



*GE Medical Systems*

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# **Technical Publications**

**Direction 2318581**  
**Revision 2**

## **Signa® Cx/K4 Magnet Wide Open Enclosure Bridge Support**

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**Operating Documentation**

## DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent, have notation "**damage in shipment**" written on **all** copies of the freight or express bill **before** delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage **MUST** be reported to the carrier **immediately** upon discovery, or in any event, within **14** days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this **14-day** period.

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Rev. 11/15/2000

## REVISION HISTORY

<u>REV</u>	<u>DATE</u>	<u>PRIMARY REASON FOR CHANGE</u>
0 .....	Sep 25, 2001	Initial version for Release.
1 .....	Mar 1, 2002	Removed procedures for installation of Gradient Radial support installation. This will be part of a new manual specific to Gradient Radial installation. Revised instructions and illustrations throughout manual for installation of Bridge Support.
2 .....	Oct. 21, 2002	Revised instructions and illustrations in reaction to CQA1022099

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1 to 25 .....	1						
1 to 24 .....	2						

\* This revision/letter corresponds to the indicated document's revision control system.

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## INTRODUCTION

Vibration can be transferred from the Gradient/RF coil to the bridge. This procedure installs a new bridge supports to isolate the bridge from the Gradient/RF coil.

## 1- PREREQUISITES AND DEFINITIONS

### 1-1 Required Field Supplied Tools And Material

Following is a list of tools and field-supplied materials needed to complete the procedures described in this document.

- Plastic / aluminum or wooden ruler, 600mm minimum length
- Plastic or aluminum T square, 300mm minimum length
- Masking tape
- 3/16" drill bit
- 1 1/2 inch (40 mm) hole saw w/ 1/4 inch (6 mm) pilot drill bit
- Variable speed drill
- Rubber mallet
- MR Tool Kit (non-magnetic tools)
- Aluminum Oxide or Silicon Carbide sandpaper 80 to 100 grit
- 4 foot plastic level
- Citric cleaner
- Alcohol wipes

### 1-2-2 Bridge Support

Table 1-1 shows a breakdown of kit parts for the bridge support section of this upgrade. Refer to Illustrations 1-1, 1-2 and 1-3 for a visual representation of the parts and finished upgrade views.

TABLE 1-1  
BRIDGE SUPPORT PARTS LIST

Part Number	Quantity	Description
2293379-2	1	Bridge Support
2109866-21	2	M10 by 30mm long bolt (stainless steel)
2109875-4	8	M10 Nut (jam nuts) (stainless steel)
2318948	2	Support Cap Cup (phenolic)
2318950	2	Support Cap (phenolic)
2318951	4	Bridge Support Stiffener Block
2226752-2	2	Foam Gasket, Bridge Support Spacer
2322944	AR	Cloth Duct Tape w/Solvent Resistant Adhesive, 2 inch x 60 yard
2116325-5	2	M10 x 110mm Stud (stainless steel)
46-136374P37	2	O-Ring, width .139 ID 0.734 durometer A 70
46-282264P37	1	2 oz Dual-Pak Cartridge Epoxy, clear
2318581	1	CX/K4 WideOpen Enclosure Bridge Support Installation Instructions
	AR	Anti-seize

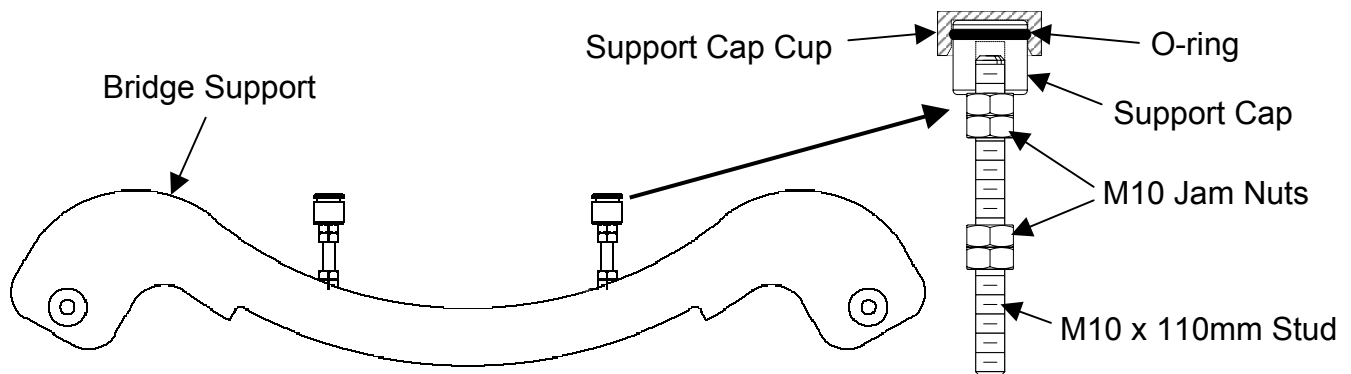


ILLUSTRATION 1-1  
BRIDGE SUPPORT ASSEMBLY PARTS ILLUSTRATION

Support Cap, one per stud, is threaded to provide vertical adjustment of bridge.

M10 x 110mm Studs, left/right.

Bridge Support

Two sets of M10 Jam Nuts are required at top and bottom of each stud.

M10 x 30mm Screws. Use a very small drop of anti-seize on the threads.

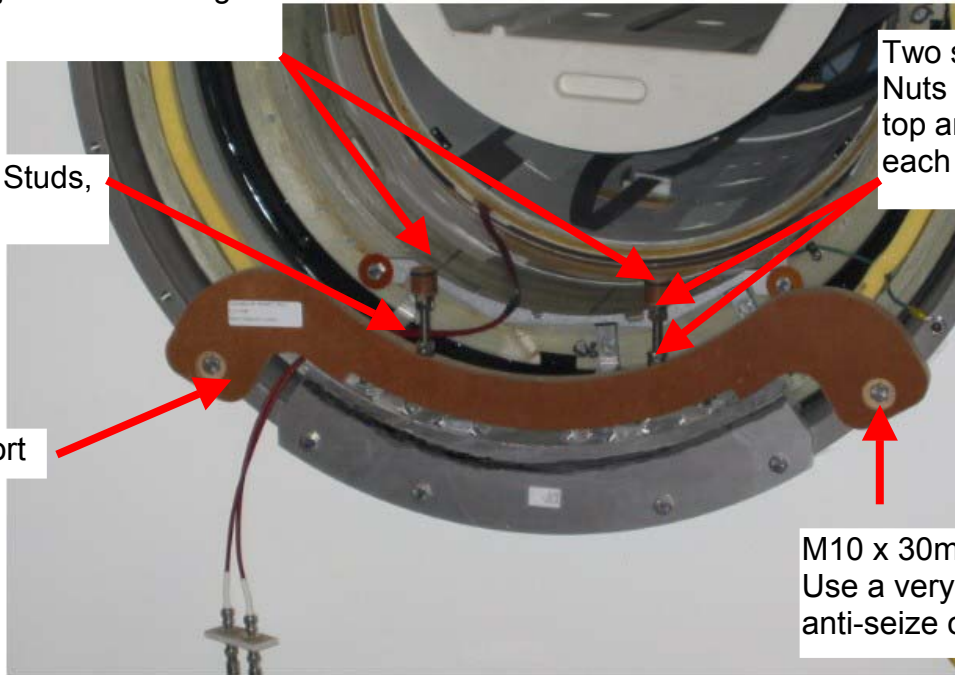


ILLUSTRATION 1-2  
UPGRADED FRONT BRIDGE ASSEMBLY

Support Cap Cup. Glues on to the bottom side of the bridge, after final bridge adjustments are complete.

Adhesive backed Foam Gasket to seal enclosure end bell air leaks around studs.

50mm long Duct Tape to cover original bridge support clearance holes.

Support Cap with Jam Nuts to lock bridge height position.

Bridge support block removed.

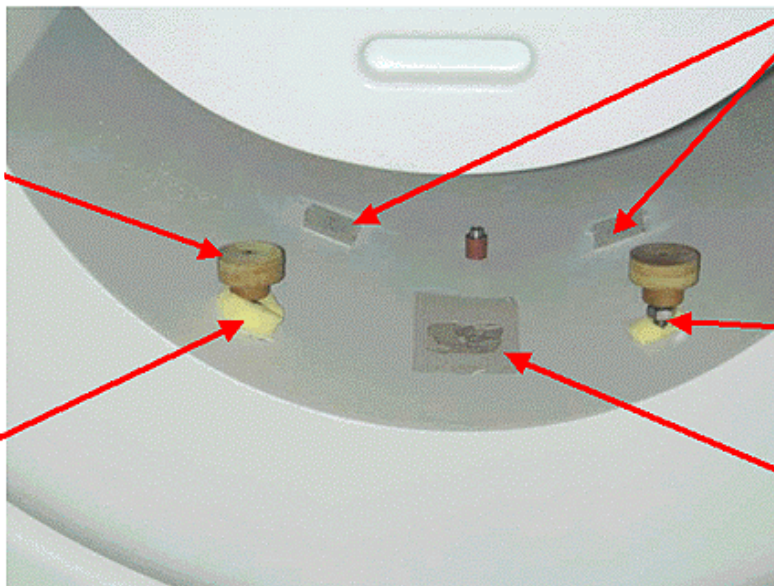


ILLUSTRATION 1-3  
UPDATED REAR ENCLOSURE

### 1-3 Time and Resources Required for this Upgrade

Performing this upgrade will take approximately 4 hours for two Engineers.

## 2- PREREQUISITE BEFORE BEGINNING THIS UPGRADE

Gradient Isolation Kit must be installed prior to installing this bridge kit. To check if the Isolation Kit has been installed, remove the front enclosure end bell. Refer to service CD ROM 2160623, Magnet Enclosure, and then go to the Wide Open Enclosure section for directions on removing the enclosure. Bridge may remain in the magnet bore to obtain general bridge support post position.

Refer to Illustration 2-1. Check to make sure the gradient isolation kit is installed. The Gradient Isolation Kit must be installed with the two (2) Upper Radial supports, located at approximately 2 and 10 o'clock positions. Note, the two (2) Upper Radial supports are installed on both the front and rear end of the gradient coil (4 per coil). If radial supports are installed, refer to 2319693 for proper parts and application. Check the tightness of each of the supports. If the parts are able to move by hand, follow the installation instructions making sure to secure the M16 screws using the proper M16 locking nut.

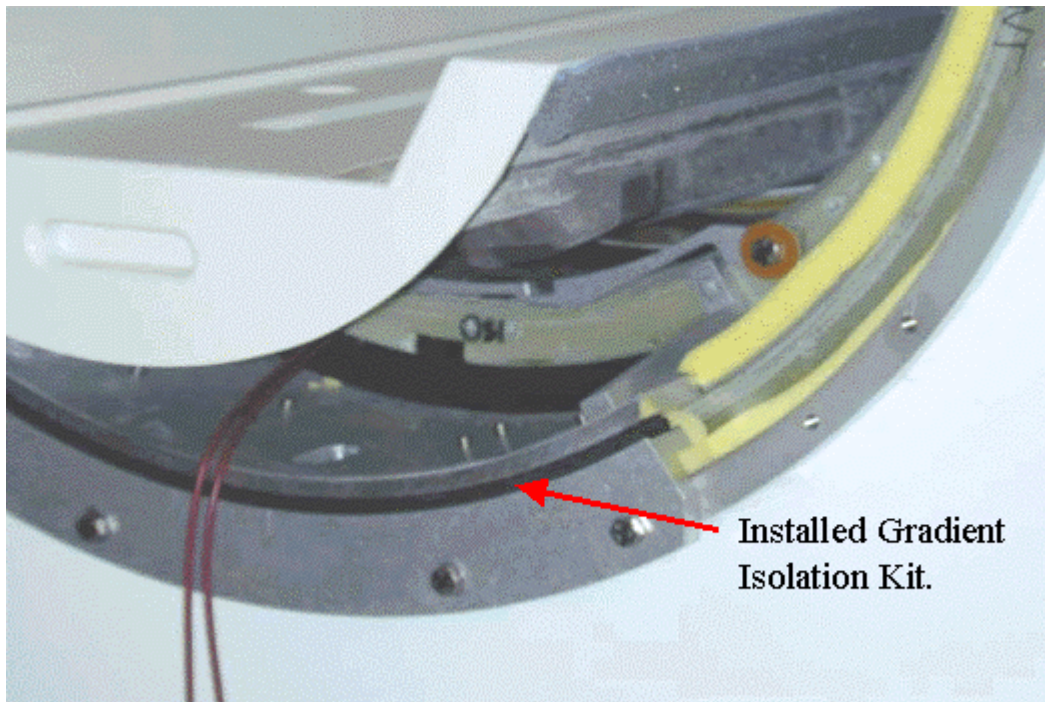


ILLUSTRATION 2-1  
CHECKING FOR GRADIENT ISOLATION KIT

If necessary, Gradient isolation kits can be ordered for either the Cx or the Cx/K4 magnet.

R4391JA	BRM Gradient Isolation Kit
R4391JB	CRM Gradient Isolation Kit

### Note

Kits deliver with the gradient isolation parts, upper radial supports, and coil-lifting tool.

### 3- PHENOLIC BRIDGE SUPPORT INSTALLATION

The phenolic bridge support will attach to the magnet interface ring. The part will mount above the gradient coil aluminum extension plate. The bridge support, when properly fitted, will not contact the magnet except at the two bolt hole locations on the magnet interface ring identified in Illustration 3-1.

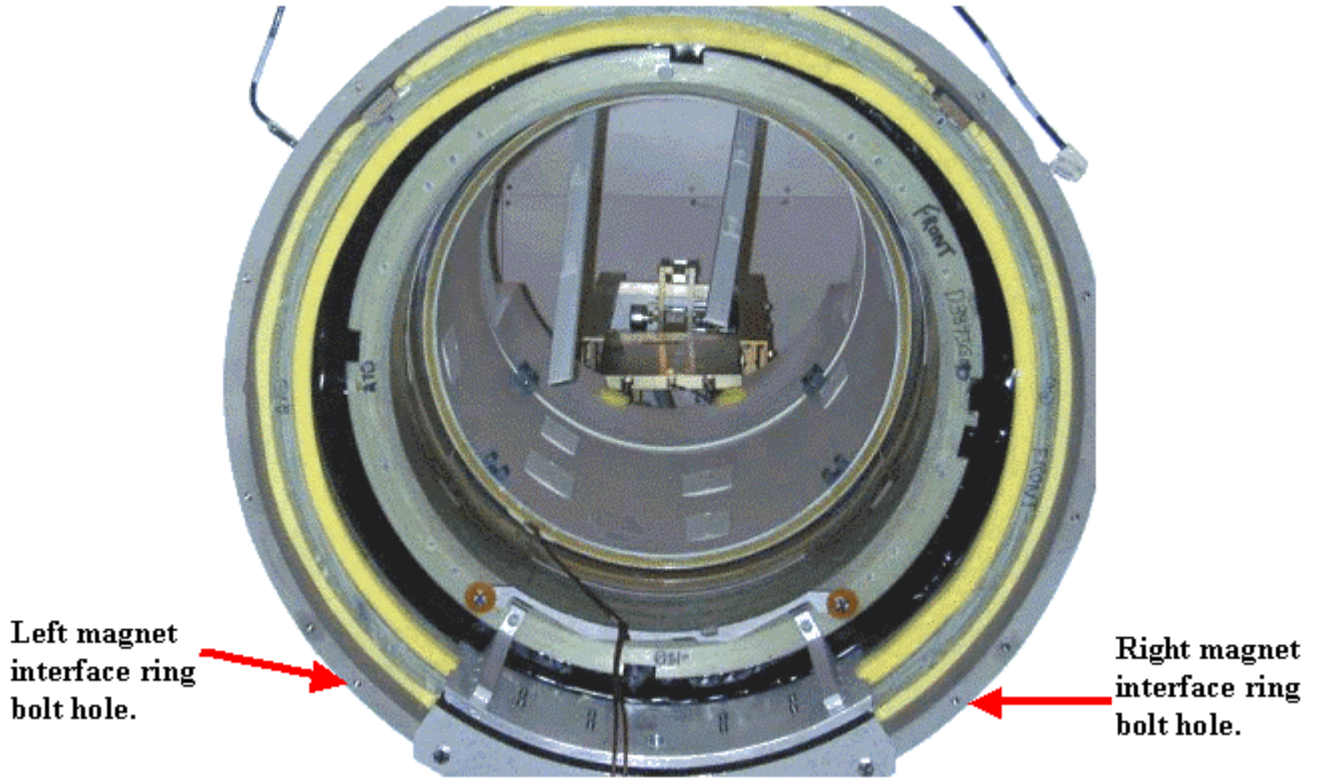


ILLUSTRATION 3-1  
BRIDGE SUPPORT MOUNT POINTS

Locate the phenolic bridge support. See Illustration 3-2.



ILLUSTRATION 3-2  
**PHENOLIC BRIDGE SUPPORT – M10 x 30mm HEX HEAD SCREWS SEATED**

The bridge support fastens to the magnet interface ring with the shown surface in Illustration 3-2 facing away from the magnet iso-center.

1. Locate 2 – M10 x 30mm Hex Head screws.
2. Apply a very small drop/dab of anti-seize to the M10 x 30mm screws.
3. Position the bridge support to align the two through holes in the phenolic support to the magnet interface ring bolt holes identified in Illustration 3-2.
4. Insert a single M10 x 30mm screw into either the left or right phenolic through hole and hand tighten.
5. Insert the second M10 x 30mm screw into the other phenolic through hole and hand tighten.
6. Tighten the M10 x 30mm bolts to 10 ft-pounds.
7. Feed RF Bias cable to the side of the gradient mounting bracket as illustrated in Illustration 3-3.

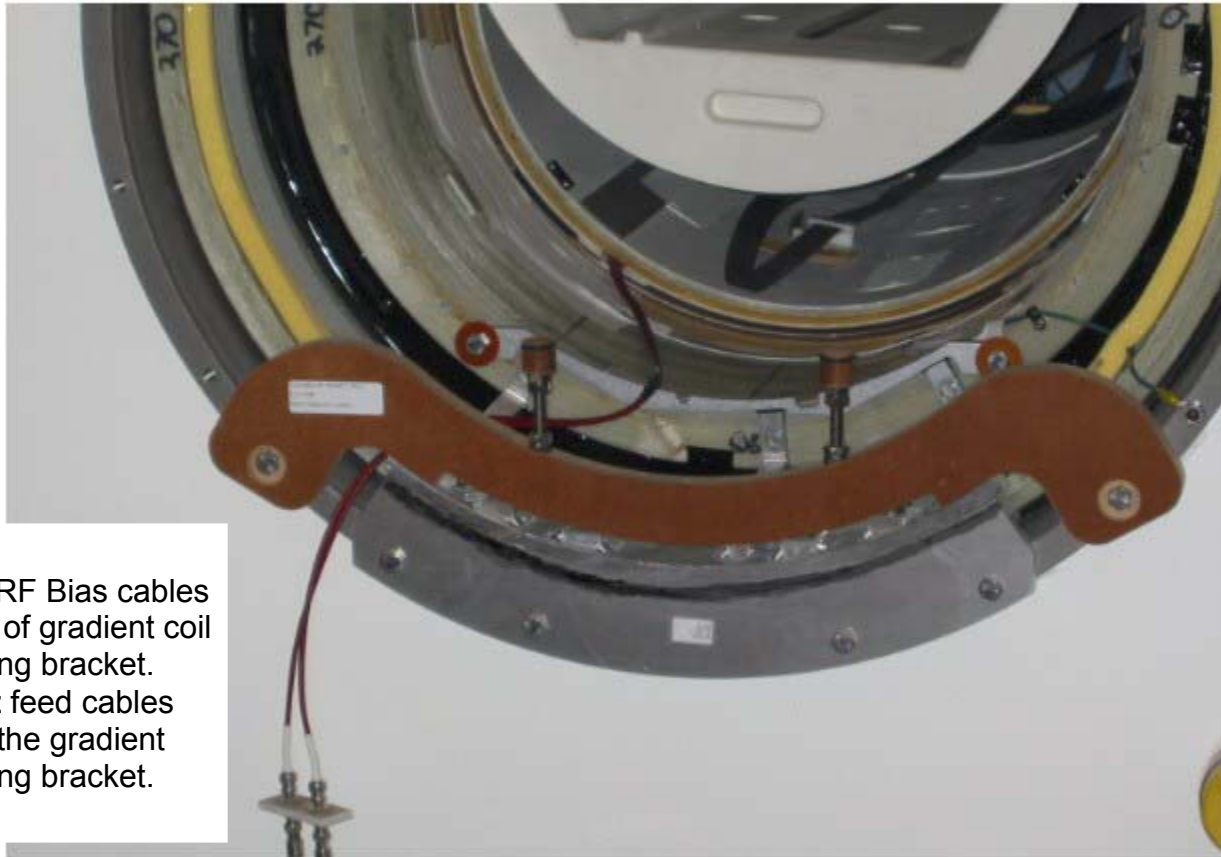


ILLUSTRATION 3-3  
INSERTING RF BIAS CABLE

**Note**

The phenolic bridge support should be installed onto the magnet without the M10 x 110mm all thread studs, jam nuts and phenolic parts. Install the M10 all-thread stud, jam nuts and phenolic parts after the end bell is re-assembled

- Set the initial height,  $h$ , to 87 mm from the phenolic interface on the (mustache) Bridge Support to the top of the Support Cap, but not including the Support Cap Cup. Refer to the details defined in Illustration 6-1, page 21 of 24 when setting the dimension  $h$ . It is critical to follow Illustration 6-1 setups to prevent the need to remove the end bell multiple times. Refer to Illustration 3-4. Use  $h$  as a starting point.

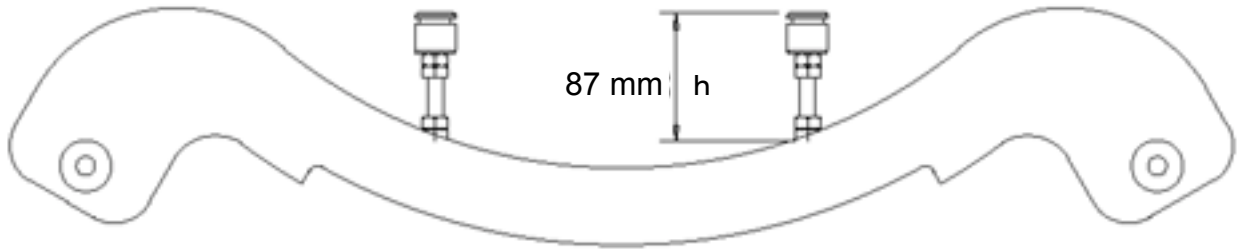


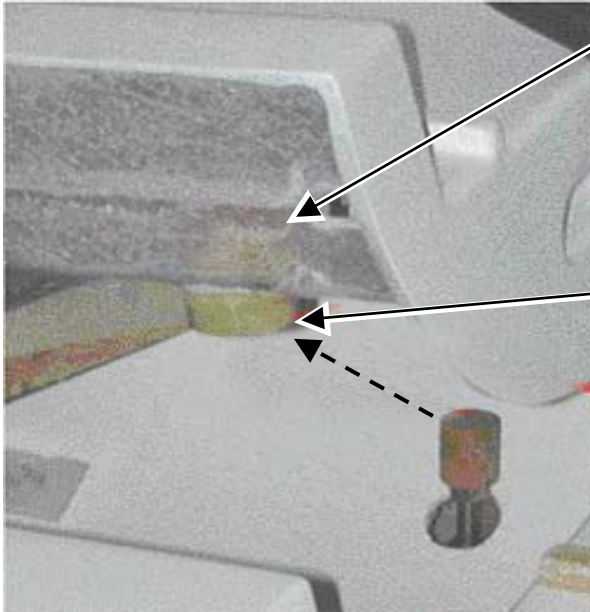
ILLUSTRATION 3-4  
SETTING THE HEIGHT OF THE PHENOLIC BRIDGE LATERAL SUPPORT

- The 110mm long all thread studs will screw into the Bridge Support to the approximate height defined **after** the end bells are secured to the magnet enclosure assembly. Jam two M10 nuts to the bridge support to prevent loosening. The final height includes the Support Cap Cup.
- Final adjustment to the final vertical position will be achieved later in Section 6 by changing the vertical position of the phenolic bearing cap support.

## 4- BRIDGE SUPPORT INSTALLATION

### 4-1 Bridge Support Structural Stiffening

The production bridge does not possess enough structural material for the bridge support to support the weight of a patient.



Bridge needs local stiffening with PVC wedges that are installed in line with the phenolic (bridge) bearing cap supports. The wedges are inserted from the opposite side shown. It is important to epoxy these in place.

**NOTE:** The lateral support member will be added later in the process and is shown to illustrate how the parts would fit together

ILLUSTRATION 4-1  
**BRIDGE STIFFENING**

The phenolic cap support will support the weight of the patient. This cap support will insert into the bridge lateral support that attaches to the bottom of the bridge. The bridge needs to be stiffened in this location.

The following steps will define a means to stiffen the bridge.

1. Locate the bridge support stiffener wedges (quantity 4).
2. Locate the rectangular opening in the bottom front of bridge where belt pulley and locating pin are attached. See illustrations 4-2 and 4-3.

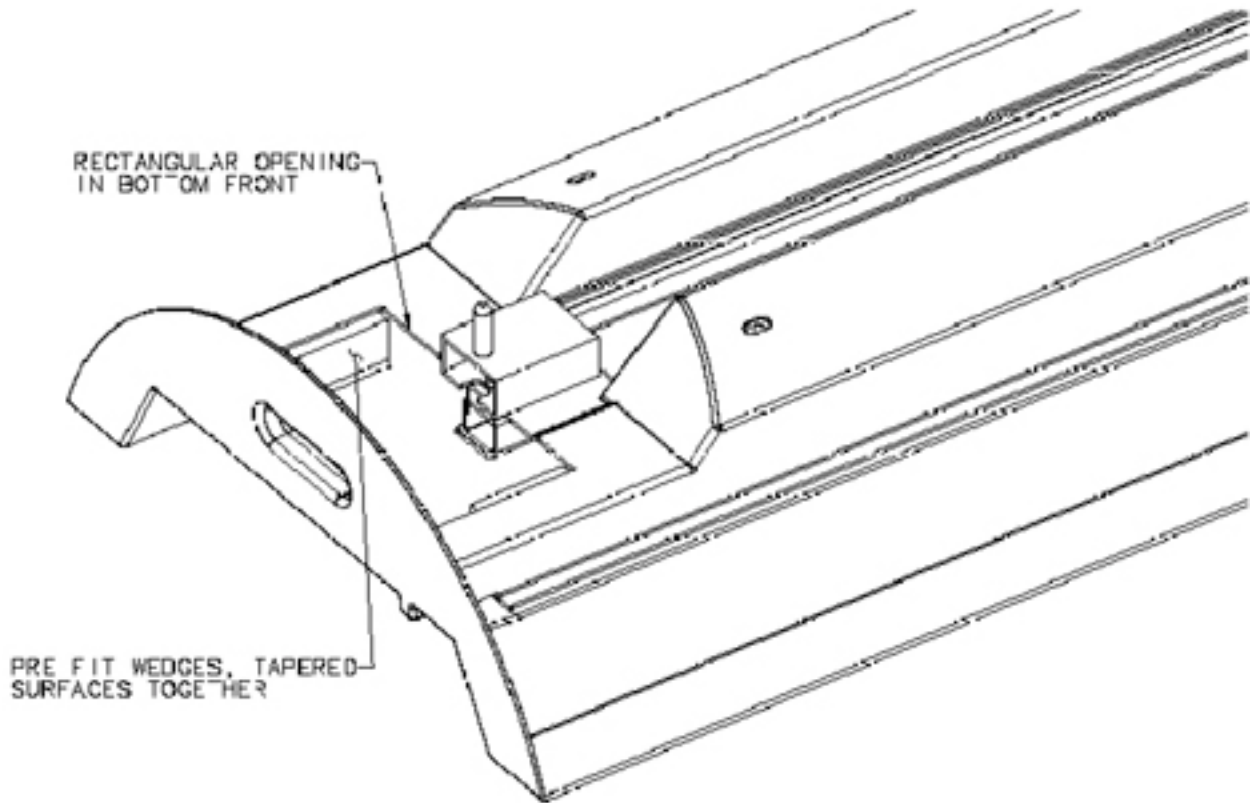


ILLUSTRATION 4-2  
LOCATE FIRST WEDGE

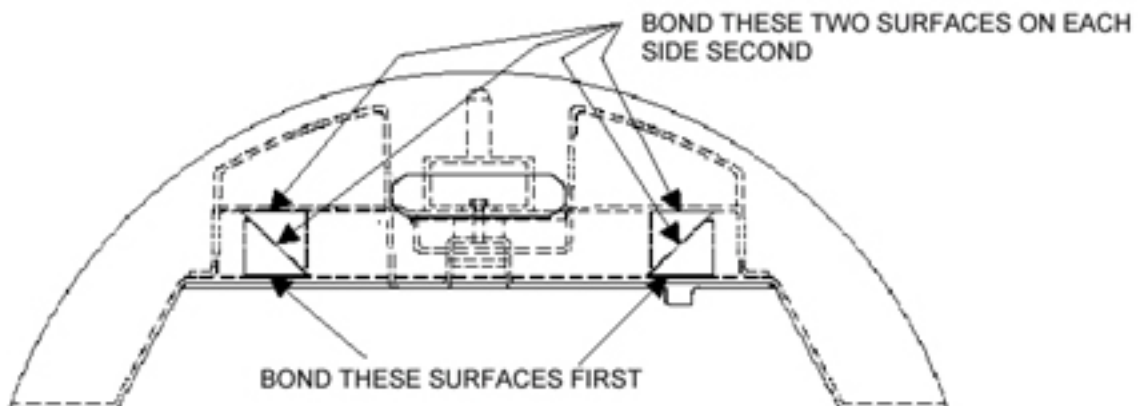


ILLUSTRATION 4-3  
END VIEW OF LOCATION

3. Position first wedge on the unfinished surface on the Bridge top (painted portion) with the taper extending toward the outside edges of the bridge. See illustration 4-4.

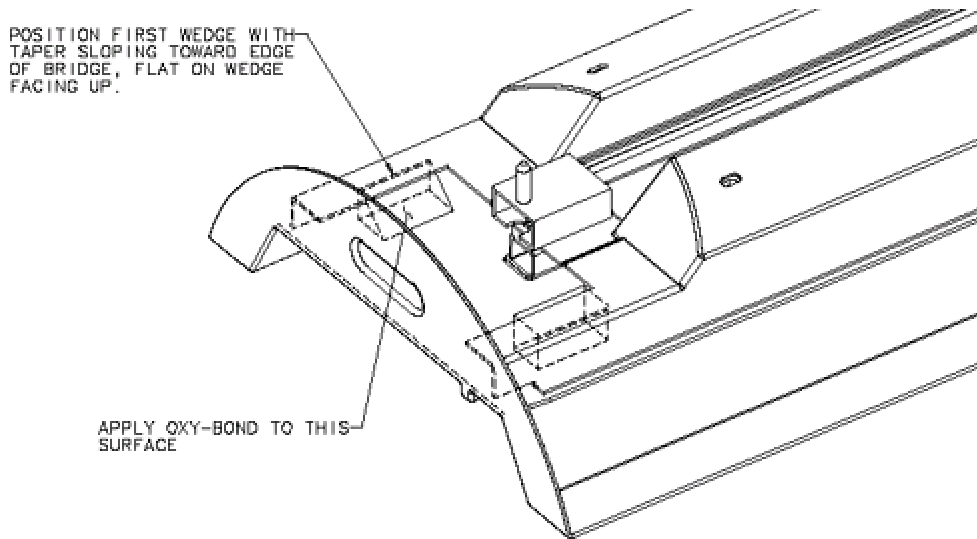


ILLUSTRATION 4-4  
**POSITION FIRST WEDGE**

4. Looking down, locate approximately 1/2" (13mm) from edge of cut out and up to rear most edge of opening. See illustration 4-5.

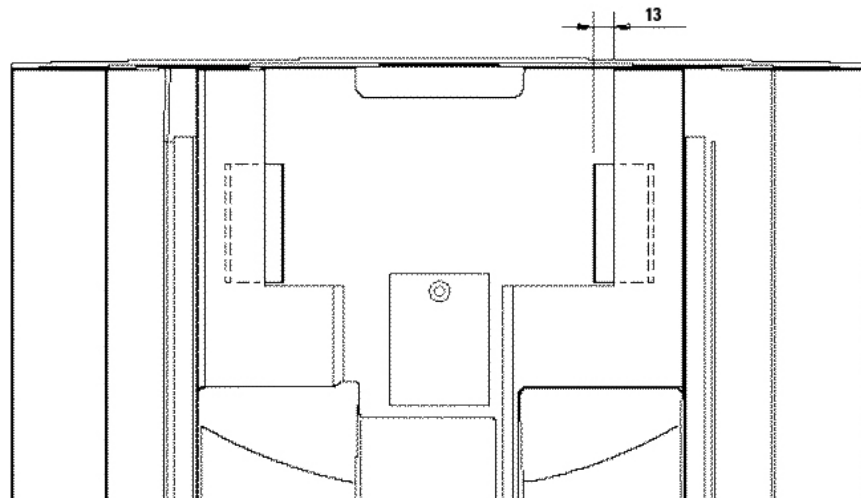
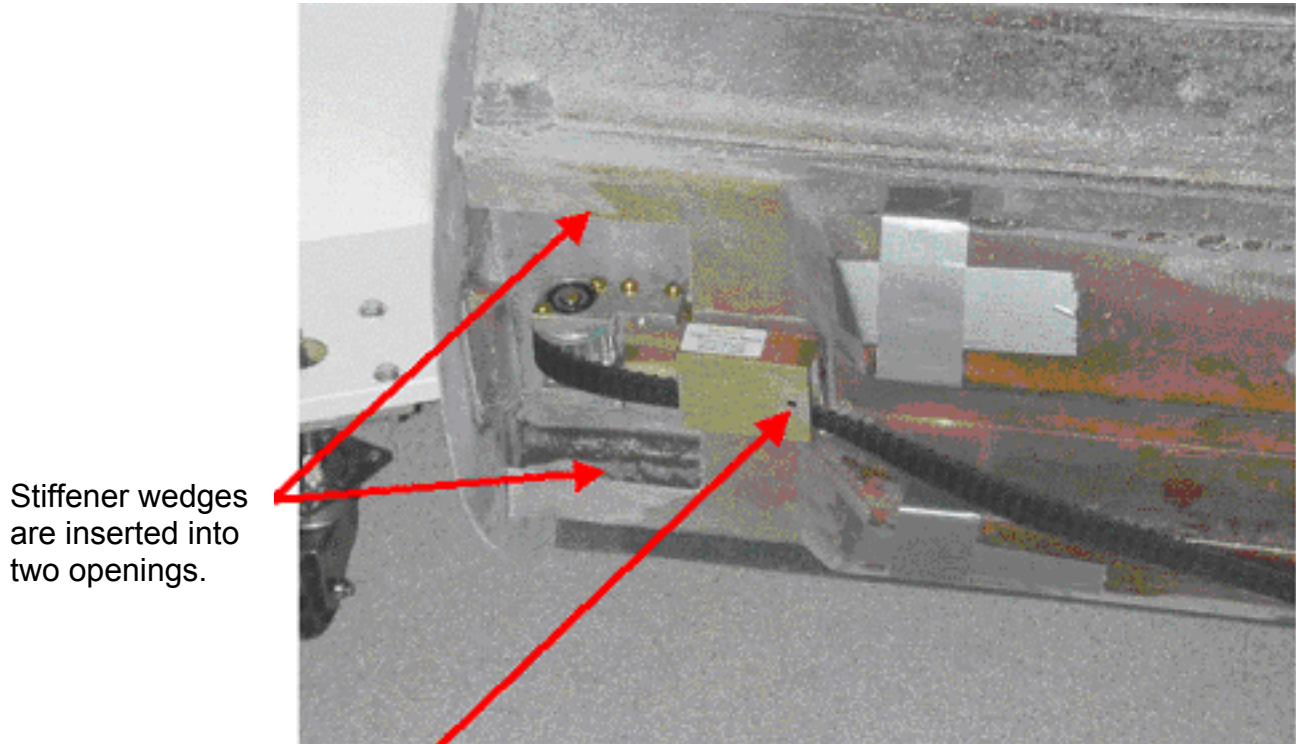


ILLUSTRATION 4-5  
**LOCATION OF FIRST WEDGE**

5. Apply epoxy adhesive to surface of wedge and adhere to fiberglass. Be sure to test the fit prior to binding by placing 2 wedges face to face (2 opposing tapered faces) to form a rectangular shape. See illustrations 4-4 and 4-5.
6. Allow epoxy adhesive to cure for approximately 10 minutes. Take another wedge and apply epoxy adhesive to tapered surface as well as the surface adjacent to the bottom inside surface of bridge (inlay).
7. Slide wedge into position as shown in illustration and allow to cure.
8. Repeat this process for both sides of bridge opening.

### 4-2 Bridge Preparation

The production bridge has a positioning pin located near the patient table belt assembly. The pin is captured in the aluminum tube. The removal of this pin is optional. If you are not able to remove the pin, leave in place but check to make sure the pin does not contact the front-end bell. See Illustration 4-6.



Location of locator pin. (Removal of this pin is optional.)

ILLUSTRATION 4-6  
LOCATOR PIN

### 5- END BELL MODIFICATIONS

End Bell Modifications and Preparations. Refer to Illustrations 5-1 and 5-2.

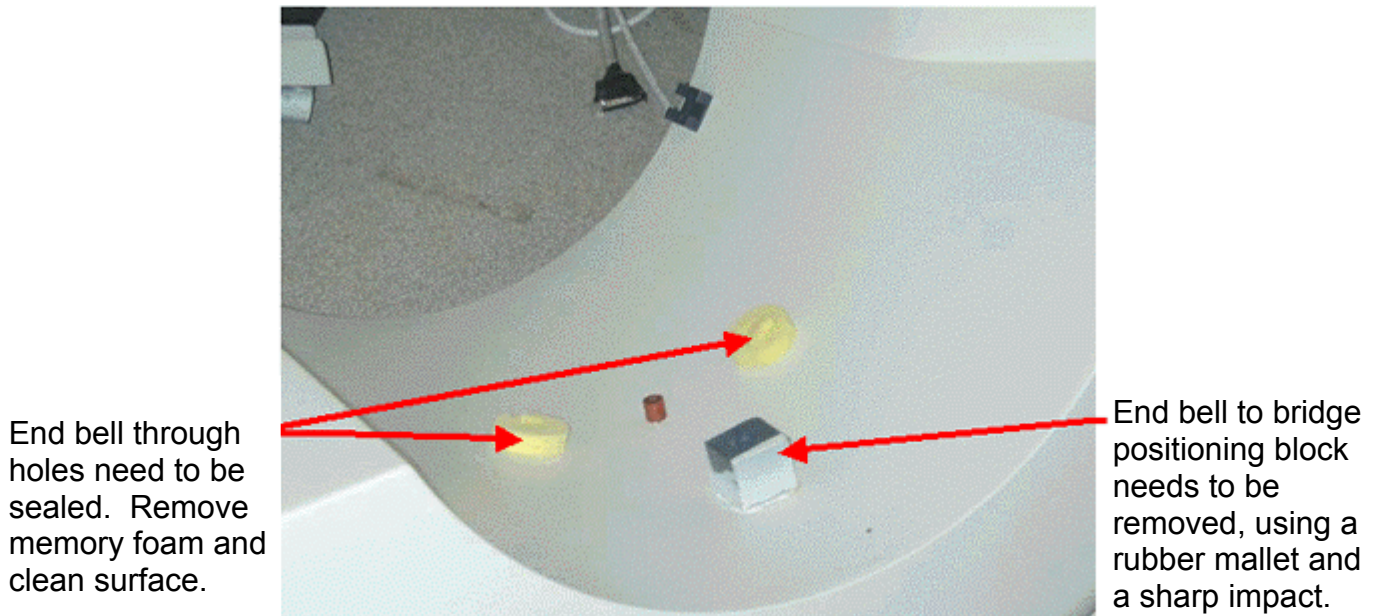


ILLUSTRATION 5-1  
END BELL MODIFICATION PREPARATIONS

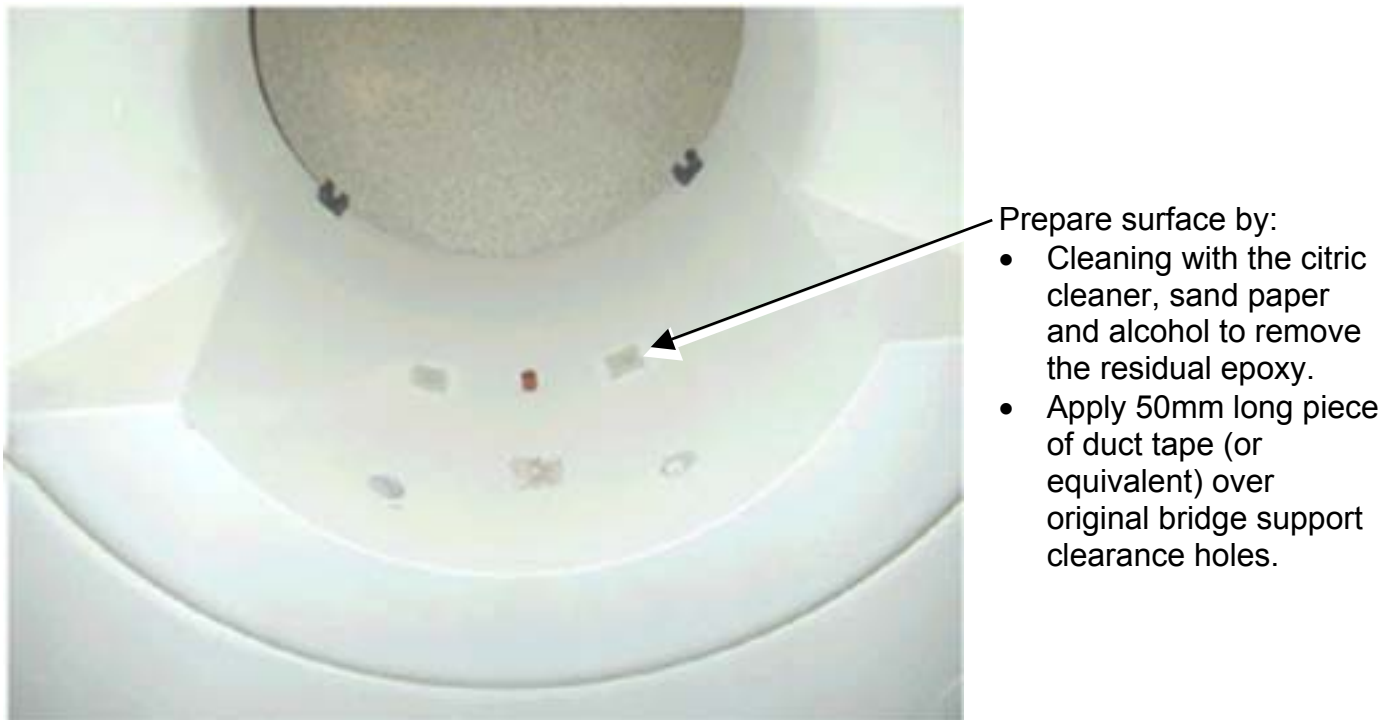


ILLUSTRATION 5-2  
END BELL MODIFICATION PREPARATIONS

Measure the distance between the centerline of the left vertical support to the centerline of the right vertical support. See illustration 5-3 to verify 233mm.

- If the distance measured is 233mm, follow illustrations 5-4 for finding where to drill. Place masking tape onto the end bell where the new holes will be drilled to pencil drill hole locations and to protect the end bell finished surface.
- Following the directions in Illustration 5-3, pencil the location of the new holes on to the masking tape.

After the points to drill are located, start drilling with a 3/16" pilot hole. Then cut 1 1/2 inch (38mm) diameter hole using hole saw (with a 1/4" mandrel). The 1 1/2 inch diameter hole needs to be drilled in a vertical direction, not normal to the surface of the end bell.

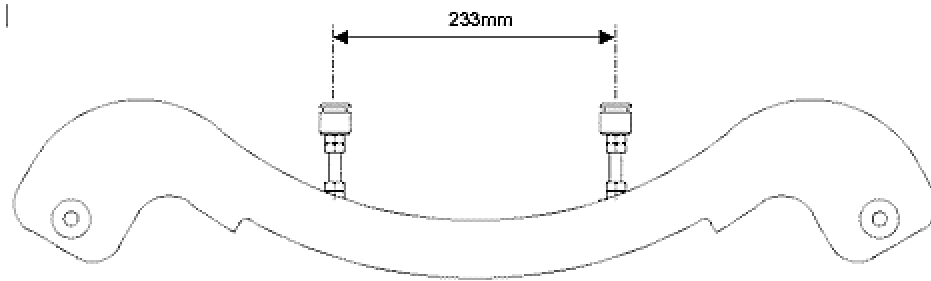


ILLUSTRATION 5-3  
THROUGH HOLE LOCATION CENTERLINE MEASUREMENT

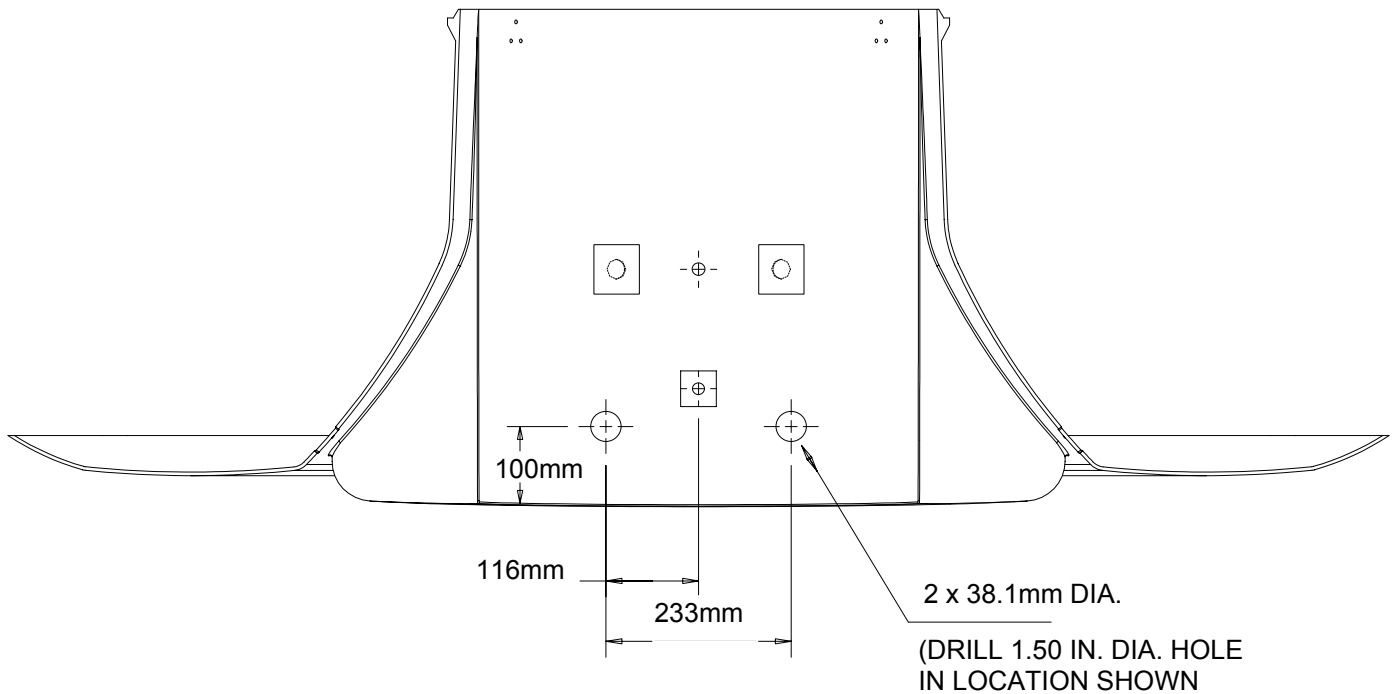


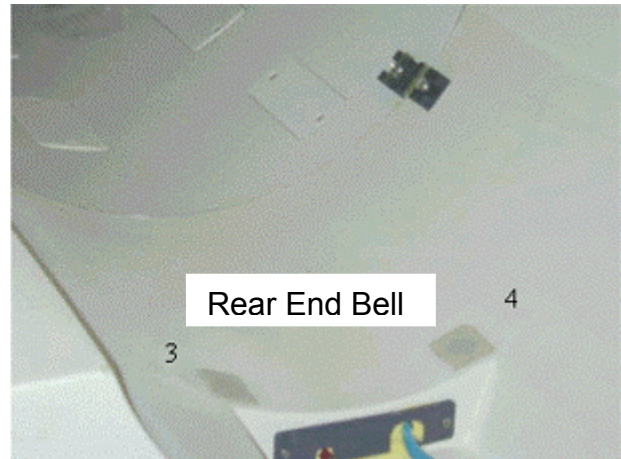
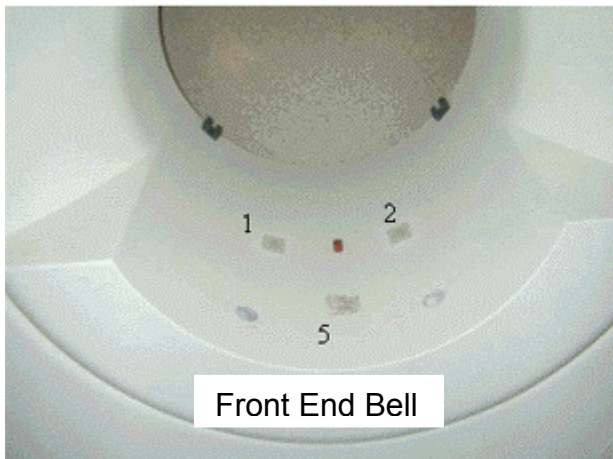
ILLUSTRATION 5-4

**THROUGH HOLE LOCATION DETAILED MEASUREMENTS IF CENTERLINE MEASUREMENT IS 233**

Illustration 6-6 shows properly fitted access holes through end bell.



**ILLUSTRATION 5-5  
END BELL WITH PROPERLY FITTED ACCESS HOLE**



**ILLUSTRATION 5-6  
CLOSURE OF AIR LEAKS**

Refer to Illustration 5-6 and close off air leaks by doing the following:

1. Clean adhesive from yellow memory foam at 2 locations front and rear end bells.
2. Apply 50mm long pieces of Cloth Duct Tape to cover holes.

3. Clean up area where positioning block was removed to eliminate remaining epoxy using citric cleaner.
4. Apply a piece of Cloth Duct Tape over area to seal surface.

Lastly, modify the rear end bell gussets as shown in Illustration 5-7.

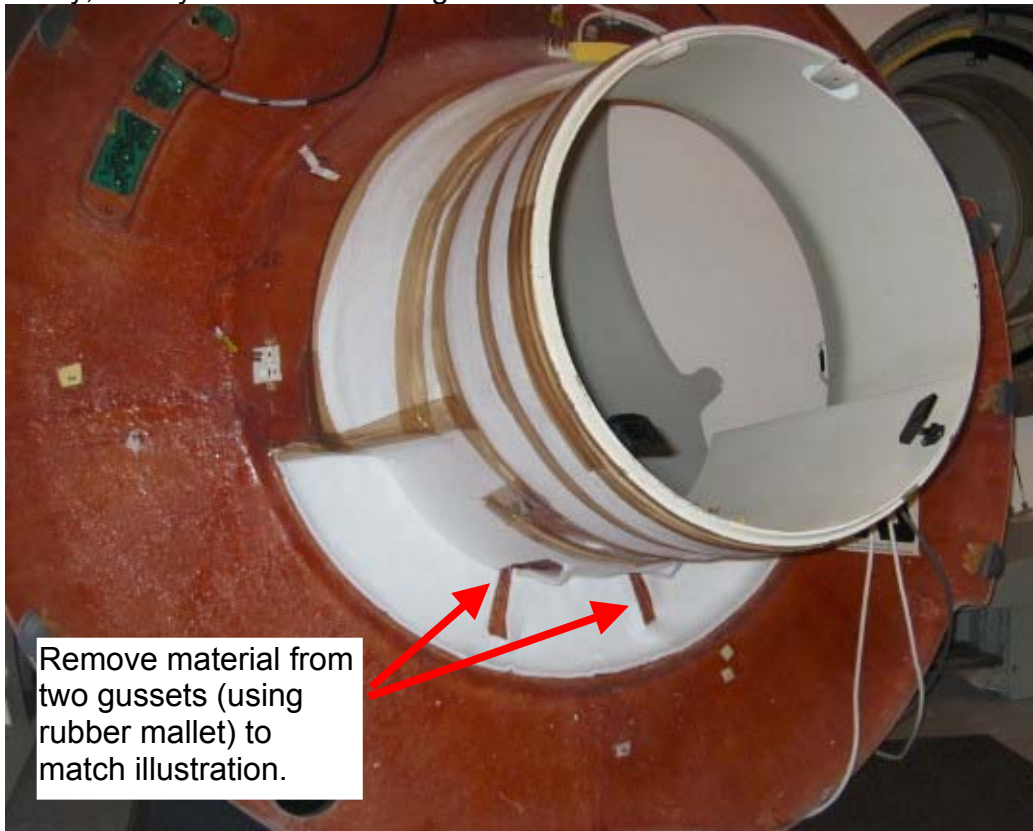


ILLUSTRATION 5-7  
MODIFICATION OF END BELL GUSSETS

## 6- FINAL ADJUSTMENTS

### 6-1 Final Front End Bell Assembly

NOTE: Two bridge support rods with jam nuts are threaded into the bridge support after the front end bell is installed.

1. Position the end bell using the standard enclosure assembly procedure found on service CD 2160623 Magnet Enclosures then Wide Open Enclosures.
2. Fasten the end bell to magnet following the enclosure assembly process.

### 6-2 Bridge Final Leveling

NOTE: Bridge is leveled using the phenolic threaded caps on the front end and through adjustment of the rear pedestal on the rear of the bridge.

1. Re-assemble and install the two bridge support rod assemblies into Support (mustache) Bracket. See illustration 6-1.
2. Stretch O-ring over Support Cap and position into groove in phenolic.
3. Slide the Phenolic Support Cap Cup onto phenolic Support Cap support member.

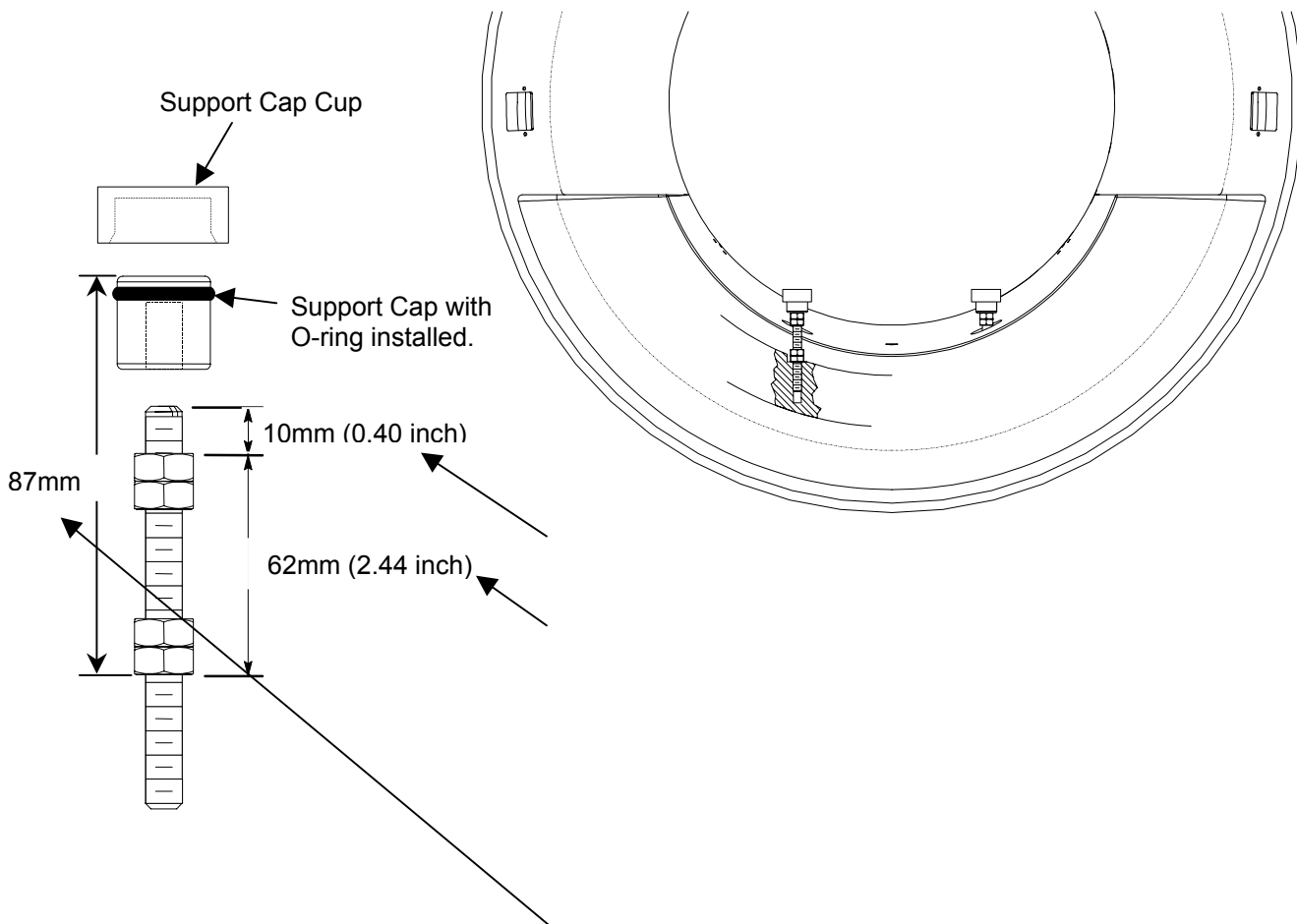


ILLUSTRATION 6-1  
INSTALL BRIDGE SUPPORT RODS

4. Lower bridge into position connecting the cradle drive mechanism. See Illustration 6-2.

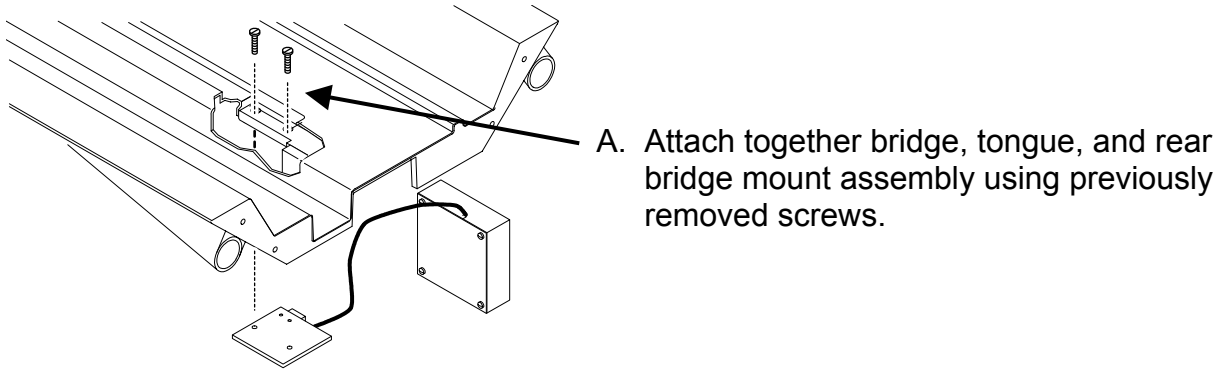
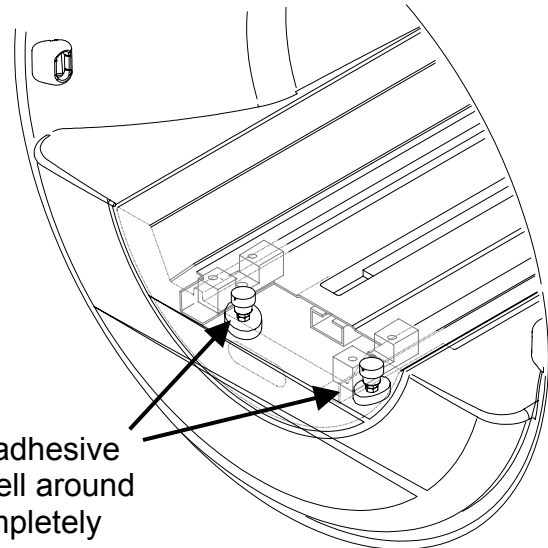


ILLUSTRATION 6-2  
ATTACH BRIDGE TO REAR PEDESTAL

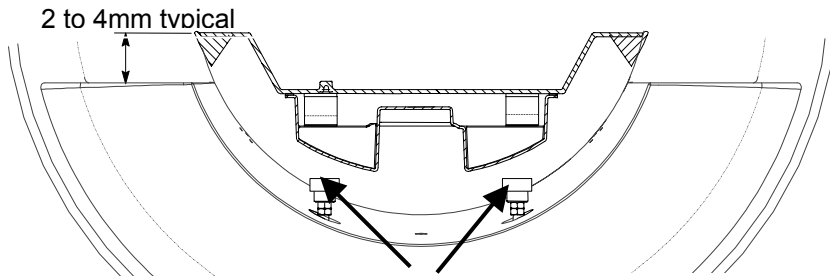
5. Align front of bridge to end bell. See illustration 6-3.



- A. Stretch Foam Gasket over rods. Remove adhesive backing protective paper and affix to end bell around clearance holes. Make sure the gap is completely covered.
- B. Lower the front of the bridge onto the Bridge Support
- C. Align the bridge left to right and front to back. Make sure front of bridge is flush with front of end bell. Also make sure that the bridge is centered left to right within the front end bell.

ILLUSTRATION 6-3  
FRONT BRIDGE ALIGNMENT

6. Adjust the front bridge to its final position. See illustration 6-4



- A. Adjust the bridge to the final vertical position. Make sure bridge is level.
- B. **NOTE:** The final position will leave the top surface of the bridge 2mm to 4 mm (or more) above the top surface of the end bell.
- C. Repeat the vertical adjustment as needed. Make sure the two M10 jam nuts are tight against each Support Cap. This will prevent change of position.
- D. Verify that the bridge is centered left to right within the end bell. Adjust if necessary.

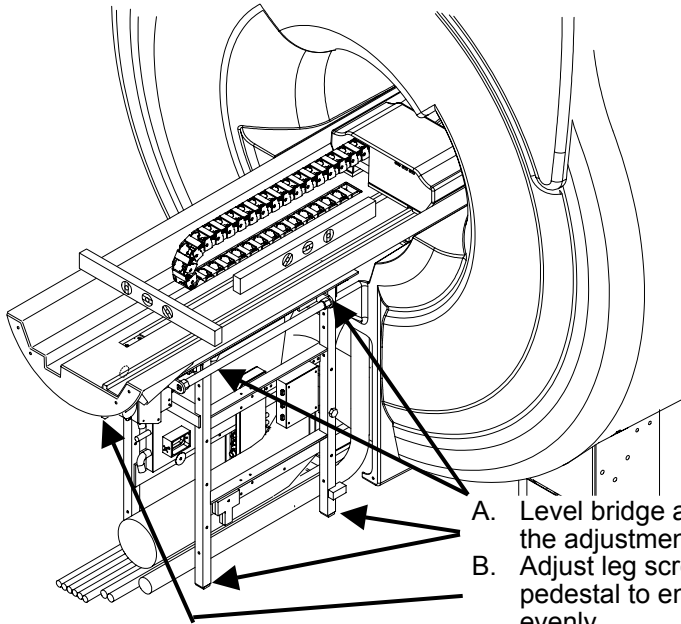
ILLUSTRATION 6-4  
FRONT BRIDGE ADJUSTMENT

7. Adjust the rear pedestal and the front threaded caps to set the final bridge leveling position. See illustration 6-5.

8. Apply adhesive to the bridge support caps:

- A. Raise the front of the bridge high enough to apply adhesive in next step.
- B. Apply adhesive to top of each Bridge Support Cap.
- C. Lower the bridge to rest firmly on the bridge support caps, making sure the bridge does not touch the boy coil or the end bells.
- D. Verify the vertical and horizontal positions as noted in step 6.
- E. Allow adhesive to cure.

9. After bridge is level, tighten jam nuts to prevent the Bridge Support Caps from changing position due to vibration. The top jam nuts (both left and right support) should be accessible with the enclosure in place.



**NOTE:** Rear pedestal to be adjusted to maintain full contact between bottom of bridge and top of rear pedestal.

**NOTE:** Tongue to bridge alignment is critical to smooth belt tracking and operation. Make sure tongue is square to bridge and rear pedestal.

- A. Level bridge and tighten vertical adjustment fasteners using the adjustments at the top rails of the rear pedestal.
- B. Adjust leg screws on both sides as needed to level rear pedestal to ensure the rear pedestal rests on the ground evenly.
- C. Front adjustments are made by raising and lowering Bridge Support Caps.
- D. Make sure that longitudinal drive assembly is level.

ILLUSTRATION 6-5  
**LEVELING OF BRIDGE**