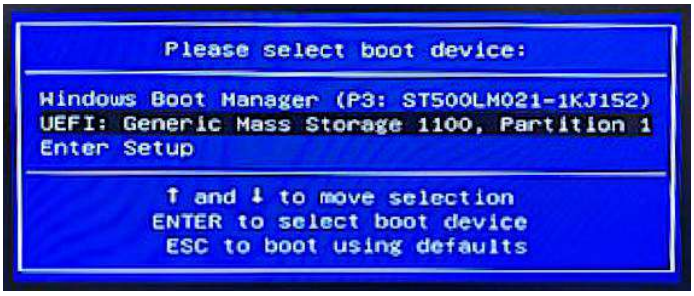


Figure 8-193 Select the Software UFD

The ultrasound system starts to boot from the selected UFD.

4.) In the next dialog, select **Install System SW**.

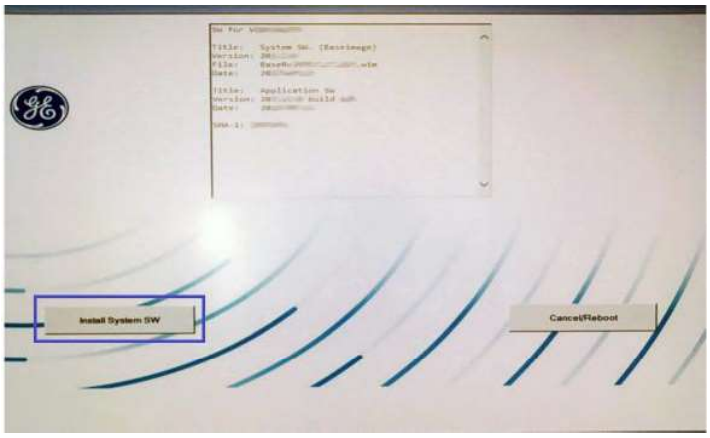


Figure 8-194 Select "Install System SW"

Next, the "Do you want to perform a clean installation" warning is displayed.

5.) Select **No** to replace the software on the **C:** partition, and keep the rest of the data on the hard drive.

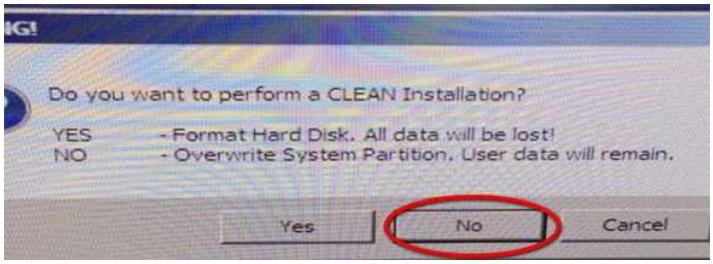


Figure 8-195 Select No.

8-7-6-5-2 Install the Base Image (System Software) and the Application Software (cont'd)

6.) A new warning is displayed.

About to overwrite System Partition. Continue?

Figure 8-196 About to overwrite System Partition

Select **Yes**.

7.) The installation program starts and will:

- copy the Base Image image-files from the UFD to the Repository partition
- deploy the Base Image to the C: partition
- copy the Application Software (7z-file) from the UFD to the Repository

These tasks may last for approximately 18 minutes.

After the tasks above have completed, a new dialog tells you to remove the installation media (UFD).

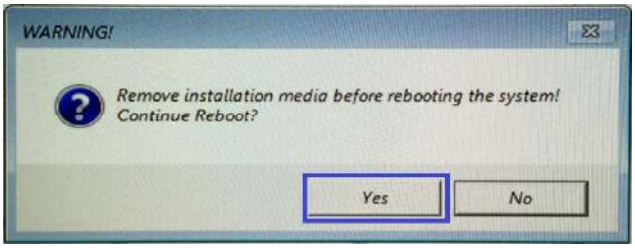


Figure 8-197 Remove the UFD, then select "Yes".

8.) Remove the UFD, then select **Yes**.

The software installation continues:

a.) The ultrasound system reboots, now starting from the new Windows software on the C: drive for the first time.

b.) The base image configuration continues on the targeted hardware.

Several restarts will occur before the setup is complete.

8-7-6-5-2 Install the Base Image (System Software) and the Application Software (cont'd)

The warning "Disk encryption is not enabled" is displayed on the screen.

Figure 8-198 Disk encryption is not enabled

c.) Select **OK** to continue.

A warning about the default password is displayed:

At least one of the build in users, ADM or USR still have the default passwords. Please set new passwords to increase the security on the system.

Figure 8-199 Built-in users have standard password

d.) The systems completes the booting.

8-7-6-6 Install the Application Software from Factory UFD

When installing the Application Software from the UFD, the ultrasound system must boot from the hard drive.

NOTE: The USB Flash Drive with the software is often called the Factory UFD, since it is also used when setting up new systems at the factory.

8-7-6-6-1 Preparing the Ultrasound System for the software installation

- Disconnect all external USB devices.

8-7-6-6-2 Install Application Software from Factory UFD

1.) With the ultrasound system running, plug in the Software UFD in one of the USB ports on the ultrasound system.

2.) Restart the ultrasound system.

Wait for the Start Application dialogue box to appear.

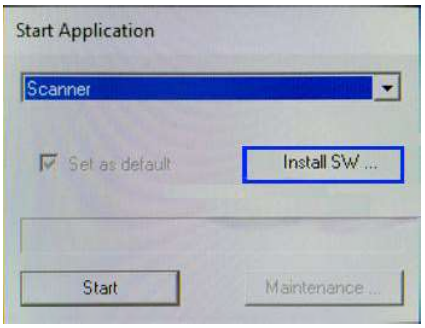


Figure 8-200 Select “Install SW …”

3.) Click **Install SW …**

4.) A new dialog is displayed on screen:

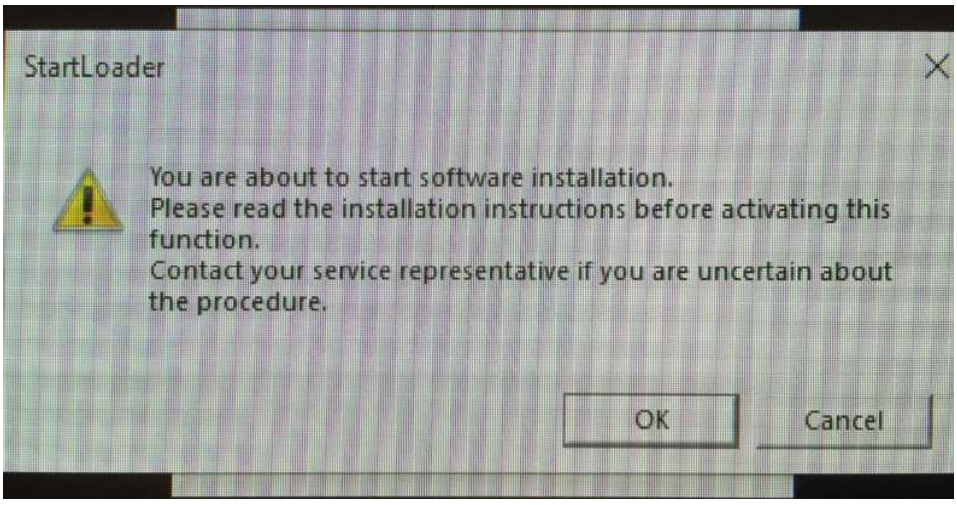


Figure 8-201 You are about to start software installation

8-7-6-6-2 Install Application Software from Factory UFD (cont'd)

5.) Click **OK**. A window with the software package is displayed:

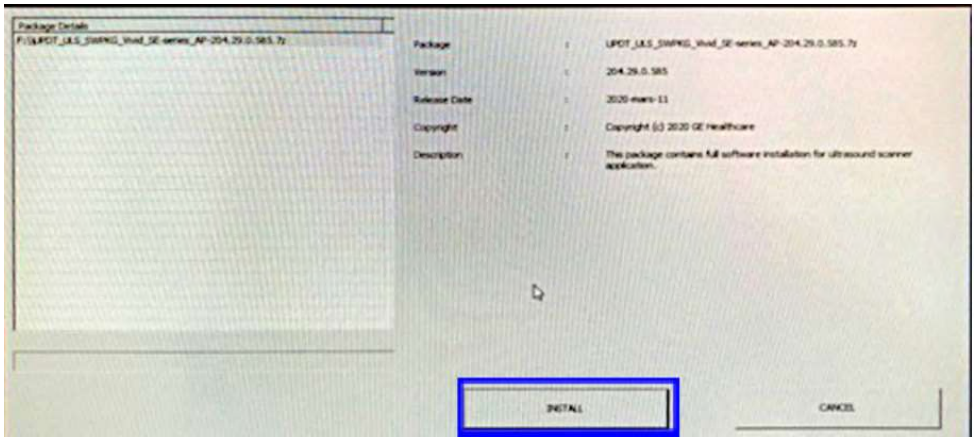


Figure 8-202 Click "Install"

6.) Click **Install**.

The installation program starts and will:

a.) copy the Application Software (7z-file) from the UFD to the Repository
b.) do an automatically restart
c.) install the Application Software
d.) do an automatically restart
e.) reprogram the DACQ firmware
f.) do an automatically restart

When these tasks have completed, the Start Application dialog is displayed once more.

7.) Unplug and remove the UFD.

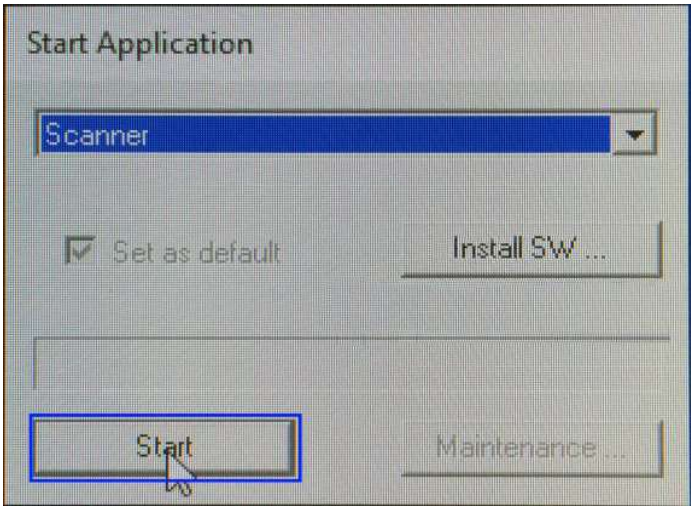


Figure 8-203 Select 'Start'

8-7-6-6-2 Install Application Software from Factory UFD (cont'd)

8.) After removing the UFD, select **Start** to continue.

If the warning "Disk encryption is not enabled" is displayed on the screen, select **OK**.

Figure 8-204 Disk encryption is not enabled

If the warning about the default password is displayed, select **OK**.

(Text in the Warning: At least one of the build in users, ADM or USR still have the default passwords. Please set new passwords to increase the security on the system.)

Figure 8-205 Built-in users have standard password

8-7-6-6-2 Install Application Software from Factory UFD (cont'd)

9.) Select **OK** to continue.
A New Software Verification window is displayed.

Figure 8-206 Software verification

10.) Perform a check for all features listed.

- Press [?] to get information on how to check each feature.
- Press [<<] to minimize the Software verification window and move it out of the way when testing.
- Select Passed or Failed for each feature. If all features are "Passed" the signature field is enabled.

CAUTION **If for any reason you select "Failed" for one of the features tested, the system will roll back to the software version that has passed the verification checks last time. Please call your local service immediately.**

8-7-6-6-3 Software Rollback

Installs the previous software from compressed files stored on the repository partition on the hard disk.

An automatic Software Rollback is initiated if any of the tests after the software upgrade fails.

8-7-7 If the Software Installation fails

In the event that the Software Installation Procedure fails, follow the instructions below:

1) Try to re-install the software.
2) If failure persists, try different software installation media.
3.) If this was a new software revision, try to reinstall the previous software version.
4.) If if it still not possible to install the software, this may be indicative of a hardware problem. In this event, contact the On-Line Center for further assistance.

8-7-8 Loading Windows Patches

8-7-8-1 Loading Windows Patches

As part of the product lifecycle management, GE regularly analyzes and integrates software updates from our third party vendors into our products. These are typically released as part of regular updates or software releases.

To load a Windows patch onto the ultrasound system,

1.) Power down the ultrasound system and insert the Windows Patch USB Flash Drive into a rear USB port.

NOTE: Ensure that the system is USB Device Enabled (check Config->Service page).

2.) Power on the ultrasound system. Windows Patch files will be loaded onto the ultrasound system automatically, following several screen prompts:

a.) Select **New Install SW...** on the Start Application screen.

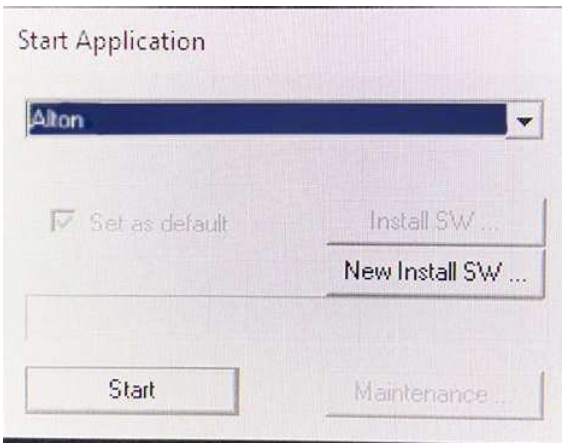


Figure 8-207 Select New Install SW...

b.) Select **OK** on the first two StartLoader screens.

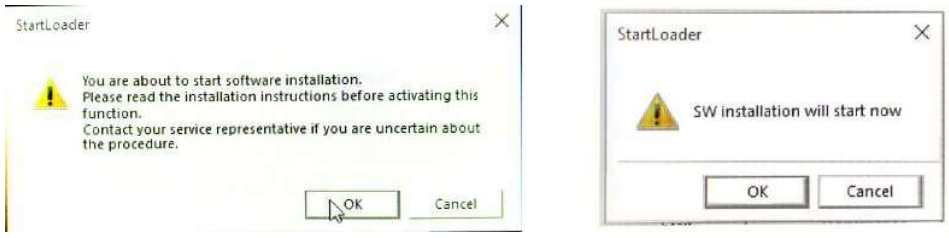


Figure 8-208 Press OK

8-7-8-1 Loading Windows Patches (cont'd)

c.) Select **Install** on the third StartLoader screen where new patch SW installation will start.

NOTE: The Patch package is installed at the root folder or under the SWLoad directory in the root folder of the USB.

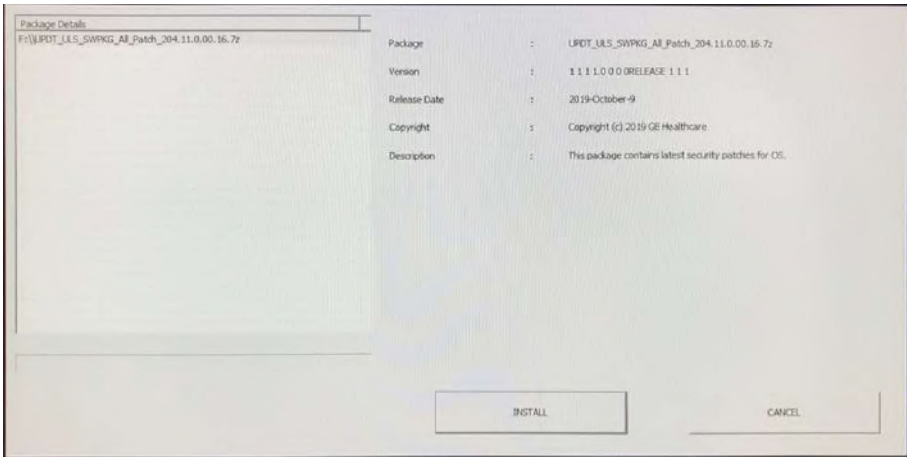


Figure 8-209 Patch Disk Details

d.) At the pop-up dialog, unplug USB and select **OK** to continue the process.

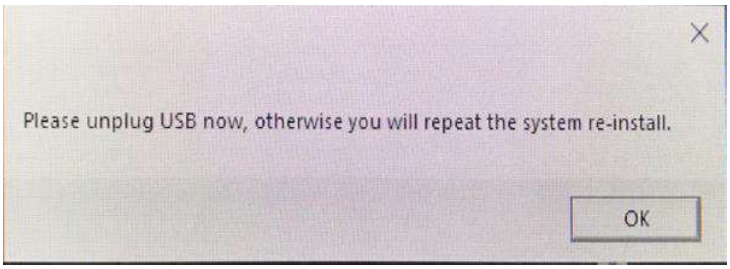


Figure 8-210 Unplug the UFD

ultiple screens appear during the software re-imaging installation process. **DO NOT** interrupt this process **AND** follow instructions as they appear on the display.

e.) Once the installation is complete, a message displays saying that the "Software Installation completed successfully. System will reboot now." The ultrasound system restarts.

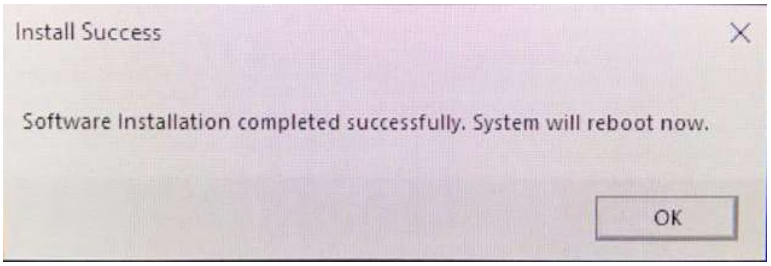


Figure 8-211 SW installation completed

8-7-8-1 Loading Windows Patches (cont'd)

3.) When the system starts up after the software installation has finished, the following dialog displays: the "New Software Verification" Checklist.

*NOTE: The Software Patch Verification dialog is critical. You **MUST** perform software verification after downloading and installing a software update.*

a.) If you are able to successfully perform each function, then Pass all of the items and type your name into the Signature box and press **OK**. Press the Question Mark if you have questions about how to perform this task.

CAUTION **Perform a check for all the features listed. You MUST ensure that the entire system functions normally, as expected, in each of the categories listed on the New Software Verification checklist.**

These verification results are tracked for regulatory purposes, sent back to GE for tracking, and approved with your signature.

b.) As you verify that each feature works correctly, select *Passed*. If all features work correclty and *Passed* is filled in for all features, then the signature field is enabled at the bottom of the New Software Verification Checklist.

Type your signature (minimum of three characters) and press **OK**. The system is now ready for use.

Figure 8-212 Verify the new software

8-7-8-1 Loading Windows Patches (cont'd)

The version of the installed Patch appears on the Service Desktop -> Software Maintenance -> Software Information.

WARNING **If** any of the features **DID NOT** function as expected, you need to select *Failed* next to the feature that failed, see step c. Proceed as described in step d.

c.) If one of the steps fails, then Fail the item(s).

Figure 8-213 If verification failed: Roll-back

d.) Type your *Signature*, then press **Roll-back**. The previous version of software will be reloaded onto the system automatically.

e.) Load the latest system patch which should be stored with the software located with the ultrasound system.

8-7-8-2 Patch Installation Notes

If by accident you try to load a patch that is not compatible with the software on the ultrasound system, an error message will notify you of this incompatibility.

If there is any issue with the media, an error message will indicate "The package cannot be installed. The package is not compatible or has been tampered. Please contact GE Service."

The system may reboot multiple times during patch/software update.

8-7-9 Load the on-board User Manuals

The on-board User Manuals are included on the Manual UFD and are not installed as part of the Application software.

Follow these steps to install the on-board user manuals:

1.) Restart the ultrasound system.
2.) When the Windows logo appears, insert the user doc UFD.
3.) The Start Application screen appears.
4.) Select Install SW.
5.) Follow the on-screen instructions to install the on-board user manuals.

Section 8-8
Peripherals - Replacement Procedures

8-8-1 DVD/CD-RW Drive Replacement Procedure

8-8-1-1 Tools

Use the appropriate Phillips-type screwdrivers.

8-8-1-2 Preparations

Shut down the ultrasound system.

8-8-1-3 DVD/CD-RW Drive Removal Procedure

1) Remove the following covers: *left* side, *right* side, *front, right* rear, *left* rear.

2.) Loosen and remove the two Phillips screws on either side of the securing panel (that holds the DVD/CD-RW Drive in position), as indicated in Figure 8-214.

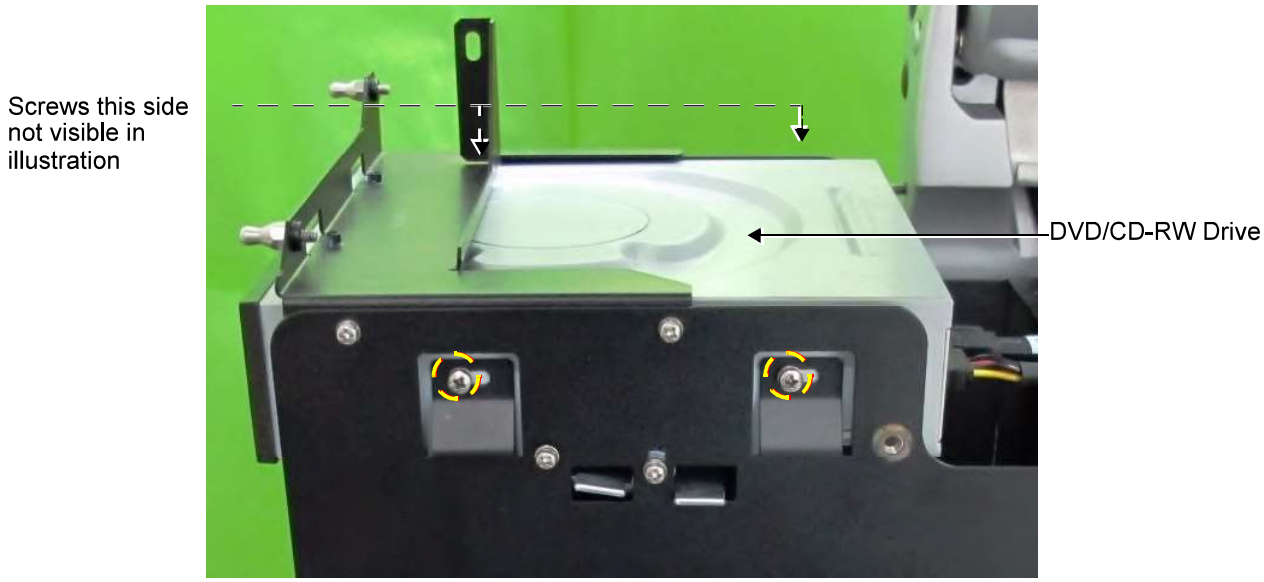


Figure 8-214 Screws Securing DVD/CD-RW Drive in Position

8-8-1-3 DVD/CD-RW Drive Removal Procedure (cont'd)

3.) Disconnect the SATA DVD cable and the SATA DVD power cable from the rear of the DVD /CD-RW Drive, as indicated in Figure 8-214.

Figure 8-215 Cables Connected at Rear of DVD/CD-RW Drive

4.) Slide the DVD /CD-RW drive out of its compartment.

8-8-1-4 DVD/CD-RW Installation Procedure

5.) Carefully place the replacement DVD /CD-RW Drive into the Peripheral Console.

6.) Connect the new DVD cable as follows:

   a.) Connect the DVD SATA cable (P/N 5417774) to the DVD and plug it into Port 2 on the BIF.

   b.) Connect the SATA power cable (P/N 5417776) to the DVD and plug it into Port 3 on the BIF (see the connection map located on the sub-woofer).

7.) Refit the covers, previously removed:

8.) Verify that the DVD is aligned with the cover on the Vivid S60N/Vivid S70N.

8-8-2 Black and White Printer Replacement Procedure

NOTE: This section describes removal and replacement procedures only. For initial installation and configuration instructions, refer to the information provided in Chapter 3 - System Setup.

Figure 8-216 Black and White Printer

NOTE: When replacing the Black and White Printer, make sure the correct cover kit has been ordered, if applicable. Refer to Chapter 9 - Renewal Parts for details.

8-8-2-1 Tools

Use the appropriate screwdrivers as indicated in the Black and White Printer replacement procedure.

8-8-2-2 Preparations

Shut down the ultrasound system as described in Power Shut Down on page 4 - 8.

8-8-2-3 Black and White Printer Removal Procedure

1) Remove the following covers: *left* side, *right* side, *front, AC Distribution Box*.

8-8-2-3 Black and White Printer Removal Procedure (cont'd)

2.) Loosen the two lower Phillips screws on either side of the Peripherals Console (that secures the Black and White Printer in position), as indicated in Figure 8-217.

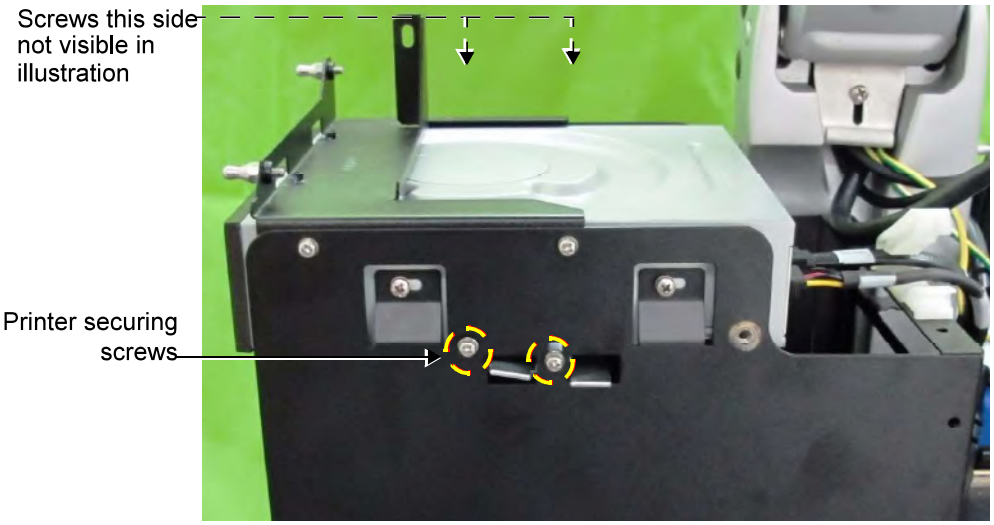


Figure 8-217 Screws Securing Black and White Printer in Compartment

3.) Disconnect the USB cable and the power cable from the rear of the Black and White Printer, as shown in Figure 8-218.

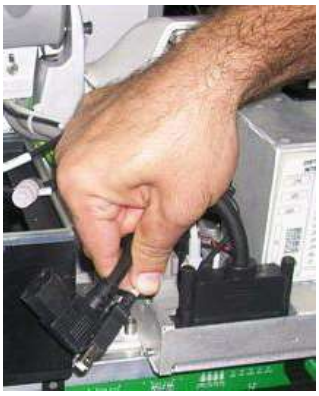


Figure 8-218 Cables Disconnected from Rear of Black and White Printer

4.) Carefully push the Black and White Printer out of the compartment, while holding it firmly to prevent it from falling.

5.) Remove the printer and place it on a flat, stable surface.

8-8-2-4 Black and White Printer Installation Procedure

1.) Carefully place the replacement Black and White Printer into the compartment. Slide it all the way in, making sure it is properly seated against the rear of the compartment.

2.) Re-connect the USB cable and the power cable to the rear of the printer - refer to, as indicated in Figure 8-218.

3.) Tighten the two lower Phillips screws previously released from either side of the Peripherals Console (refer to Figure 8-217). Make sure the printer is firmly secured in position.

4.) Refit the covers previously removed.

This page was intentionally left blank.

Chapter 9
Renewal Parts

Section 9-1
Overview

9-1-1 Purpose of Chapter 9

This chapter gives you an overview of replacement parts for the Vivid S60N/Vivid S70N.

Table 9-1 Contents in Chapter 9

NOTE: In the detailed Parts lists, illustrations are accompanied by FRU names, corresponding Part Numbers and a compatibility matrix.

This Replacement Procedure icon  *indicates that a replacement procedure is available and includes a link to the instructions in Chapter 8 - Replacement Procedures.*

NOTE: The illustrations provided in this chapter are for illustration purposes only and are subject to change without notice.

Section 9-2
List of Abbreviations

Assy	-	Assembly
BEP	-	Back End Processor
BIF	-	Back End Interface
CMST		CSound Master Board
CRU	-	Customer Replaceable Unit
Ctrl	-	Control
FEP	-	Front End Processor
FEPS	-	Front End Power Supply
FRU	-	Field Replaceable Part
HDD	-	Hard Disk Drive
Int	-	Internal
I/O	-	Input/Output
LCD	-	Liquid Crystal Display
OP	-	Operating (or Operator) Control Panel
PSB	-	Probe Selection Board
PWA	-	Printed Wire Assembly
Recv	-	Receive
TS	-	Touch Screen
XFRMR	-	Transformer

Section 9-3
Renewal Parts Lists

9-3-1 Content in this Section

9-3-2 Mechanical Parts

Table 9-2 Mechanical Parts, sheet 1 of 2

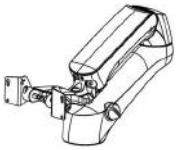
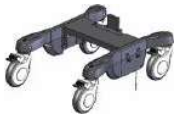
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	JOINT ASSY. R4 Black 	S2420695-1				RP
2	UPPER LOWER ARM ASSY. KIT. R4 Black 	S2421633-1				RP
3	Mechanical assembly-Interface base for operator panel FRU, R4 Black 	NS5450417-1				RP
4	PROBE SHELF VS6, R4 Black 	S2421613-1				RP
5	LCD Arm Alton 21.5in Wide -- for 21.5" Monitor 	5957000-180				RP
6	LCD Arm Riser - Alton -- for 21.5 inch monitor 	5737199				RP
7	Gas Spring FRU 	S5460989				RP

Table 9-2 Mechanical Parts, sheet 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
8	Gas Spring Cable	S2420834				RP
9	VS60 and VS70 Lock Caster  *Note!* *This caster is installed on the left-hand side on the rear of the console (seen from the front of the console).*	5748386-S				RP
10	VS60 and VS70 Swivel Rear right Caster  *Note! This caster is used on the right-hand side on the rear of the console (viewed from the front of the console) and in both the left and the right-hand sides on the front of the console.*	5748387-S				RP
11	Rear Handle Kit 	S2424091				RP
12	Mechanical assembly-Base console FRU, R4 Black 	NS5507214-1				RP
13	Column_Main support assy FRU, R4 Black 	NS5409464-1				RP

9-3-3 Covers

Table 9-3 Covers, sheet 1 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
1	Cover-AIR INLET ONYX BLACK FRU R4 	S5490611-1				RP	No
2	Cover-LEFT SIDE ONYX BLACK FRU R4 	S5490610-1				RP	No
3	Cover-LEFT SIDE BLANK ONYX BLACK FRU, R4 Black 	S5490605-1				RP	No
4	Cover-DVD assy ONYX BLACK FRU, R4. 	S5490608-1				RP	No
5	Cover-DVD and PRINTER ONYX BLACK FRU, R4 Black 	S5490607-1				RP	No
6	Cover for Printer assembly ONYX BLACK FRU, R4 	S5490609-1				RP	No

Table 9-3 Covers, sheet 2 of 3

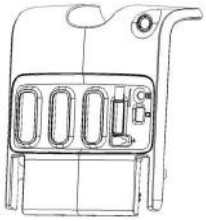
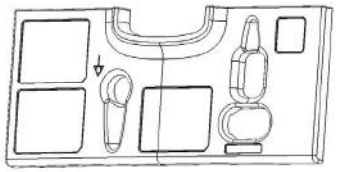
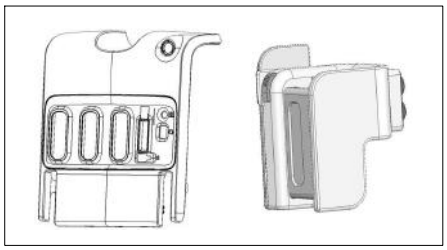
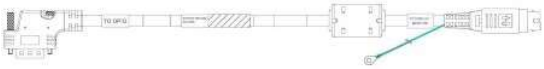
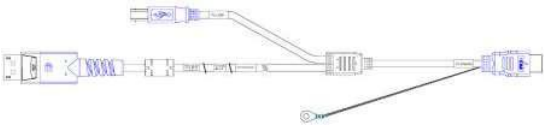
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
7	Cover-REAR RIGHT FRU 	S5490604				RP	No
8	S5490603 	S5490603				RP	No
9	Cover-FRONT assy RS FRU Note: It is also necessary to order GE logo kit PN 5543611 	S5490614				RP	No
10	Cover-AC BOX FRU 	S5490612				RP	No
11	Air filter FRU 	S5432149				RP	Yes

Table 9-3 Covers, sheet 3 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
12	RS cable locker assy FRU (cable restrainer) Note: also necessary to order GE logo kit PN 5543611 	S5534095				RP	No
13	Alton Touch Panel Rear Cover SVC Kit  Cover-Touch panel_Rear FRU	5750792-S S5437448				RP	No
14	Alton Touch Panel Back Service Cover SVC Kit 	5750793-S S5453526				RP	No
15	Rear box FRU 	S5445377				RP	No
16	OPIO BASKET FRU 	S5460993				RP	No
17	Screws kit for Monitor FRU	5490637					No

9-3-4 Monitor Parts

Table 9-4 21.5" Monitor Parts

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	21.5 INCH LCD MONITOR without glass filter (Order the label GC314438 together with the monitor) 	5501560-15 5501560-13				RP
2	POWER TO DISPLAY CABLE - WHITE - FOR ERGOTRON ARM - 21,5IN MONITOR 	S5737737-01				
3	BIF TO DISPLAY DP CABLE - White 	S5737736				
4	GND Cable - 460 mm - White - Yellow_green heat shrink tube on ends - M4 Terminals - service 	S5750190-01				

9-3-5 Operator Panel

9-3-5-1 Operator Panel parts

Table 9-5 Operator Panel parts, sheet 1 of 2

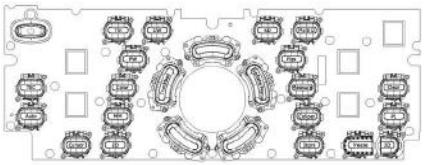
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
1	OPIO KBD Assy SVC Kit (including cable for the Encoder Board) (Without Touch Screen)  Necessary to also order: • Operator Panel Label: - for Vivid S60N: PN: 5791217-1-S - for Vivid S70N: PN: 5791216-1-S • GE logo kit PN: 5543611.	5750840-1-S				RP	No
2	Alton Functional and Power Keys SVC Kit 	5750839-1-S				RP	No
3	Vivid S60 S70 Touch Screen Module SVC kit, R4 Black  Additional Parts needed: • 5750840-S OPIO KBD Assy SVC Kit • 5746901-S Alton Soft KBD PWA SVC Kit (Encoder Board) • 5750293-S Alton Rotary Keys SVC Kit • 5746912-S TP Display cable • 5750792-S TS Rear Cover • 5750793-S TS Rear Service Cover	5778989-1-S				RP	No

Table 9-5 Operator Panel parts, sheet 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
4	Alton Rotary Keys SVC Kit The kit includes the following parts: - 8 x Big Rotaries Cap Assy - 3 x Small Rotaries Cap Assy - 11 x Knob Spring 	5750293-S				RP	Yes
5	Keycaps Kit for Operator Panel 	5490616				RP	No
6	Screws Kit for Operator Panel	5490615				N/A	No
7	Alton Soft KBD PWA SVC Kit 	5746901-S				RP	No
8	Alton trackball SVC kit 	5750826-S				RP	No
9	Trackball Ring 	5661884				RP	No
10	Label-GE Logo 40mm (2 per kit) 	5543611				RP	No
11	Alton Label Vivid S70N SVC Kit 	5791216-1-S				RP	No
12	Alton Label Vivid S60N SVC Kit 	5791217-1-S				RP	No

9-3-5-2 Optional Alphanumeric Keyboard

Table 9-6 Optional Alphanumeric Keyboard , sheet 1 of 2

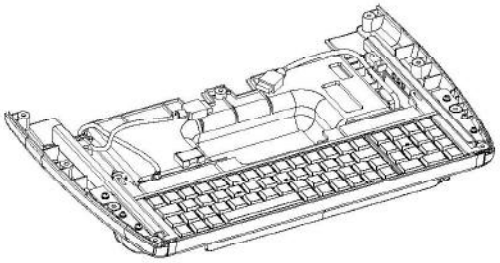
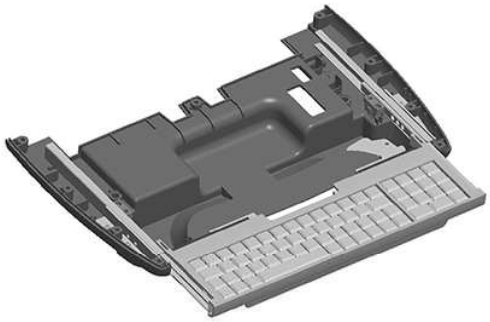
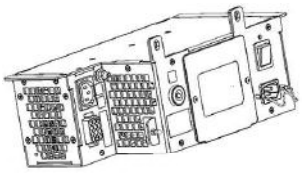
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
1	ALTON AN DRAWER - English International with package 	5767065	5459218			RP	No
2	Alton AN Drawer German with package	5767065-2				RP	No
3	Alton AN Drawer French with package	5767065-3				RP	No
4	Alton AN Drawer Spanish with package	5767065-4				RP	No
5	Alton AN Drawer Italian with package	5767065-5				RP	No
6	Alton AN Drawer Portuguese with package	5767065-6				RP	No
7	Alton AN Drawer Russian with package	5767065-7				RP	No
8	Optional A/N Keyboard Kit (complete with OPIO bottom cover) 	5459218		5767065		RP	No
9	English A-N Keycaps kit	S5439674				RP	Yes
10	Danish A-N Keycaps kit	S5439674-10				RP	Yes
11	Finnish A-N Keycaps kit	S5439674-11				RP	Yes
12	French A-N Keycaps kit	S5439674-3				RP	Yes
13	German A-N Keycaps kit	S5439674-2				RP	Yes
14	Italian A-N Keycaps kit	S5439674-5				RP	Yes
15	Norwegian A-N Keycaps kit	S5439674-13				RP	Yes
16	Polish A-N Keycaps kit	S5439674-14				RP	Yes
17	Portuguese A-N Keycaps kit	S5439674-6				RP	Yes
18	Russian A-N Keycaps kit	S5439674-9				RP	Yes

Table 9-6 Optional Alphanumeric Keyboard (Cont'd), sheet 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
19	Spanish A-N Keycaps kit	S5439674-4				RP	Yes
20	Swedish A-N Keycaps kit	S5439674-12				RP	Yes

9-3-6 Power Parts

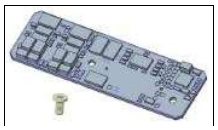
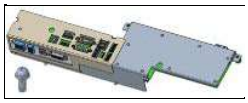
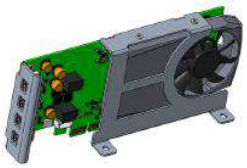
Table 9-7 Power Parts

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc	CRU
1	AC Box module 	5750877-2-S	5750877-S S5399339			RP	No
2	Spare part for the battery pack assembly for Alton 	S5399340-2	S5399340			RP	No

9-3-7 Back End Unit

9-3-7-1 Back End Processor (BEP) parts

Table 9-8 Mini cSound Back End Unit

Item	Part Name		Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	COMe FRU		S5804145-2	NS5804145 S5804145			
2	BEP & CPU Module FRU The kit includes the following parts: • BEP Module---1pcs • CPU Module---1pcs • Screw M3x13---1pcs • Screw M3x8---6pcs • Screw M3x8---2pcs • Screw M2.5x20---5pcs		NS5804145 S5804145		S5804145-2		RP
3	CWD PWA FRU The kit includes the following parts: • ALTON CWD PWA---1pcs • Screw M2.5x5---2pcs		NS5764721-2 S5764721-2				RP
4	Hard Disk Module FRU The kit includes the following parts: • Hard Disk Module---1pcs • Screw M3x8---2pcs • SATA cable • Power cable		NS5767525-2 S5767525-2	NS5767525 S5767525			RP
5	Hard Disk Module FRU The kit includes the following parts: • Hard Disk Module---1pcs • Screw M3x8---2pcs • SATA cable • Power cable • Tie-wrap (introduced 2020)		NS5767525 S5767525		NS5767525-2 S5767525-2		RP
6	BIF Module FRU The kit includes the following parts: • BIF Module Assy ---1pcs • Screw M3x8---2pcs		NS5766993 S5766993				RP
7	GPU Module FRU		NS5778606 S5778606				RP
8	CMOS Battery FRU		NS5145407 S5145407				RP

9-3-8 Front End Unit

Table 9-9 Mini cSound Front End Unit, sheet 1 of 2

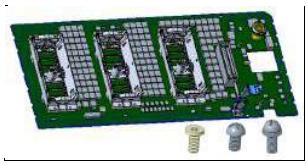
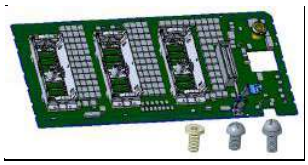
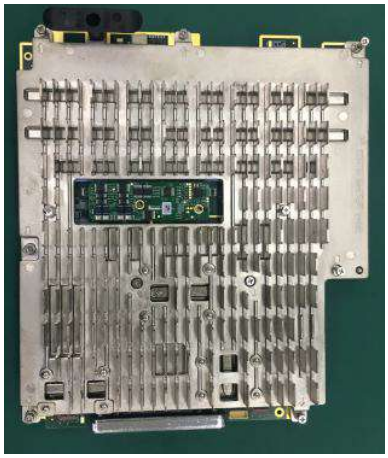
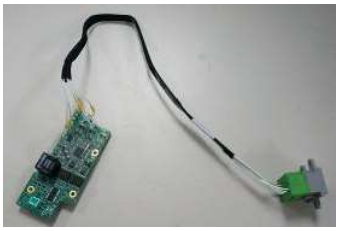
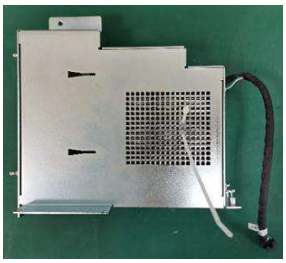
Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	PSB Module Vivid S60-S70, R3 Forward Added support for ML6-15-D probe for version 204 only. Backward compatible. 	NS5766836-2 S5766836-2	NS5766836 S5766836			RP
2	PSB Module FRU (Introduced for R3)  The kit includes the following parts: • Relay Sub Assy ---1PCS • Screw M3x8---11pcs • Plastic Screw M3x5---3pcs • Screw M3x6---3pcs	NS5766836 S5766836		NS5766836-2 S5766836-2	ML6-15-D probe	RP
3	CMST Module FRU  The following parts are included: • CMST Module -- 1pcs • Screw M3x8 -- 9pcs • ALTON R2 PATIO BEP2CMST cable -- 1pcs • Plastic screw M3x6 -- 3pcs • M3 hand spin screw -- 2pcs	NS5766838 S5766838				RP

Table 9-9 Mini cSound Front End Unit, sheet 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
4	ECG Module FRU  The kit includes the following parts: • ALTON ECG Input Cable---1pcs • ECG TO MAT Cable---1pcs • Plastic Screw M3x5---3pcs • Screw M3x8---16pcs • Screw M3x6---3pcs • Plastic standoff--- xx pcs	NS5802128 S5802128				RP

9-3-9 FEPS

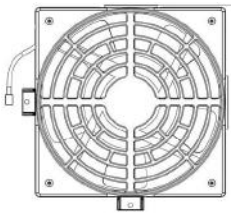
Table 9-10 Mini cSound FEPS

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	FEPS Module  The kit includes the following parts: • FEPS Module---1pcs • Screw M3x8---5pcs	NS5767344 S5767344				

9-3-10 Electro Mechanical Parts

9-3-10-1 Electro Mechanical Parts

Table 9-11 Electro Mechanical Parts

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	FAN Module FRU FAN Module FRU 	NS5766826 S5766826				

9-3-11 Software

Figure 9-1 Software

9-3-11-1 Software

Table 9-12 Software

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	BC100830-41-1 spare part	BC100830-41-1				
2	Vivid S70N S60N v204 v36.1 service version	BC100830-36-1				

9-3-12 Cables

9-3-12-1 System Cables

Table 9-13 System Cables

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	HDD Power Cable FRU 	NS5767763 S5767763				RP
2	FEPS to BIF Cable FRU 	NS5766269 S5766269				RP
3	STD Cable FRU 	NS5444463 S5444463				RP
4	FEPS to CMST Cable FRU 	NS5766268 S5766268				RP
5	BEP to CMST Cable FRU 	NS5777312 S5777312				RP

9-3-12-2 System Power Cables

Table 9-14 System Power Cables, sheet 1 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
1	POWER CABLE C15M 4,50M AUSTRALIA 	R2415383-7	S2414985-5		
	VS5,S6 POWER CABLE AUSTRALIAN KIT	S2414985-5		R2415383-7	
2	Power Cable C15M 3,00M Brazil 	5405959			
	Brazilian Power and periph. Cables Vivid S5_S6_i_q Cart RSPL Kit Kit with 5405959 and two other cables	5420774			
3	POWER CABLE C15M 4,50M UK 	R2415383-4	2415383-4 S2414985-6		
	VI CART POWER CABLE-UK/HK/SINGAPORE	2415383-4		R2415383-4	
	VS5,S6 POWER CABLE UK KIT	S2414985-6		R2415383-4	
4	POWER CABLE C15M 4,50M CHINA 	R2415383-6	S2415383-6		
	V S5 S6 POWER CABLE CHINA	S2415383-6		R2415383-6	
5	Power Cable C13M 3,00M Denmark 	5439668	S2414985-4		
	VS5,S6 POWER CABLE DANISH KIT	S2414985-4		5439668	

Table 9-14 System Power Cables, sheet 2 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
6	POWER CORD C15M 3,00M EUROPE 	R2418616	2418616 S2414985-2		
	VI CART PWR CABLE EUROPE	2418616		R2418616	
	VS5,S6 POWER CABLE EURO PLUG	S2414985-2		R2418616	
7	POWER CABLE C15M 4,50M ISRAEL 	R2415383-1	S2414985-7		
	VS5,S6 POWER CABLE ISRAELI	S2414985-7		R2415383-1	
8	POWER CABLE C15M 4,50M JAPAN 	R2415383-5	5497798 and S2414985-8		
	VI CART POWER CABLE-JAPAN	5497798		R2415383-5	
	VS5,S6 POWER CABLE JAPAN (Peripherals Power Cable Japan)	S2414985-8		R2415383-5	
9	POWER CABLE C15M 4,50M SWISS 	R2415383-8	S2414985-3		
	V S5 S6 POWER CABLE SWISS	S2414985-3		R2415383-8	
10	POWER CABLE C15M 4,50M North America 	R2269460-2	S2414985		
	V S5 S6 POWER CABLE USA-CANADA	S2414985		R2269460-2	

Table 9-14 System Power Cables, sheet 3 of 3

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
11	POWER CABLE C15M 4,50M INDIA India / South Africa 	R2421019			

9-3-12-3 ECG Cables

Table 9-15 ECG Cables

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	CRU
1	ECG Ext. cable VS-Service Kit 	S2420410				✓
2	ECG CABLE SET Contents: • Cable • Adapter RCA male - BNC female • Adapter RCA female - 6 • Adapter RCA female - 3	FC200389				✓
3	Cable: ECG MARQ. AHA/America	164L0025				✓
4	Cable: ECG MARQ. IEC / EU+AS	164L0026				✓
5	Leadwires ECG MARQ. AHA / AMERICA	164L0027				✓
6	Leadwires ECG MARQ. IEC/EU+AS	164L0028				✓
7	ECG Cable, neo, AHA Multi-Link 3-lead ECG Care cable neonatal DIN, AHA (3.6 m/12ft) Used together with neonatal leads H45571RJ	2017004-001				✓
8	ECG cable, neo, IEC Multi-Link 3-lead ECG Care cable neonatal DIN, IEC (3.6 m/12ft) Used together with neonatal leads H45571RK	2017004-003				✓

9-3-13 Optional Peripherals

Table 9-16 Optional Peripherals, sheet 1 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
1	DVD RW Drive SATA 	066E8899				
2	Color Laser Printer 220V  Report Printer with network capabilities, either:					
	HP Color LaserJet Pro M454dn, 220V-240V w/ additional HP Power Cords	066E8935	066E8922 066E3023 5456780			
	HP Color LaserJet Pro M452, 220V-240V -- Going Obsolete	066E8922	066E3023	066E8935		
	HP Laser Jet Pro 400 Color M451 (220V) -- Obsolete	066E3023		066E8935		
	LaserJet Pro M451 220V Printer RSPL Kit -- Obsolete	5456780		066E8935		
3	Color Laser Printer 110V  Report Printer with network capabilities, either:					
	HP Color LaserJet Pro M454dn, 110V-127V w/ additional HP Power Cords	066E8936	066E8923 5438549 066E3024			
	HP Color LaserJet Pro M452, 110V-127V -- Going Obsolete	066E8923	066E3024	066E8936		
	HP LaserJet Pro M451 110V Printer RSPL Kit -- Obsolete	5438549		066E8936		
	HP Laser Jet Pro 400 Color M451; 110-120V -- Obsolete	066E3024		066E8936		
4	Aurora Alton Wireless Interface USB Adapter kit Requires software version 202 revision 34.0 or higher. Content in the kit: • Netgear A6210 WiFi USB Adapter, including USB-Docking for A6210   • Wi-Fi label • Velcro tape strips for attaching the USB-Docking to the ultrasound system	GC200539			v201	

Table 9-16 Optional Peripherals, sheet 2 of 2

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With	Repl Proc
5	USB Sandisk-Cruzer RSPL Kit 	5460632				
6	3 button foot switch Rev1.1 	5380960-2				
7	A6 Color Printer Sony UP-D25MD 	066E2956				
8	SONY UP-D898MD DIGITAL A6 BW PRINTER 	5555265				
9	Epiphan VGADVI Broadcaster (Used for View-X)  For Installation Instruction, see: • Epiphan DVI Broadcaster Installation Manual, Direction Number: GC294481	066E8925			Software v201	
10	Video BOX for CVUS SVC KIT	5794927-S			Software v201 or v202	
11	CABLE ETHERNET PATCH 5,00M	070D2950				
12	ETHERNET CROSSOVER CABLE 5M	070D2951				

9-3-14 Jigs

Table 9-17 Jigs

Item	Part Name	Part Number	Can Replace Part #	Can Be Replaced by Part #	Not Compatible With
1	PENCIL PROBE JIG-VS5,S6-IB 	S2421758		5498103	
	PENCIL PROBE JIG-VS5_S6-IB 	5498103	S2421758		
2	DISPLAY PORT and power ADAPTER JIG FRU 	5499567			

Chapter 10
Care and Maintenance

Section 10-1
Overview

10-1-1 Purpose of Chapter 10

This chapter describes **Care and Maintenance** on the Ultrasound system and peripherals. These procedures are intended to **maintain the quality** of the Ultrasound **system's performance**. Read this chapter completely and familiarize yourself with the procedures before performing a task.

10-1-2 Care and Maintenance

Normal Care and Maintenance is mandatory; it is the responsibility of the customer and includes the following:

- Quality Assurance Program to perform routine quality control testing.

NOTE: Some customers' Quality Assurance Programs may require additional tasks and or inspections at a different frequency than listed in this manual.

- System Maintenance and Checks (Preliminary System, Functional Checks, Peripheral, Cable, Physical Inspection).
- Probe Maintenance
- System Cleaning, including Air Filter Cleaning
- Electrical Safety Testing

*NOTE: It has been determined by engineering that your Ultrasound System **DOES NOT** have any high wear components that fail with use. **Therefore, Periodic Maintenance inspections are not mandatory for any Ultrasound system**. Only normal Care and Maintenance is recommended.*

10-1-3 Contents in this chapter

Table 10-1 Contents in Chapter 10

Section 10-2
Warnings

DANGER

THERE ARE SEVERAL PLACES INSIDE THE CAGE, THE AC DISTRIBUTION BOX, AND THE DISTRIBUTION INTERFACE BOARD (DIB) THAT COULD BE DANGEROUS. BE SURE TO DISCONNECT THE SYSTEM POWER PLUG AND TO TURN OFF THE POWER ON/OFF SWITCH BEFORE YOU REMOVE ANY PARTS. PROCEED WITH CAUTION WHENEVER POWER IS ON AND COVERS ARE REMOVED.

DANGER

DO NOT PULL OUT OR INSERT CIRCUIT BOARDS WHILE MAINS POWER TO THE SYSTEM IS ON.

CAUTION **PRACTICE GOOD ESD PREVENTION. WEAR AN ANTI-STATIC STRAP WHEN HANDLING ELECTRONIC PARTS AND WHEN DISCONNECTING/CONNECTING CABLES.**

CAUTION **Do not operate this ultrasound system unless all board covers and frame panels are securely in place. system performance and cooling require this.**

When covers are removed, EMI may be present.

CAUTION **To ensure the mutual protection and safety of GE service personnel and our customers, all equipment and work areas must be clean and free of any hazardous contaminants before a Service Engineer starts a repair. This includes, but is not limited to, decontamination and/or sterilization, depending on the application or use of the medical device.**

Section 10-3
Why do Maintenance

10-3-1 Keeping Records

It is good business practice that ultrasound facilities maintain records of all corrective maintenance and care and maintenance on Ultrasound systems where it is applicable. The Ultrasound Equipment Quality Check form provides the customer with documentation that the Ultrasound system is maintained regularly.

A copy of the *Ultrasound Equipment Quality Check* form should be kept in the same room or near the Ultrasound system.

10-3-2 Quality Assurance

In order to gain accreditation from organizations such as the *American College of Radiology* (*USA*), it is the customer's responsibility to have a quality assurance program in place for each Ultrasound scanner. The program must be directed by a medical physicist, the supervising radiologist/physician or appropriate designee.

Routine quality control testing must occur regularly. The same tests are performed during each period so that changes can be monitored over time and effective corrective action can be taken.

Testing results, corrective action, and the effects of corrective action, must be documented and maintained on site.

Your GE service representative can help you with establishing, performing and maintaining records for a quality assurance program. Contact GE for coverage and/or price for service.

Section 10-4
Maintenance Task Schedule

10-4-1 How often should maintenance tasks be performed?

The Customer Care & Maintenance Task Schedule (provided in Table 10-2 on page 10-5) specifies how often the ultrasound system should be serviced, and outlines items requiring special attention.

NOTE: It is the customer's responsibility to ensure the Ultrasound System care and maintenance is performed as scheduled in order to retain its high level of safety, dependability and performance.

Your GE Service Representative has an in-depth knowledge of your ultrasound system and can best provide competent, efficient service. Contact GE for coverage information and/or price for service.

The service procedures and recommended intervals shown in the Customer Care & Maintenance Task Schedule assumes that you use your ultrasound system for an average patient load (10-12 patients per day) and not use it as a primary mobile ultrasound system which is transported between diagnostic facilities.

NOTE: If conditions exist which exceed typical usage and patient load, it is strongly recommended to increase the maintenance frequencies.

Table 10-2 Customer Care & Maintenance Task Schedule

Service at Indicated Time	Daily	Weekly	Monthly	Per Facility's QA Program	Notes
Clean Probes	•*				* or before each use
Clean Probe Holders	•				
Clean Air Filters		•			More frequently if necessary, depending on the environment
Inspect AC Mains Cable			•		Mobile Ultrasound system: Check Weekly
Inspect Cables and Connectors			•		
Clean Console			•		
Clean Monitor and Touch Panel			•		
Inspect Wheels, Casters, Brakes and Swivel Locks			•		Mobile Unit: Check Daily
Check Operator Panel Movement			•		Mobile Unit: Check Daily
Console Current Leakage Checks				•	Also after corrective maintenance.
Peripheral Current Leakage Checks				•	Also after corrective maintenance.
Surface Probe Current Leakage Checks				•	Also after corrective maintenance.
Endocavity Probe Current Leakage Checks				•	Also after corrective maintenance.
Transesphongeal (TEE) Probe Current Leakage Checks				•	Also after corrective maintenance.
Surgical Probe Current Leakage Checks				•	Also after corrective maintenance.
Functional Checks				•	Also after corrective maintenance.

Section 10-5
System Maintenance

10-5-1 Preliminary Checks

The preliminary checks take approximately 15 minutes to perform. Refer to the *Vivid S60N/Vivid S70N User Manual* whenever necessary.

Table 10-3 System Preliminary Checks

Step	Item	Description
1.	Ask & Listen	Ask the customer if they have any problems or questions about the equipment.
2.	Paperwork	Fill in the top of the EQC inspection form. Record all probes and Ultrasound system options.
3.	Power-up	• Turn the Ultrasound system power ON and verify that all fans and peripherals turn On. • Watch the displays during power up to verify that no warning or error messages are displayed. • Where applicable, confirm that the battery is charged. If no AC Input present, use the internal battery.
4.	Probes	Verify that the Ultrasound system properly recognizes all probes.
5.	Displays	Verify proper display on the Monitor and Touch Screen.
6.	Review Error Logs	Where applicable, Error Logs can be reviewed via system diagnostics.
7.	Presets	Back-up all Customer Presets onto appropriate media.
8.	Image Archive	Back up the Image Archive onto appropriate media.

10-5-2 Functional Checks

NOTE: Refer also to Chapter 4 - General Procedures and Functional Checks, for additional details about the functional checks described in this section.

The functional checks take approximately 60 minutes to perform. Refer to the *Vivid S60N/Vivid S70N User Manual* whenever necessary.

10-5-2-1 System Checks

Table 10-4 System Functional Checks

Step	Item (or Mode)	Description
1.	B-Mode	Verify basic B-Mode (2D) operation. Check the basic Ultrasound system controls that affect this mode of operation.
2.	CF-Mode	Verify basic CF-Mode (Color Flow Mode) operation. Check the basic Ultrasound system controls that affect this mode of operation.
3.	Doppler Modes	Verify basic Doppler operation (PW and CW if available). Check the basic Ultrasound system controls that affect this mode of operation.
4.	M-Mode	Verify basic M-Mode operation. Check the basic Ultrasound system controls that affect this mode of operation.
5.	3D Mode	Where applicable, verify basic 3D Mode operation. Check the basic system controls that affect this mode of operation.
6.	Basic Measurements	Check Distance and Tissue Depth Measurement.
7.	Probe Elements	Perform an Element Test on each probe to verify that all the probe elements and system channels are functional.
8.	Applicable Software Options	Verify the basic operation of all optional modes such as Contrast. Check the basic Ultrasound system controls that affect each option's operation.
9.	Transmit/Receive	Verify that all system XMIT/RECV channels are functional, where applicable.
10.	Operator Panel test	Perform the Operator Panel Test Procedure.
11.	Keyboard	Do the interactive keyboard test.
12.	Touch Panel	Verify basic Touch Panel display functions.
13.	Monitor	Verify basic monitor display functions.
14.	Peripherals	See: Peripheral/Option Checks on page 10 - 8.

10-5-2-2 Peripheral/Option Checks

If any peripherals or options are not part of the system configuration, the check can be omitted.

Refer to the *Vivid S60N/Vivid S70N User Manual* for a list of approved peripherals/options.

Table 10-5 GE Approved Peripheral/Hardware Option Functional Checks

Step	Item	Description
1	Media	Verify media drive(s) read/write properly. Clean if necessary.
2	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5	ECG	Verify basic operation with customer.
6	Footswitch	Verify that the footswitch is functioning as programed. Clean as necessary.

10-5-2-3 Mains Cable Inspection

Table 10-6 Mains Cable Inspection, As Appropriate

Step	Item	Description
1	Unplug Cord	Disconnect the mains cable from the wall outlet and from the Ultrasound system.
2	Inspect	Inspect the mains cable and its connectors for any damage.
3	Verify	Verify that the LINE, NEUTRAL and GROUND wires are properly attached to the terminals, and that no strands may cause a short circuit.
4	Verify	Verify that the Inlet connector retainer is functional.

10-5-3 Physical Inspection

Table 10-7 Physical Checks

Step	Item	Description
1.	Labeling	Verify that all Ultrasound system labeling is present and in readable condition.
2.	Scratches & Dents	Inspect the exterior for dents, scratches or cracks.
3.	Covers	Where applicable, verify all covers are secured in place and are properly aligned with other covers. Replace any covers that are damaged.
4.	Wheels and Brakes	• Where applicable, check all wheels and casters for wear and verify operation of foot brake, to stop the Ultrasound system from moving, and release mechanism. • Where applicable, check all wheel locks and wheel swiveling for proper operation.
5.	Operating Panel Movement	• Where applicable, verify ease of Operator Panel (Operator Control Panel) movement in all acceptable directions. • Where applicable, ensure that it latches in position as required.
6.	Input Power	Refer to: Mains Cable Inspection on page 10 - 8.
7.	Operating Panel	Inspect alphanumeric keyboard and operator panel (operator control panel). Record any damaged or missing items.
8.	External I/O	Check all connectors for damage.
9.	Operating Panel Lights	Check for proper operation of all operator panel and TGC lights.
10.	LCD	Inspect the LCD Display for scratches and bad pixels. Verify proper operation of Contrast and Brightness controls. Where applicable, confirm that the LCD arm allows: • Swiveling the screen to the left and to the right • Folding the screen to the locked position • Release and adjustment backwards and forwards • Can be adjusted in the up/down positions. Note: LCD Arm movement may vary and is not applicable to all Ultrasound systems.
11.	Monitor Light	Check for proper operation of any monitor lighting, if available.
12.	Cables and Connectors	Check all internal cable harnesses and connectors for wear and secure connector seating. Pay special attention to probe strain or bend reliefs.
13.	Shielding and Covers	Check to ensure that all EMI shielding, internal covers, air flow panels and screws are in place. Missing covers and hardware could cause EMI/RFI problems while scanning.
14.	Control Panel	Inspect alphanumeric keyboard and Operator Panel. Record any damaged or missing items.
15.	Probe Holders	Where applicable, inspect the Probe Holders for cracks or damage.
16.	Power and System Status Indicators	Check for proper operation of all Power and System Status Indicators.
17.	Battery	Where applicable, check that the battery is not damaged, does not leak, does not emit an odor, and is not deformed or discolored. Observe all warnings and cautions for battery handling, recharging, storing, and/or disposal.

10-5-4 Cleaning

10-5-4-1 General Cleaning

Refer to the Vivid S60N/Vivid S70N User Manual for cleaning instructions.

10-5-4-2 Air Filter Cleaning

CAUTION **Lock the Ultrasound system's wheels prior to removing/cleaning the air filter. This prevents the system from moving unexpectedly.**

Table 10-8 Air Filter Cleaning - Frequency Varies with Your Environment

Step	Item	Description
1	Remove Filter Cover	Remove the left side cover from the system, as described in Air Inlet (Left Side) Cover Removal Procedure on page 8 - 6. Remove the air filter from the cover, as shown in Figure 8-4 on page 8-7.
2	Clean Filter	The filter can be cleaned in sprinkling water, or it can be dusted with a vacuum cleaner. If the filter is metal, wash and/or vacuum. If the filter is fiber or plastic, vacuum or replace. Dry the filter.
3	Install Filter	Install the clean (and dry) filter. Refer to the Air Filter Installation Procedure on page 8 - 7 for air filter installation instructions.

NOTE: For convenience (or if the air filter is excessively dirty), replacement filters are available.

10-5-5 Probe Maintenance

Refer to the Ultrasound System User Manual, the probe's User Manual/Probe Care Card, or Probe Addendum for probe maintenance, checks, cleaning, and disinfecting instructions.

WARNING ***To help protect yourself from blood borne diseases, wear approved disposable gloves. These are made of nitrile derived from vegetable starch to prevent allergic latex reactions.***

CAUTION **Failure to follow the prescribed cleaning or disinfection procedures will void the probe's warranty.**

DO NOT soak or wipe the lens with any product not listed in the User Manual. Doing so could result in irreparable damage to the probe.

Follow care instructions that came with the probe.

CAUTION **Disinfect a defective probe before you return it. Be sure to tag the probe as being disinfected.**

CAUTION **Transesophageal and intraoperative probes require a special handling. Refer to the user documentation enclosed with these probes.**

NOTE: GE does not substantiate the effectiveness of recommended disinfectant products. Questions regarding efficacy, instructions for use, and proper handling should be directed to the disinfectant manufacturer. GE publishes a list of material-compatible disinfectants (see below and also refer to the GE website at: https://www.gehealthcare.com/en/products/ultrasound/ultrasound-transducers. DO NOT use non-GE-approved disinfectants or products that have not been evaluated by GE for material compatibility. Damages linked to the use of disapproved chemicals are not covered under product warranty or service contract.)

NOTE: For details on general probe cleaning, refer to the information provided in the User Manual.

NOTE: For specific probe cleaning instructions, refer to the individual probe Users Manual (or care card supplied with the probe).

10-5-6 Probe Related Checks

Table 10-9 Probe Related Checks

Step	Item	Description
1	Probe Holder	Clean probe holders (they may need to be soaked to remove excess gel).
2	Probes	Thoroughly check the Ultrasound system probe connectors and remove dust from inside the connector sockets if necessary. Visually check for bent, damaged or missing pins.
3	Probes	Verify that the Ultrasound system properly recognizes all probes.

10-5-7 Probe Handling

All Vivid S60N/Vivid S70N probes are designed and manufactured to provide trouble-free, reliable service. To ensure this, the correct handling of probes is important and the following points should be noted:

- Do not drop a probe or strike it against a hard surface, as this may damage the probe elements and the acoustic lens, or may crack the housing.
- Do not use a cracked or damaged probe. Any evidence of wear indicates the probe must *not* be used. Call your field service representative immediately for a replacement.
- Perform a visual check of the probe pins and system sockets before plugging in a probe
- Avoid pulling, pinching or kinking the probe cable, since a damaged cable may compromise the electrical safety of the probe.
- To avoid the risk of a probe accidentally falling, do not allow the probe cables to become entangled with, or to be caught in the wheels of the system.
- Protect the probe when moving the unit.
- Use a soft cloth and warm, soapy water to clean the probe.

Note: For detailed information on handling Endocavity probes, refer to the appropriate supplementary instructions for each probe.

10-5-8 Basic Probe Care

The *Vivid S60N/Vivid S70N User Manual* and the individual probe manufacturers' handling cards provide a complete description of probe care, maintenance, cleaning and disinfection. Ensure that you are completely familiar with the proper care of GE probes.

NOTE: The most recent, up-to-date information on probes and probe care is available at:
https://www.gehealthcare.com/en/products/ultrasound/ultrasound-transducers

WARNING ***ANY EVIDENCE OF WEAR ON A PROBE INDICATES THAT IT MUST NOT BE USED. IMPROPER HANDLING MAY EASILY DAMAGE ULTRASOUND PROBES.***

SEE THE Vivid S60N/Vivid S70N USER MANUAL AND ALSO REFER TO THE PROBE MANUFACTURER'S HANDLING INSTRUCTIONS, FOR MORE DETAILS.

FAILURE TO FOLLOW THESE PRECAUTIONS CAN RESULT IN SERIOUS INJURY AND EQUIPMENT DAMAGE. FAILURE TO PROPERLY HANDLE OR MAINTAIN A PROBE MAY ALSO VOID ITS WARRANTY.

Always perform a visual check of the probe pins and system sockets before plugging in a probe.

When handling probes, always observe the precautions listed in Probe Handling on page 10 - 12.

The TEE and Interoperative probes often have special usage considerations; always refer to the individual probe manufacturers' handling instructions/user manual.

10-5-9 Returning and Shipping of Defective Probes

WARNING ***ALWAYS DISINFECT A DEFECTIVE PROBE BEFORE RETURNING IT TO THE MANUFACTURER. BE SURE TO TAG THE PROBE AS BEING DISINFECTED.***

CAUTION **TO HELP PROTECT YOURSELF FROM BLOOD-BORNE DISEASES WHEN CLEANING AND HANDLING PROBES, WEAR APPROVED, NON-ALLERGIC DISPOSABLE GLOVES.**

Equipment being returned must be properly clean and free of blood and other potentially infectious contaminants.

GE policy states that body fluids must be properly removed from any part or equipment prior to shipment. GE employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstances should a part or equipment be shipped before being visibly clean and properly disinfected.

The purpose of the regulation is to protect employees in the transportation industry, as well as the persons who will receive and/or open the package.

NOTE: The US Department of Transportation (DOT) has ruled that "items that were saturated and/or dripping with human blood that are now caked with dried blood; or which were used or intended for use in patient care" are "regulated medical waste" for transportation purposes and must be transported as a hazardous material.

10-5-10 Phantoms

The use of a Phantom is not required during Care and Maintenance. Customer may use it as part of their Quality Assurance Program tests.

Section 10-6
Electrical Safety Tests

10-6-1 Safety Test Overview

DANGER TO AVOID ELECTRICAL SHOCK, THE ULTRASOUND SYSTEM UNDER TEST **MUST NOT** BE CONNECTED TO OTHER ELECTRICAL EQUIPMENT. REMOVE ALL INTERCONNECTING CABLES AND WIRES. THE ULTRASOUND SYSTEM UNDER TEST MUST NOT BE CONTACTED BY USERS OR PATIENTS WHILE PERFORMING THESE TESTS.

WARNING To minimize risk of electric shock, only trained persons are allowed to perform the electrical safety inspections and tests.

WARNING Energy Control and Power Lockout for Vivid S60N/Vivid S70N.

When servicing parts of the Ultrasound system where there is exposure to voltage greater than 30 volts:

1. Follow LOCK OUT/TAG OUT procedures.
2. Turn off the breaker.
3. Unplug the mains cable from the wall outlet, then from the Ultrasound System.
4. Maintain control of the Ultrasound system power plug.
5. Wait for at least 30 seconds for capacitors to discharge as there are no test points to verify isolation.
6. Remove/disconnect the battery if present.

Ultrasound System components may be energized.

CAUTION Possible risk of infection. Do not handle soiled or contaminated probes and other components that have been in patient contact. Follow appropriate cleaning and disinfecting procedures before handling the equipment.

NOTE: For all instructions in the "Electrical safety tests" section, in the event of using a UPS (uninterrupted power supply) the terms outlet, wall outlet, AC wall outlet and power outlet refer to the AC power outlet of the UPS. In case of further available AC (or DC) power outlets at the same used UPS, these must remain unused i.e. not connected to any other devices.

10-6-1 Safety Test Overview (cont'd)

The electrical safety tests in this section are based on IEC/EN 60601 standard including national deviations for Health Care Facilities and IEC/EN 62353 Medical electrical equipment - Recurrent test and test after repair of medical electrical equipment. These standards provide guidance on evaluating electrical safety of medical devices which are placed into service and are intended for use in normal Care and Maintenance or testing following service or repair activities. They differ somewhat from the standards that are used for design verification and manufacturing tests (e.g., IEC/EN 60601-1 including national deviations) which require a controlled test environment and can place unnecessary stress on the Ultrasound system.

These tests may refer to specific safety analyzer equipment as an example. Always refer to the safety analyzer's user manual that will be used to perform the tests.

Prior to initiating any electrical test, the Ultrasound system must be visually inspected. Perform the following visual checks:

- Check for missing or loose enclosure covers that could allow access to internal live parts.
- Examine the mains cord, mains plug and appliance inlet for damaged insulation and adequacy of strain relief and cable clamps.
- Locate and examine all associated transducers. Inspect the cables and strain relief at each end. Inspect the transducer enclosure and lens for cracks, holes and similar defects.

WARNING ***Users must ensure that safety inspections are performed whenever damage is suspected and on a regular basis in accordance with local authorities and facility procedures. DO NOT use the Ultrasound system or individual probes which fail any portion of the safety test.***

CAUTION **For all instructions in this section in case of using a UPS (Uninterrupted Power Supply) the terms outlet, wall outlet, AC wall outlet and power outlet refer to the AC power outlet of the UPS. In case of further available AC (or DC) power outlets at the same used UPS, these must remain unused i.e. not connected to any other devices.**

WARNING ***To minimize the risk and avoid an electric shock, only trained persons are allowed to perform the electrical safety inspections and tests.***

CAUTION **Compare all safety-test results with safety-test results of previously performed safety tests (e.g. last year etc). In case of unexplainable abrupt changes of safety-test results consult experienced authorized service personnel or GE for further analysis.**

CAUTION **To avoid electrical shock, the Ultrasound system under test MUST NOT be connected to other electrical equipment. Remove all interconnecting cables and wires. The Ultrasound system under test must not be contacted by users or patients while performing these tests.**

10-6-2 Leakage Current Limits

WARNING

Energy Control and Power Lockout for Vivid S60N/Vivid S70N.

When servicing parts of the Ultrasound system where there is exposure to voltage greater than 30 volts:

1. Follow LOCK OUT/TAG OUT procedures.
2. Turn off the breaker.
3. Unplug the Ultrasound system.
4. Maintain control of the Ultrasound system power plug.
5. Wait for at least 30 seconds for capacitors to discharge as there are no test points to verify isolation.
6. Remove/disconnect the battery, if present.

Ultrasound System components may be energized.

The following acceptance limits and test conditions are summarized from IEC/EN 60601-1 and IEC/EN 62353 and in some cases are lower than that specified by the standards.

In accordance with these standards, fault conditions like Reverse Polarity of the supply mains and Open Neutral are no longer required for field evaluation of leakage current.

CAUTION Compare all safety-test results with safety-test results of previously performed safety tests (e.g. last year etc). In case of unexplainable abrupt changes of safety-test results consult experienced authorized service personnel or GE for further analysis.

NOTE: Open Grounding is also known as "Lift Ground".

Table 10-10 Leakage Current Limits for Ultrasound System Operation on 100-240 Volt Mains

Leakage Current Test	System Power	Grounding/ PE Conductor	Limit in mA	Limit in µA
Earth Leakage	On and Off	N/A	0.5	500
Chassis/Enclosure Leakage	On and Off	Closed	0.1	100
		Open	0.5	500
Type BF Applied Parts	On (transmit)	Closed	0.1	100
		Open	0.5	500
Type CF Applied Parts	On (transmit)	Closed	0.01	10
		Open	0.05	50
Type BF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	5	5000
Type CF Applied Parts (sink leakage, mains voltage on applied part)	On and Off	Closed	0.05	50
Values based on IEC/EN 60601				

Table 10-11 Mains on Applied Part Limits[a]

Probe Type	Measurement
BF	5.0 mA (5000 µA)
CF	0.05 mA (50 µA)

a. Mains on Applied Part Limits refers to the sink leakage test where mains (supply) voltage is applied to the part to determine the amount of current that will pass (or sink) to ground if a patient is in contact with mains voltage.

NOTE: Electrical leakage testing may be accomplished with any calibrated Electrical Safety Analyzer tool compliant with AAMI/ESI 1993 or IEC/EN 60601 or AS/NZS 3551, IEC/EN 62353 or other relevant national regulation.

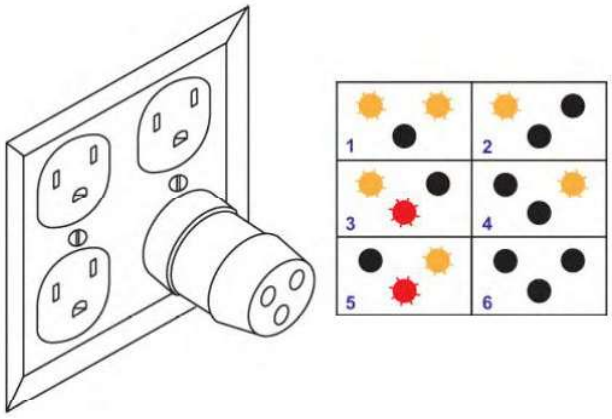
.

Table 10-12 Equipment Type and Test Definitions

Applied Parts (AP)	Parts or accessories that contact the patient to perform their function. For ultrasound equipment, this includes transducers, ECG leads and e-TRAX Needle Sensor.	
Type BF	Type BF Applied Part (man in the box) symbol is in accordance with IEC 60417-5333, e.g. ultrasound probes which are marked with the 'man in box' BF symbol.	
Type BF Defib.-Proof	Type BF defibrillation proof Applied Part (man in the box with paddle) symbol is in accordance with IEC 60417-5334, e.g. ECG electrodes which are marked with the 'man in box with paddle' BF symbol.	
Type CF	Type CF Applied Part (heart in the box) symbol is in accordance with IEC 60417-5335, e.g. intraoperative probes for direct cardiac contact, isolated ECG connections and e-TRAX Needle Sensor, so marked with the 'heart in box' CF symbol.	
Type CF Defib.-Proof	Type CF defibrillation proof Applied Part (heart in the box with paddle) symbol is in accordance with IEC 60417-5336, e.g. intraoperative probes for direct cardiac contact, isolated ECG connections and e-TRAX Needle Sensor, so marked with the 'heart in box with paddle' CF symbol.	
Sink Leakage	The current resulting from the application of mains voltage to the applied part. This test is required for Type BF and CF applied parts.	

10-6-3 Outlet Test - Wiring Arrangement - USA and Canada

Test all outlets in the area for proper grounding and wiring arrangement by plugging in the neon outlet tester and noting the combination of lights that are illuminated. Any problems found should be reported to the hospital immediately and the receptacle should not be used.



1. Correct Wiring
2. Open Ground Wire
3. Reversed Polarity
4. Open Neutral Wire
5. Hot and Ground Reversed
6. Open Hot Wire

Figure 10-1 Typical Alternate Outlet Test

NOTE: No outlet tester can detect the condition where the Neutral (grounded supply) conductor and the Grounding (protective earth) conductor are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

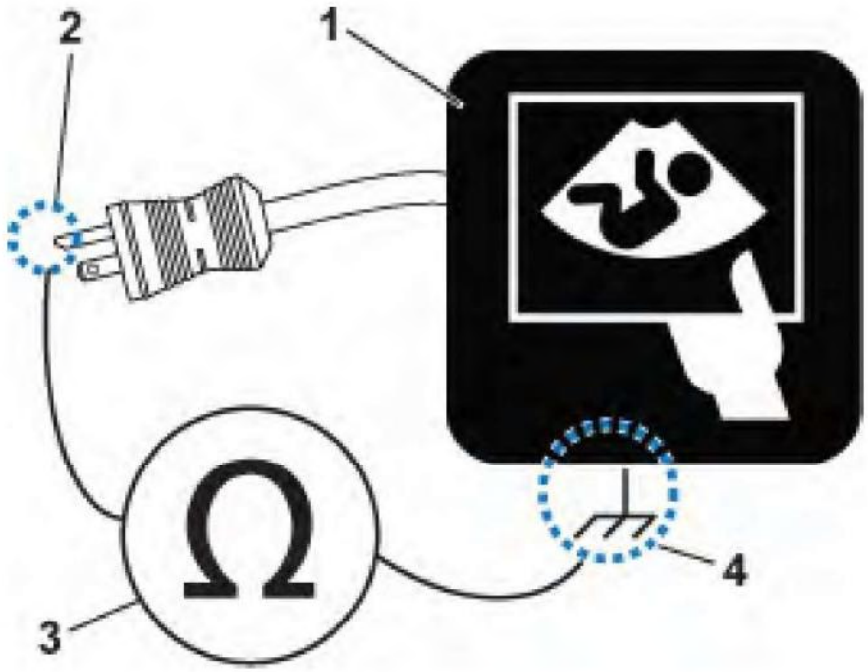
10-6-4 Grounding Continuity

DANGER **Electric Shock Hazard!**

The patient or operator MUST NOT come into contact with the equipment during this test.

CAUTION **Lacquer is an isolation barrier! Measure only on blank accessible metal parts.**

Measure the resistance from the third pin of the attachment plug to the exposed metal parts of the case. The ground wire resistance should be less than **0.2** ohms.
Reference the procedure in IEC/EN 60601-1.



1. Ultrasound System
2. Ground Pin
3. Ohmmeter or Electrical Safety Analyzer
4. Accessible Metal Part such as:
   - Potential equilibrium connector
   - Monitor housing
   - Probe connector

Figure 10-2 Ground Continuity Test

10-6-5 Chassis Leakage Current Test

DANGER **Electric Shock Hazard.**

When the Electrical Safety Analyzer's ground switch is OPEN, DO NOT touch the Ultrasound system!

CAUTION **Equipment damage possibility.**

Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the "POLARITY" switch and/or the "NEUTRAL" switch on the Electrical Safety Analyzer to avoid possible power supply damage.

10-6-5-1 Definition

This test, also known as Enclosure Leakage current test, measures the current that would flow through a grounded person who touches the accessible conductive parts of the equipment during normal and fault conditions.

The test verifies the isolation of the power line from the chassis.

The testing Electrical Safety Analyzer is connected to parts of the equipment, easily contacted by the user or patient.

Measurements should be made under the test conditions specified in Table 10-10 on page 10-16.

Record the highest reading.

10-6-5-2 Generic Procedure

The test verifies the isolation of the power line from the chassis. The testing Electrical Safety Analyzer is connected from accessible metal parts of the case to ground. Measurements should be made under the test conditions specified in:

- Table 10-10 on page 10-16.

Record the highest reading of current.

1.) Connect Safety analyzer to wall AC power outlet.
2.) Plug the equipment under test power cable into the receptacle on the panel of the Electrical Safety Analyzer.
3.) Connect the Electrical Safety Analyzer to an accessible metal surface of the Vivid S60N/Vivid S70N ultrasound system using the cable provided with the Electrical Safety Analyzer.
4.) Select the "Chassis" or "Enclosure Leakage" function on the Electrical Safety Analyzer.
5.) Test opening and closing the ground with the Vivid S60N/Vivid S70N ultrasound system ON and OFF as indicated in Table 10-10 on page 10-16 as applicable.

NOTE: For more information, refer to the safety analyzer's user manual that will be used to perform the tests.

The maximum allowable limit for chassis source leakage is shown in:

- Table 10-10 on page 10-16
  as Chassis/Enclosure Leakage.

10-6-5-3 Data Sheet for Enclosure/Chassis Leakage Current

Table 10-13 shows a typical format for recording the enclosure/chassis leakage current.

Measurements should be recorded from multiple locations for each set of test conditions.

The actual location of the test probe may vary by Ultrasound system.

Record all data in the Electrical safety tests log.

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC/EN 62353 and IEC/EN 60601-1.

Table 10-13 Typical Data Format for Recording Enclosure/Chassis Leakage

Unit under test_____ Date of test:_____					
Test Conditions		**Measurement/Test Point Location**			
System Power	**Grounding/PE**	**Potential equilibrium connector / Rear Panel**	***Lower Frame***	**Probe Connector**	**Main Handle**
off	closed				
off	open				
on	closed				
on	open				

NOTE: Values in italics font are given as examples only.

10-6-6 Isolated Patient Lead (Source) Leakage – Lead-to-Ground

CAUTION

Equipment damage possibility.

Never switch the Polarity when the Ultrasound system is powered ON.

Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the “POLARITY” switch and/or the “NEUTRAL” switch on the Electrical Safety Analyzer to avoid possible power supply damage.

10-6-6-1 Definition

This test measures the current which would flow to ground from any of the isolated ECG leads. The Electrical Safety Analyzer simulates a patient who is connected to the monitoring equipment and is grounded by touching some other grounded surface.

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the Ultrasound system on and off (per IEC/EN 62353).

For each combination, the operating controls, such as the lead switch, should be operated to find the worst-case condition.

10-6-6-2 Generic Procedure

1) Connect Safety analyzer to wall AC power outlet.
2) Plug the equipment under test power cable into the receptacle on the panel of the Electrical Safety Analyzer.
3) Connect the ECG cable to the Vivid S60N/Vivid S70N ultrasound system and the Patient leads to the analyzer.
4) Select the “Patient Lead Leakage” function on the Electrical Safety Analyzer.
5) Test opening and closing the ground with the Ultrasound system on and off.

NOTE: For more information, refer to the safety analyzer's user manual.

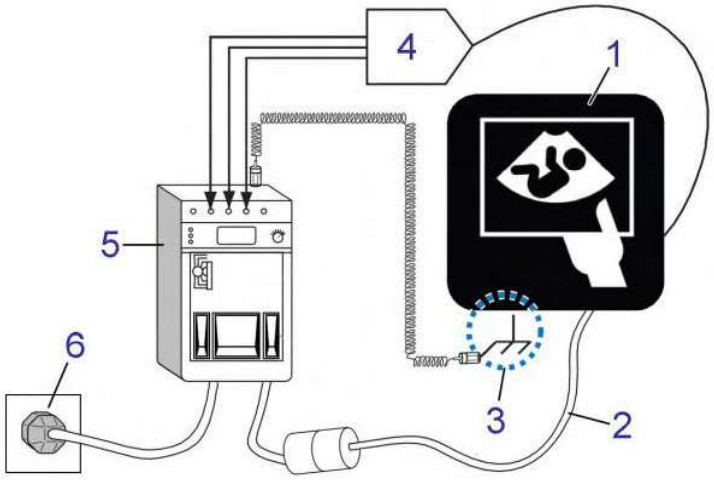
Measurements should be made under the test conditions specified in:

- Table 10-10 on page 10-16.

For each combination, the operating controls (such as the lead switch) should be operated to find the worst-case condition.

Record all data and keep the record of the results with other hard copies of maintenance data.

10-6-6 Isolated Patient Lead (Source) Leakage – Lead-to-Ground (cont'd)



1. Ultrasound system
2. Mains power cable
3. Accessible Metal Parts (chassis - non-earth ground, unprotected surface)
4. ECG patient cable
5. Electrical safety analyzer
6. AC wall outlet

Color of Power Outlet Cable:

USA and Canada:
- **H** - Hot, Black
- **N** - Neutral, White
- **G** - Ground, Green or Green-yellow

Others:
- **H** - Hot, Brown
- **N** - Neutral, Blue
- **G** - Ground, Green-yellow

Figure 10-3 Set Up for Test of Earth Leakage Current, IEC/EN 60601-1

10-6-7 Isolated Patient Lead (Source) Leakage – Lead-to-Lead

When using any calibrated Electrical Safety Analyzer tool compliant with AAMI/ESI 1993 or IEC/EN 60601 or AS/NZS 3551, switch the Electrical Safety Analyzer's function selector to the LEAD-LEAD position (or equivalent function in the device).

Select and test each of the ECG lead positions (except ALL) on the LEAD selector, testing each to the power and ground condition combinations found in:

- Table 10-10 on page 10-16

Record the highest leakage current measured.

NOTE: This test is also known as the Patient Auxiliary Current test.

10-6-7-1 Lead-to-Lead Leakage Test Record

Table 10-14 below shows a typical format for recording the patient lead-to-lead leakage current.

Measurements should be recorded from each lead combination under each set of test conditions specified in:

- Table 10-10 on page 10-16

Record all data and keep the record of the results with other hard copies of maintenance data.

1) Connect Safety analyzer to wall AC power outlet.
2) Plug the equipment under the test power cable into the receptacle on the Electrical Safety Analyzer's panel.
3) Connect the ECG cable to the ultrasound system and the Patient leads to the analyzer.
4) Select the Patient lead leakage function on the Electrical Safety Analyzer.
5) Test opening and closing the ground with the Ultrasound system on and off.

NOTE: Refer to the safety analyzer's user manual that will be used to perform the tests.

Keep a record of the results with other hard copies of maintenance data using Table 10-14.

10-6-7-1 Lead-to-Lead Leakage Test Record (cont'd)

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC/EN 62353 and IEC/EN 60601-1.

Table 10-14 Typical Data Format for Recording Patient Lead-to-Lead Leakage

Unit under test_____ Date of test:_____				
Test Conditions		**Patient Lead or Combination Measured**		
System Power	**Grounding/PE**	**RA to LA**	**LA to LL**	**LL to RA**
Off	open			
Off	closed			
On (Transmit)	open			
On Transmit)	closed			

10-6-8 Isolated Patient Lead (Sink) Leakage - Isolation Test

Select the Individual Leads as well as All Lead position since the test is performed with mains applied to all ECG leads at the same time.

CAUTION **Line voltage is applied to the ECG leads during this test. To avoid possible electric shock hazard, the Ultrasound system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed.**

10-6-8-0-1 Isolated lead (sink) leakage test record

Table 10-16 on page 10-27 shows a typical format for recording the isolated patient lead sink leakage current.

Measurements should be recorded for full lead combination under each set of test conditions specified in:

- Table 10-11 on page 10-17

Record all data and keep the record of the results with other hard copies of maintenance data.

1.) Connect the Safety analyzer to a wall AC power outlet.
2.) Plug the equipment under test into the receptacle on the panel of the Electrical Safety Analyzer.
3.) Connect the ECG cable to the Ultrasound system and the patient leads to the analyzer.
4.) Select the “Patient Lead Leakage” function on the Electrical Safety Analyzer.
5.) Test with closed ground with the Ultrasound system on and off.

NOTE: Refer to the electrical safety analyzer’s user manual that will be used to perform the tests.

Keep a record of the results with other hard copies of maintenance data using Table 10-16 on page 10-27.

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC/EN 62353 and IEC/EN 60601-1.

Table 10-15 Typical data format for recording isolated patient lead (sink) leakage

Unit under test_____		Date of test:_____
Test Conditions		**Patient Lead**
System Power	**Grounding/PE**	**RA+LA+LL**
On	closed	
Off	closed	

Table 10-16 Typical data format for recording isolated patient lead (sink) leakage

Unit under test_____			Date of test:_____
Test Conditions			**Patient Lead**
System Power	**Grounding/PE**	**Limit µA**	**RA+LA+LL**
On	closed	50	
Off	closed	50	
On	closed (reversed polarity)	50	
Off	closed (reversed polarity)	50	

10-6-9 Probe (Source) Leakage Current Test

DANGER Do not use the probe if the insulating material has been punctured or otherwise compromised. Integrity of the insulation material and patient safety can be verified by safety testing according to IEC/EN 60601-1.

10-6-9-1 Definition

This test measures the current that would flow to ground from any of the probes through a patient who is being scanned and becomes grounded by touching some other grounded surface.

NOTE: Each probe will have some amount of leakage, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. It is abnormal if no leakage current is measured. If no leakage current is detected, check the configuration of the test equipment.

10-6-9-2 Generic Procedure on Probe Leakage Current

The most common method of measuring probe leakage is to partly immerse the probe into a saline bath while the probe is connected to the Ultrasound system and active. This method measures the actual leakage current resulting from the transducer RF drive.

Measurements should be made under the test conditions specified in:

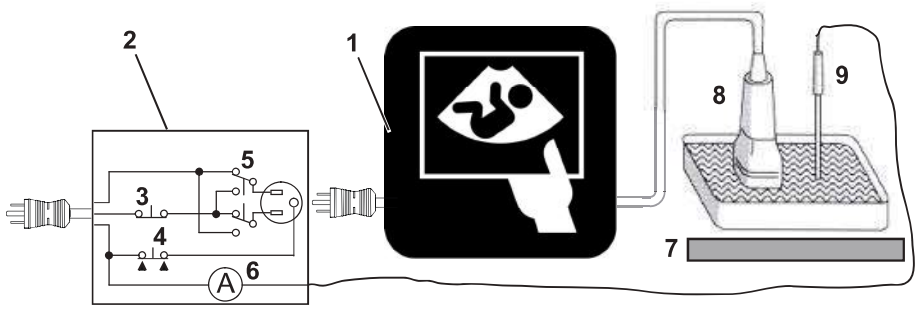
- Table 10-10 on page 10-16 as applicable for every probe.

For each combination, the probe must be active to find the worst case condition.

Record all data and keep the record of the results with other hard copies of maintenance data.

NOTE: Saline water pod should be insulated from floor and earth ground.

NOTE: The Saline solution is a mixture of water and salt. The salt adds free ions to the water, making it conductive. Normal saline solution is 0.9% salt and 99.1% water. If ready-mixed saline solution is not available, a mixture of 1 quart or 1 liter water with 9 or more grams of table salt, mixed thoroughly, will substitute.



1. Ultrasound System
2. Tester
3. Neutral Switch
4. Ground Switch
5. Polarity Reversing Switch
6. Meter
7. Isolator
8. Ultrasound Probe
9. Saline Probe

Figure 10-4 Set Up for Probe Leakage Current

10-6-9-2 Generic Procedure on Probe Leakage Current (cont'd)

NOTE: Follow manufacturer's recommendations for handling saline solution. Refer to their Material Safety Data Sheet (MSDS) for more information.

Figure 10-5 Test Set Up with Electrical Safety Analyzer

This test is also known as Patient Leakage Current.

1) Turn the Vivid S60N/Vivid S70N **OFF**:
2) Connect the Safety analyzer to wall AC power outlet.
3) Set the Safety analyzer's function switch to "Chassis" or "Enclosure Leakage".
4) Plug the Vivid S60N/Vivid S70N's power cord into the test Electrical Safety Analyzer.
5) Plug the Chassis Ground Probe (saline probe) into the test Electrical Safety Analyzer's "CHASSIS" connector.

CAUTION **To avoid probe damage and possible electric shock, do not immerse probes into any liquid beyond the level indicated in the probe user's manual.**

Do not touch the probe, conductive liquid or any part of the Ultrasound system under test while doing the test.

CAUTION **Equipment damage possibility.**

Never switch the Polarity and the status of Neutral when the Ultrasound system is powered ON. Power off the Ultrasound system, allow the stored energy to bleed down, and turn the circuit breaker off BEFORE switching the "POLARITY" switch and/or the "NEUTRAL" switch on the Electrical Safety Analyzer to avoid possible power supply damage.

6) Connect the Ultrasound Probe to the Vivid S60N/Vivid S70N.
7) Immerse the Saline Probe in the Saline Solution.
8) Immerse the Ultrasound probe's face (imaging area of the probe) into the saline solution.

10-6-9-2 Generic Procedure on Probe Leakage Current (cont'd)

9) Test opening and closing the ground with the scanner on and off.

a.) Power ON the ultrasound system.

b.) After the ultrasound system has completed the boot process, select the probe to be tested so it is the active probe.

c.) Depress the LIFT GROUND rocker switch and record the highest current reading.

d.) Follow the test conditions and test limits described in Table 10-10 on page 10-16, as applicable for every probe.

10.) Record the highest current reading.

The test passes when all readings measure less than the stated limits.

The actual location of the test probe may vary by Ultrasound system. Measurements should be recorded for each probe under the set of test conditions.

Record all data and keep the record of the results with other hard copies of maintenance data.

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC/EN 62353 and IEC/EN 60601-1.

Table 10-17 Typical Data Format for Recording Probe (Source) Leakage

Unit under test_____ Date of test:_____					
Test Conditions		**Probe as measured in saline bath**			
System Power	**Grounding /PE**	***4C***	***i12L***	***TS***	***E8C***
off	closed				
off	open				
on	closed				
on	open				

NOTE: Values in italics font are given as examples only.

10-6-10 Isolated Probe (Sink) Leakage-Isolation Test

DANGER **Do not use the probe if the insulating material has been punctured or otherwise compromised. Integrity of the insulation material and patient safety can be verified by safety testing according to IEC/EN 60601-1.**

CAUTION **Line voltage is applied to the ultrasound probe during this test. To avoid possible electric shock hazard, the system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed.**

Measurements should be recorded for probes and transducers under each set of test conditions specified in:

- Table 10-11 on page 10-17

Record all data and keep the record of the results with other hard copies of maintenance data.

1.) Connect the Safety analyzer to an AC wall outlet.
2.) Plug the equipment under test into the receptacle on the panel of the Electrical Safety Analyzer.
3.) Connect the Ultrasound probe to be tested to the Ultrasound system.
4.) Immerse the saline probe in the saline solution.
5.) Immerse the Ultrasound probe's face (imaging area of the probe) into the saline solution.
6.) Select the "Patient Lead Leakage" function on the Electrical Safety Analyzer.
7.) Test with closed ground with the Ultrasound system on and off.

NOTE: For more information, refer to the safety analyzer's user manual.

Record all data and keep the record of the result with other hard copies of maintenance data.

NOTE: Not all test procedures are applicable to all areas of the world. Reversed Polarity testing content satisfies regions following IEC/EN 62353 and IEC/EN 60601-1.

Table 10-18 Typical Data Format for Recording Probe (Source) Leakage

Unit under test_____ Date of test:_____					
Test Conditions		**Probe as measured in saline bath**			
System Power	**Grounding /PE**	***4C***	***i12L***	***TS***	***E8C***
off	closed				
on	closed				

NOTE: Probe names in italics font are given as examples only.

10-6-10 Isolated Probe (Sink) Leakage-Isolation Test (cont'd)

Table 10-19 Typical Data Format for Recording Probe (Source) Leakage

Unit under test_____ Date of test:_____						
Test Conditions			Probe as measured in saline bath			
System Power	Grounding /PE	Limit µA	*4C*	*i12L*	*TS*	*E8C*
off	closed					
on	closed					
off	open					
on	open					

10-6-10-1 Mains On Applied Part

NOTE: Mains Applied refers to the sink leakage test where mains (supply) voltage is applied to the part to determine the amount of current that will pass (or sink) to ground if a patient contacted mains voltage.

Mains on applied part is one of the described leakage current tests applicable for probes (Ref: IEC/EN 60601-1). This is to be performed with the probe disconnected from the Ultrasound system. Apply mains voltage over the insulation barrier. (Between protective earth on the probe connector, and an electrical anode in saline solution. The patient applied part of the probe is immersed into the saline solution.) Measure current flowing in the circuit. = leakage current.

As a minimum, tests according to IEC/EN 60601-1 must be performed once a year. The requirements for Body Floating (BF) have to be applied for TEE and Trans thorax probes bearing the symbol for safety class BF.

The symbol for BF is indicated on the probe connector label below:

Figure 10-6 GE Probe Connector Label - Example

NOTE: Where applicable, a typical test setup of non-TEE Probes can be as illustrated in: Table 10-4 on page 10-28.

10-6-10-1 Mains On Applied Part (cont'd)

A typical test setup for TEE probes could be as indicated in Figure 10-7 (on the next page).

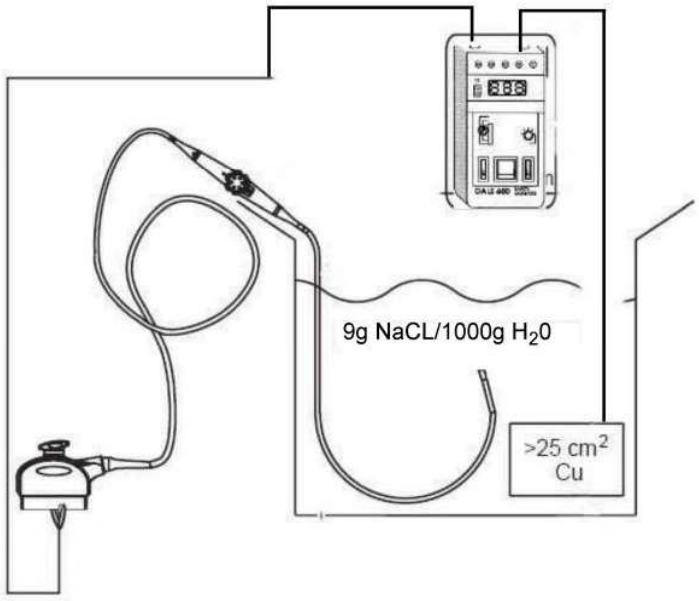


Figure 10-7 TEE Probe Leakage Isolation (Sink) Current Test

WARNING ***The handle of the TEE probes must not be immersed. For immersion levels, please refer to the User Manual.***

The test passes when the reading measure less than the values in:

- Table 10-11 on page 10-17.

This page was intentionally left blank.

Manufacturer:
GE Vingmed Ultrasound AS
Strandpromenaden 45
3191 Horten
NORWAY
Tel: (+47) 3302 1100 Fax: (+47) 3302 1350

www.gehealthcare.com