

Booms

# stryker®

Installation and Service Manual





# Stryker Booms

## Installation and Service Manual

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**Stryker Booms and Lights Installation and Service Manual**

**1004-400-061 REV YR**



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## 1. Warnings and Cautions

Please read this manual and follow its instructions carefully. The words WARNING, CAUTION, and Note carry special meanings and should be carefully reviewed:

**Warning**

**The personal safety of service personnel may be involved. Disregarding this information could result in injury to the patient.**

**Caution**

**Special service procedures or precautions must be followed to avoid damaging the equipment.**

**Warning**

**A warning with a lightning bolt warns of hazardous voltage. All service must be performed by authorized personnel.**

**Note**

Special information to make maintenance easier or important information more clear.

### 1.1 Safeguards and Precautions

Stryker trained personnel are the only personnel authorized to install the equipment described in this manual.

Incorrect operation or negligence of safety measures may cause damage to the equipment, bodily injury or death. Thoroughly read this manual before use.

### 1.2 Warnings

1. Be a qualified/trained installer for this equipment.
2. Test this equipment prior to release for use by hospital personnel.
3. Disconnect the unit from the electric outlet before inspecting or servicing system components. Note that more than one electrical supply may be used. Disconnect all power sources before inspecting.
4. The electrical installation of the operating room must comply with any applicable IEC, CEC, NEC requirements as well as the local codes and pre-installation manual.

**Caution**

**Carefully unpack the unit and check to ensure that no damage occurred during shipment. If damage has occurred, please contact Stryker Communications.**

## 2. Product Symbol Definition

The following symbols may be found on the Stryker Booms and Lights equipment:

	An exclamation mark within a triangle is intended to alert the user to the presence of important operating and maintenance (service) instructions in the literature accompanying the product.
	A lightning bolt indicates the presence of hazardous voltage. Refer all service to authorized personnel.
	Denotes usage tips and useful information.
	Denotes compliance to European Community Directive 93-42-EEC.
	Indicates the product is compliant “Medical Electrical Equipment with Respect to Electrical Shock, Fire, and Mechanical Hazard only in accordance with UL60601-1.
	Indicates the product is compliant “Medical Electrical Equipment with Respect to Electrical Shock, Fire, and Mechanical Hazard only in accordance with CAN/CSA C22.2 No601.1.
	Indicates the product is compliant “Medical Electrical Equipment with Respect to Electrical Shock, Fire, and Mechanical Hazard only in accordance with UL60601-1, CAN/CSA C22.2 No601.1.
	Indicates hot surfaces.
	Denotes compliance to CSA Standard C22.2, 60601.1 - M90, AS 3200, IEC 60601, IEC 60601-2-41, UL 60601, EN 60601
	Denotes the date the equipment was manufactured.
	Denotes the manufacturer of the device.
	A yellow box with a hand within a triangle is intended to warn the user of the presence of an electrostatic sensitive device. Follow ESD prevention procedures.
	Denotes product/part number.
	Denotes product/serial number.
	Denotes lot or batch number.
	The acceptable wattage input range for this product.



In accordance with European Community Directive 2002/96/EC on Waste Electrical and Electronic Equipment, this symbol indicates that the product must not be disposed of as unsorted municipal waste but should be collected separately.

**Note:** The device does not contain any hazardous materials.

Legal regulations may include specifications regarding the disposal of this product. We request that you contact Stryker when you plan to withdraw this device from service for discard.

## 3. Tool List

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### 3.1 Required Tools

- Genie lift or equipment lift, SLC-12 or equivalent
- Torpedo level
- Metric allen set (Shortened 3mm)
- Small and large phillips head
- Small and Large flat head screwdriver
- 24mm (15/16 inch) wrench
- Snap ring plier (adjustable to 15mm)
- Torque Wrench (in. lbs.)
- Torque Wrench (ft. lbs.)

### 3.2 Optional Tools

- Porta band saw
- Large hand file
- 1/2 inch Drill/Driver
- Tape measure
- Drill bit set
- Hand tool pouch
- Adjustable wrench
- Roofer's square

## 4. Unpacking

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Each Boom will arrive in a shipping box on one pallet. The shipping box should contain a Boom Arm, Service Head, shelves (if applicable), and Ceiling Covers.

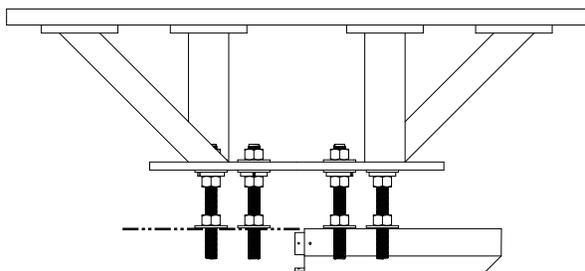
Use box cutters to open the shipping box along the seams.

Verify that all parts are present and visibly undamaged.

## 5. Preparing the Mounting (Interface) Plate

Remove the hardware bag from the suspension box.

 **Note** Ensure all-thread rods do not interfere with the application of ceiling cover by performing a dry fit. The all-thread rods should not extend below the base of the cover. If they do, cut the rods back.



1. Install six hex nuts below Mounting (Interface) Plate to align flange top approximately even with the bottom of finished ceiling.
2. Use a Torpedo Level to verify that the nuts are level. Measure two sets at a time.

3. Place flat washers and Plastic Isolation Discs (required in Europe) below each hex nut to hold in place.

 **Note** Plastic Isolation Discs are only required in Europe.

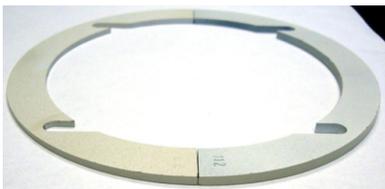
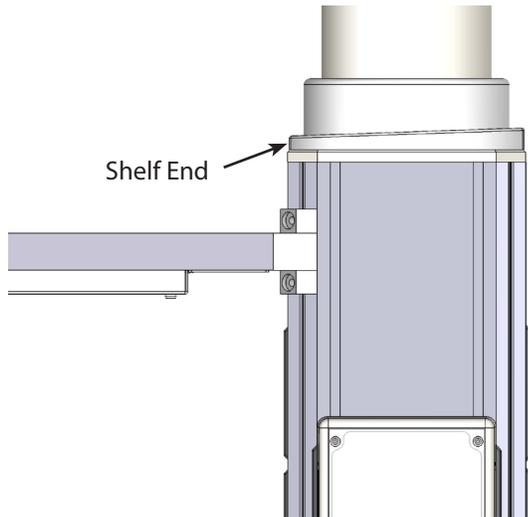
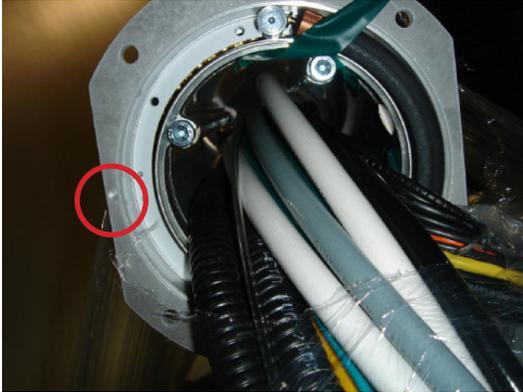
 **Caution** No more than 3 inches of exposed all-thread rod is allowed between the Pre-installation Plate and the down tube flange for Seismic considerations.

Cover Size	
180 mm (7 inches)	153 mm (6 inches)
80 mm (3 inches)	64 mm (2.5 inches)

## 6. Preparing the Suspensions

### 6.1 Booms

Due to door entry height, the flange and drop tube may be removed for entry into the room. The flange and drop tube must be reinstalled before installation of the equipment boom.



0682-001-345 Wedge Kit

1. Place pallet securely on material lift (e.g., Genie Lift).
2. Determine the orientation of the service head before attaching to the down tube, feel for the notch. The notch will be mounted to the front of the service Head.
3. Remove the Allen screws from the Service Head.
4. Locate the cable kit end and pass through the service head opening.

*MMP200 only*



**Note**

The Shelf Wedge kit has a thick and a thin component. Orientation of the thin side towards the front of the service head is important.

5. Verify which Wedge is the thinner wedge of the 2 halves of the Wedge Kit
6. Place the thinner Wedge towards the front of the Service Head



7. Place the thicker Wedge towards the rear of the Service Head.
8. Connect Service Head to drop tube.
9. Tighten the four Allen screws to 14.75 lb-ft (20 Nm) using a 5mm Allen wrench.

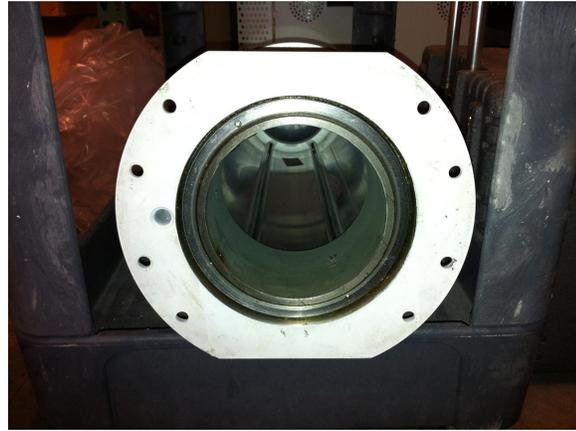
For OSC400/600 booms w/ drop tubes not attached in packaging (otherwise, skip to step 22):



1. Support the boom arm set with a material lift, being careful not to scratch the paint. Secure the boom arm set to the lift using a strap.
2. Free the arm set by removing the iron support bars. Each iron support bar is attached with 15/16 all threads and nuts (may also be M16 all threads and nuts). Packaging hardware should not be used for mounting of the boom.



3. With the material lift, raise the arm set and remove the packaging.
4. Set the drop tube on the ground with the beveled edge end facing up, maneuver the material lift so the drop tube and location of its attachment to the arm set are in place. Lower the lift to mate the arm set with the drop tube; the beveled edges should line up to the sides of the arm set.

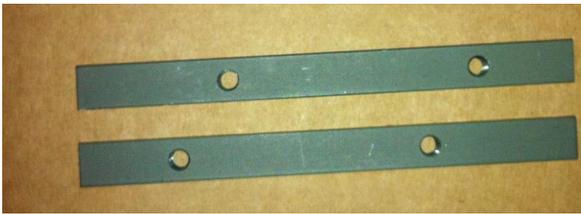


- FOR OSC600 booms, locate the opening for the brake bladder and align with the opening in the arm set. This location is facing away from the arm set.



**Caution**

**Lowering the material lift too far may result in the arm set falling off.**



- Remove the screws and hardware that are loosely threaded into the boom arm set for drop tube attachment.
- Thread two screws that was removed in the previous step (M8x30mm) with washers through the drop tube and into the threaded bar stock. Repeat the same for the opposite side.
- Insert an M8x30mm screw with washer through one of the remaining openings and cap off with a flat washer and then nut. Repeat for the 3 remaining screws.
- Tightened all screws to 23 Nm.
- Raise the material lift for space to attach the service head.
- Position the service head underneath the drop tube and roll out the gas hoses, electrical conduits and low voltage cables.

**Caution**

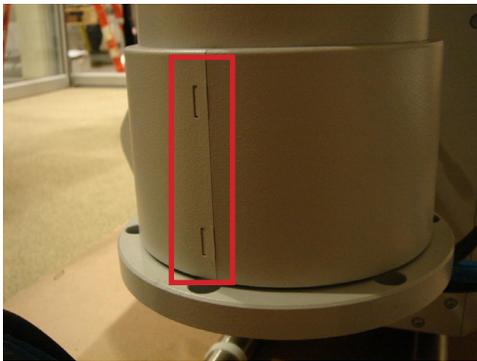
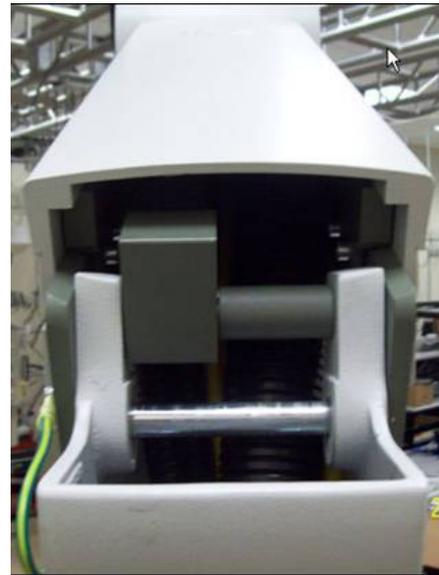
When adding cabling/hoses to existing booms in the field, ensure cable fill capacity is not exceeded. Exceeding cable fill capacity can potentially cause cables/hoses to be damaged. If questionable, the capacity can be confirmed by measuring the perimeter of the entire cable/hose bundle with a string; cross reference the string to a measuring tool and determine the length. The following maximum cable fill parameters are used for the different booms:

Boom	Maximum cable fill area	Maximum cable fill perimeter
MMP200	36 cm <sup>2</sup>	21 cm
OSC400	42 cm <sup>2</sup>	23 cm
OSC600	50 cm <sup>2</sup>	25 cm

**Note**

The following cable pulling instructions should be followed when routing any cabling or hoses through boom armsets in the field and may be performed in the reverse cable pull direction when needed.

12. Disengage the EP Module box and partially remove so that cables can be pulled through.
13. Keeping the EP Module out, pull the low voltage control cables down through the arm set, drop tube and into the service head. Make sure to keep slack within the arm set for removal of the EP Module box [for future servicing].
14. Pull the gas hoses through the drop tube and lower arm.
15. Pull the electrical conduits through the drop tube and lower arm.
16. Pull the low voltage cabling through the drop tube, lower arm and upper arm.
17. Pull the electrical conduits through the upper arm and flange.
18. Pull the gas hoses through the upper arm.
19. Pull the low voltage cables through the flange.
20. Pull the gas hoses through the flange.
21. Reattach the EP Module box into the upper arm.
22. When pulling cabling/hoses through an articulating boom, ensure the cabling/hoses run through the armsets in the proper manner to avoid being pinched as shown in the following figures. After cables have been pulled, articulate the boom up and down and visually confirm that no cables are being pinched during articulation.



23. Remove the six (6) Allen screws from the Service Head using a 5mm Allen wrench.
24. Remove the cylinder cover located on the Down Tube. The two (2) halves can be detached by depressing on the two (2) clips with a flat edge tool.
25. Rotate the Down Tube and determine the stop location. This point will be installed to the front of the service head.

26. Locate the cable kit end and pass through the service head opening. In some cases, half of the pass-thru plate will need to be removed to feed the cable kit completely through.



**Caution**

**Be sure to leave enough slack for the EP Module control cable within the arm set. Failure to do so may result in damage to the cable upon removal of the EP module.**

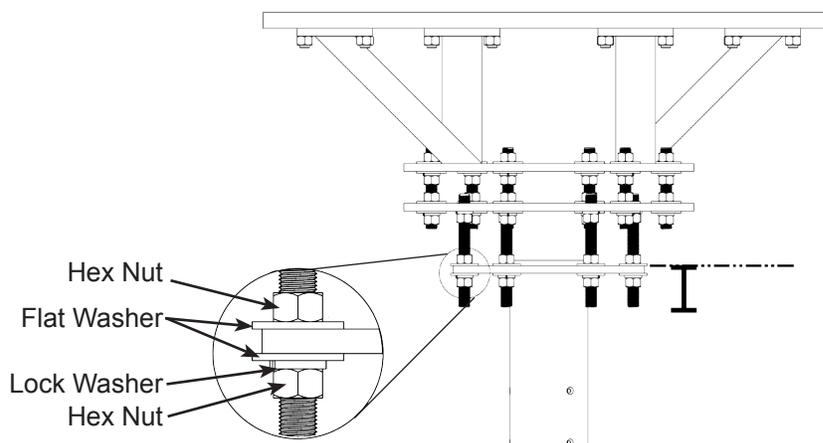
27. Attach the service head by inserting and tightening the six (6) Allen screws to 7.4 lb-ft (10 Nm) using a 5mm Allen wrench.

## 6.2 Routing Cables

This section is only applicable to suspensions with lengthy cable kits.

1. Uncoil the cable kit.
2. Pull the cables from the suspension through the top of the mounting interface plate.
3. Continue to route the cable through the ceiling conduits. Consult your Project Engineer and/or room drawings to determine cable routing through the conduits.

## 7. Installing the Boom Arms



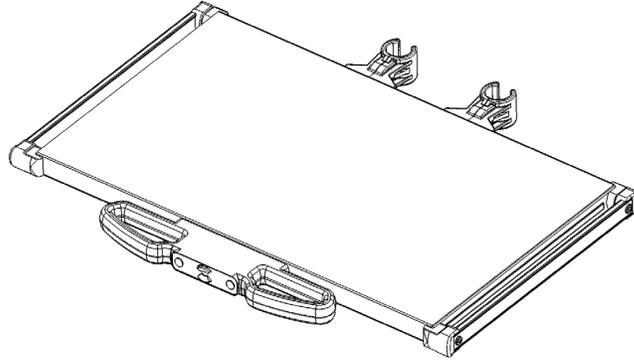
**Note** When necessary, Plastic Isolation Discs surround the mounting plate, but are only required in Europe.

1. Raise the assembly toward the mount site.
2. Take care when raising to prevent pinching cables between the all-thread rods and down tube.
3. Guide the all-thread rods through the holes located on the down tube flange.  
The down tube flange must press lightly against the hardware assembly.
4. Pull all cables and electrical connections through the Mounting (Interface) Plate. If ORIS connectivity is going to occur at a later date, tie-wrap cable kit to down tube flange.
5. Place a flat washer on alternating all-thread rods followed by a hex nut; tighten the hex nut.
6. Install a flat washer, lock washer, and hex nut on the remaining all-thread rods.
7. Tighten the hex nuts to 75 ft-lbs. Ensure the lock washers are fully compressed.
8. Remove the hex nuts from the all-thread rods applied in step 10 and install a lock washer and hex nut.
9. Use a Torpedo Level to verify that the down tube flange is level across three horizontal planes.
10. Connect the ground wire (found on the down tube flange) to the ground lug located in the ceiling.
11. Lower the lift device and check for stability.
12. Pull excess cable through conduit.

## 8. Boom Shelf Attachment and Adjusting Brakes/Stops

### 8.1 Boom Shelf and Accessories Attachment

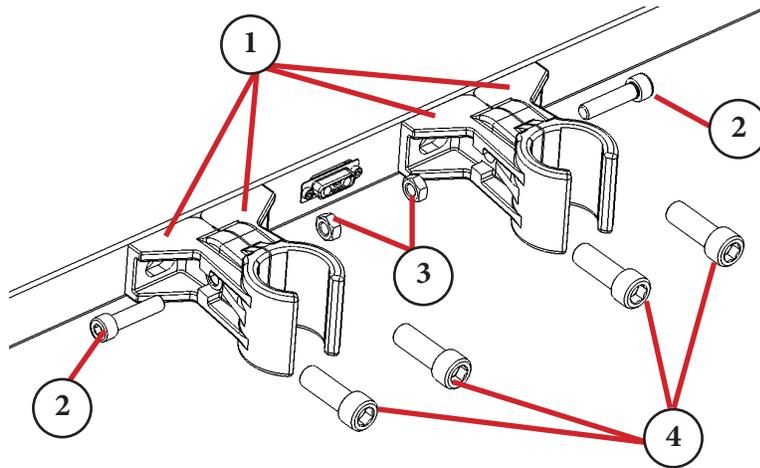
#### 8.1.1 FLEXiS Shelf Installation



*Shelf with handle attached*

To install a shelf:

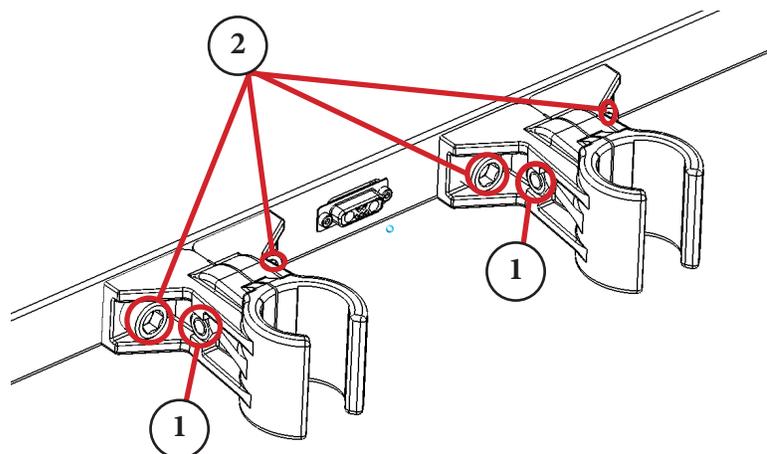
1. Remove the shelf from the packaging. The shelf should include all the parts shown in the figure above, unless it comes without a handle.
2. Assemble the shelf clamps.
  - a. Combine the clamp pieces as shown in the figure below (Item 1). Use the M8 clamp screw (Item 2) and clamp nut (Item 3) to loosely assemble the clamps.
  - b. Assemble the M10 mounting screws (Item 4) through the clamps into the shelf.



*Shelf Assembly*

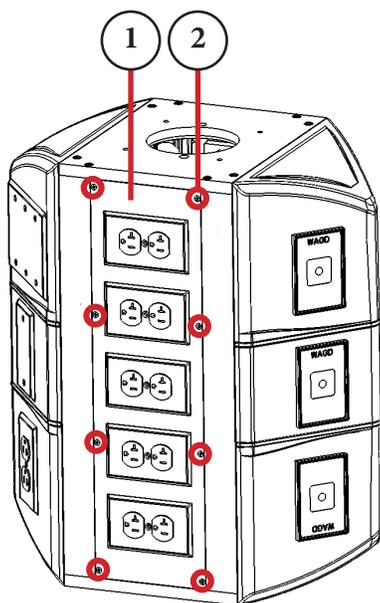
Part	Part Name
1	Shelf Clamps
2	M6 Clamp Screws
3	Clamp Nuts
4	M10 Mounting Screws

3. Loosen the mounting screws (Item 2).
4. Loosen the clamp screws (Item 1 in the following figure) as much as possible without disassembly.



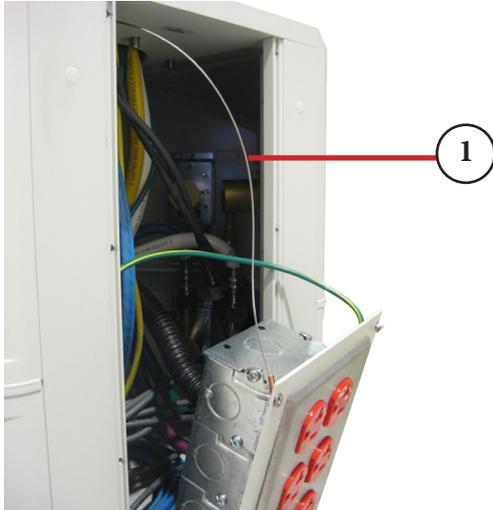
*Screw and Nut Locations*

5. Slide each clamp assembly apart and position the shelf on the MFRs of the FLEXiS System. The clamps should be able to open enough to directly install the shelf to the desired location. The shelf can also be attached by sliding the clamps onto the MFRs.
6. If the clamps cannot close properly, the shelf may not be level.
7. Fully tighten the clamp screws (Item 1).
8. Fully tighten the mounting screws (Item 2).

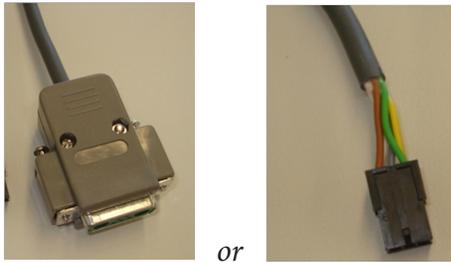


*Location of Screws on Access Panel*

9. If the shelf has a handle, connect the control cable from the FLEXiS System to the connector on the back of the shelf.
  - a. Using a Phillips screw driver, open the access panel (Item 1) on the front or back of the FLEXiS System by removing the eight Phillips screws (Item 2).



*Tether Wire Location*



*Control Cable for a Shelf with Handle*



*Data Pass-Through Location*

- b. The access panel is attached to the FLEXiS System via a tether wire inside the system to prevent it from falling when removed. Ensure the panel rests on the tether when it is removed and not on the medical gas hoses.

- c. Locate the control cable connector inside the FLEXiS System. This may be a D-sub or six-pin connector. Newer units have two six-pin connectors on the ends of the controller cables.

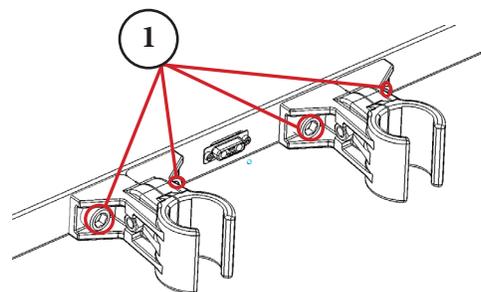
- d. Pass the control cable through the data pass-through on the same side as the shelf with handle.
- e. Connect the control cable to the shelf and store cable slack inside the FLEXiS System.

### 8.1.1.1 Installing Shelf Shims

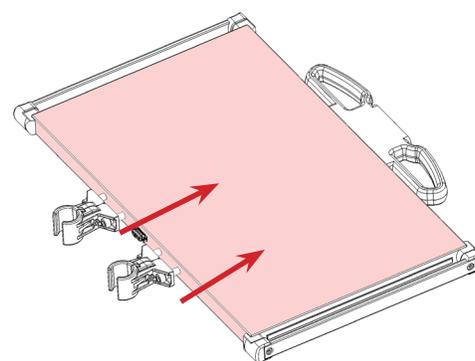
If upon installation of a FLEXiS shelf it is determined that the shelf is canted to greatly shelf shims can be installed to improve the flatness of the shelf when loaded with medical equipment.

To install shelf shims:

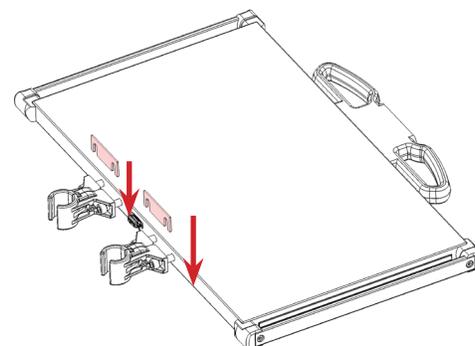
1. Loosen the mounting screws (Item 1) that hold the FLEXiS shelf to the Service Head MFRs but do not fully remove them.



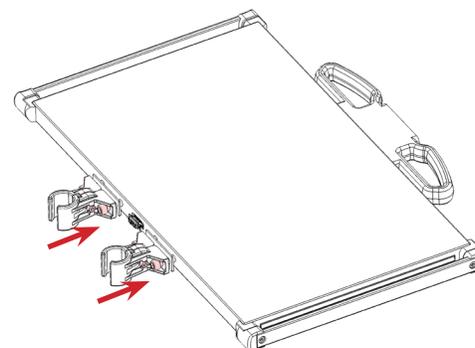
2. Pull the shelf body (shown in pink) away from the clamps, creating a gap between the shelf body and the clamps.



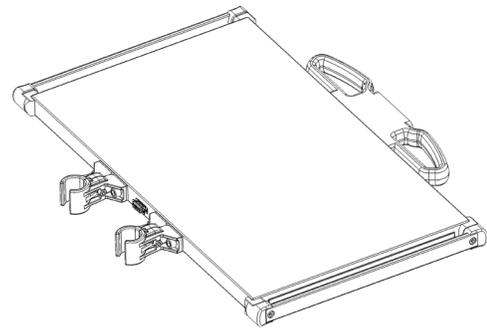
3. Insert the shelf shims (1 per clamp, shown in pink) with the thicker side towards the bottom so that when installed the shelf is canted up. The shims sit over the clamp mounting screws (Item 1 in Step 1).



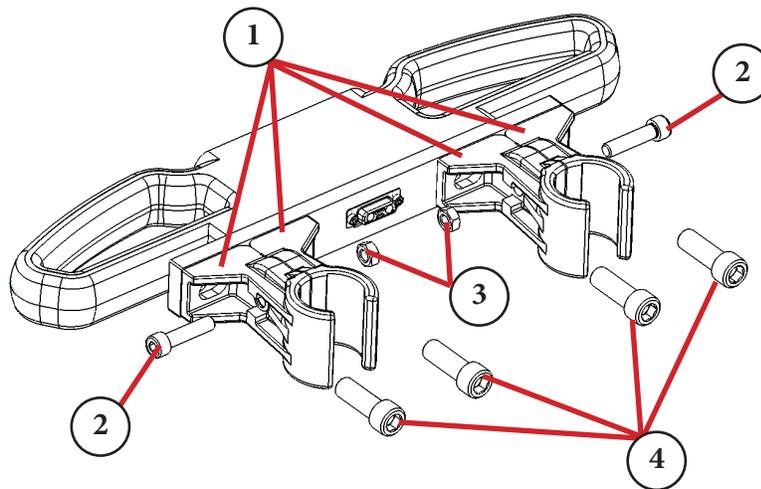
4. Close the gap between the shelf body and the clamps by tightening the clamp screws and then the mounting screws (both are shown in pink below).



5. The FLEXiS shelf with shims is now installed.



### 8.1.2 FLEXiS Handle to MFR Bracket Installation

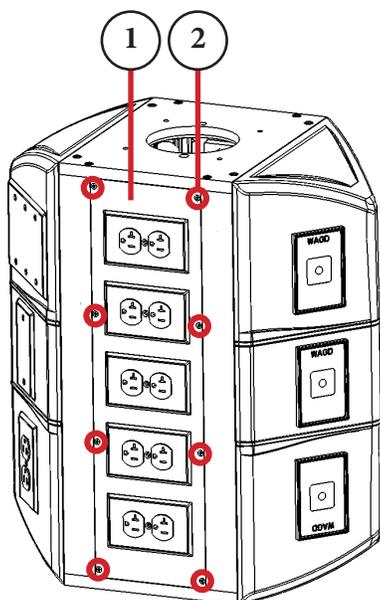


*Handle Assembly*

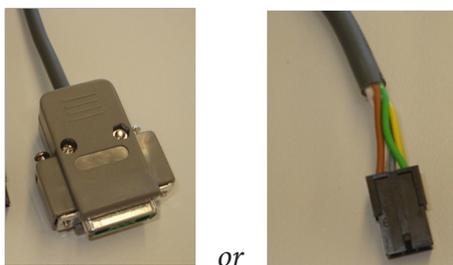
Part	Part Name
1	Clamps
2	M6 Clamp Screws
3	Clamp Nuts
4	M10 Mounting Screws

1. Remove the handle to MFR bracket and handle from the packaging. The handle with bracket should include all the parts seen in the figure above. The clamps may be disassembled.
2. If the bracket comes with clamps attached skip to Step 5, otherwise assemble the clamps.
  - a. Combine the clamp pieces as shown in the figure above (Item 1). Use the M8 clamp screws (Item 2) and clamp nut (Item 3) to loosely combine the clamps.
  - b. Assemble the M10 mounting screws (Item 4) through the clamps into the handle. Do not tighten completely
3. Loosen the mounting screws (Item 4).
4. Loosen the clamp screws (Item 2) as much as possible without disassembly.
5. Slide each clamp assembly apart and position the bracket on the MFRs of the FLEXiS System. The clamps should be able to open enough to directly install the bracket to the desired location.
6. Use a level to ensure the shelf is level.
7. Fully tighten the clamp screws (Item 2).

8. Fully tighten the mounting screws (Item 4).



*Location of Screws on Access Panel*



*Primary Control Cable*



*Data Pass-Through Location*

9. Connect the control cable from the FLEXiS System to the connector on the bracket.

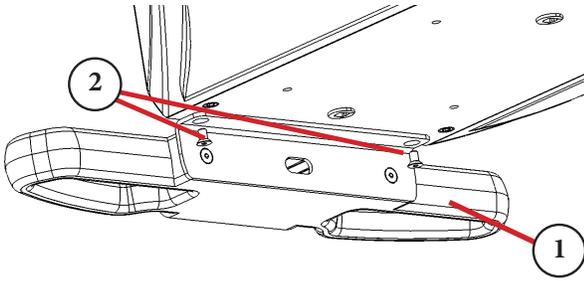
a. Using a Phillips screw driver, open the access panel (Item 1) on the front or back of the FLEXiS System by removing the eight Phillips screws (Item 2).

b. Locate the control cable connector inside the FLEXiS System. If this handle is the main control interface of the boom use the primary (larger) connector, or the unit may have two six-pin connectors if it is a newer model. If this handle is an addition to a shelf control use the extra cord provided with the handle and connect to the secondary (smaller) control cable inside the FLEXiS System.

c. Pass the control cable through the data pass-through on the same side as the handle.

d. Connect the control cable to the bracket and store cable slack inside the FLEXiS System.

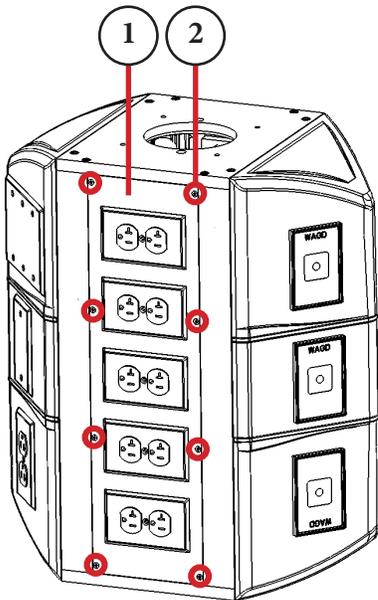
### 8.1.3 FLEXiS Handle to Service Head Installation



*Handle to FLEXiS Bracket*

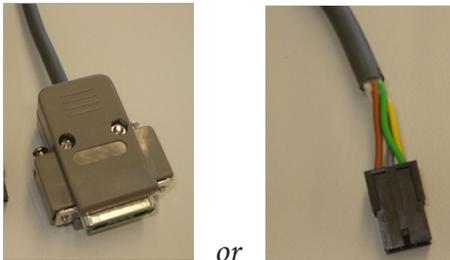
1	Handle and Bracket
2	M3 Mounting Screws

1. Remove the handle to chassis bracket from the packaging.
2. Position the handle and bracket under the FLEXiS System (Item 1) chassis in the desired location.
3. Install the M3 mounting screws (Item 2) into the bottom plate of the FLEXiS System.



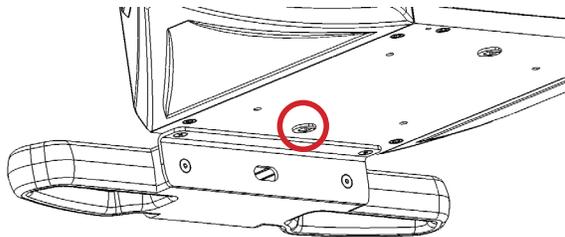
*Location of Screws on Access Panel*

4. Connect the control cable from inside FLEXiS System to the additional cable included with the bracket.
  - a. Using a Phillips screw driver, open the access panel (Item 1) on the front or back of the FLEXiS System by removing the eight Phillips screws (Item 2).



*Control Cable*

- b. Locate the control cable connector inside the FLEXiS System. This may be a D-sub or six-pin connector. Newer units have two six-pin connectors on the ends of the controller cables.



*Strain Relief Plug Location*



*Strain Relief Plug*

- c. Remove the strain relief plug from the bottom of the FLEXiS System by punching it out from the inside of the FLEXiS using a screw driver or similar tool.



**Caution**

**Take care not to damage the service head when removing the strain relief plug.**

- d. Pass the small end of the cable provided with the handle through the strain relief and into the FLEXiS System.
- e. Connect the cable to the secondary control cable inside the FLEXiS System.
- f. Connect the cable to the D-sub connector on the bracket.
- g. Measure the appropriate amount of slack and install the strain relief plug around the cable and into the bottom of the FLEXiS System.

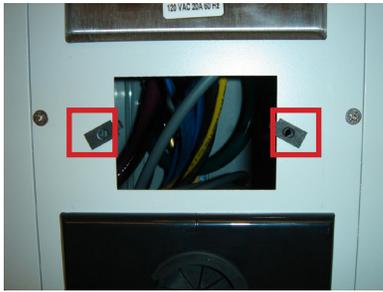
#### 8.1.4 Installing Auxiliary Plates



*External View*

*Internal View*

1. Locate a blank plate location to install the auxiliary plate.
2. Remove the two (2) 6-32 screws that hold the plate attached to the service head. These screws are held in place by either a grounding bracket with pem nut (side modules) or metal screw clips (front or back plate), so there are no screw nuts to account for.



Screw Clips

3. Route the appropriate cables through the opening and connect to the auxiliary plate.
4. Push any slack from the cable back into the plate opening and install the auxiliary plate with the two (2) 6-32 screws that were removed in Step 2.

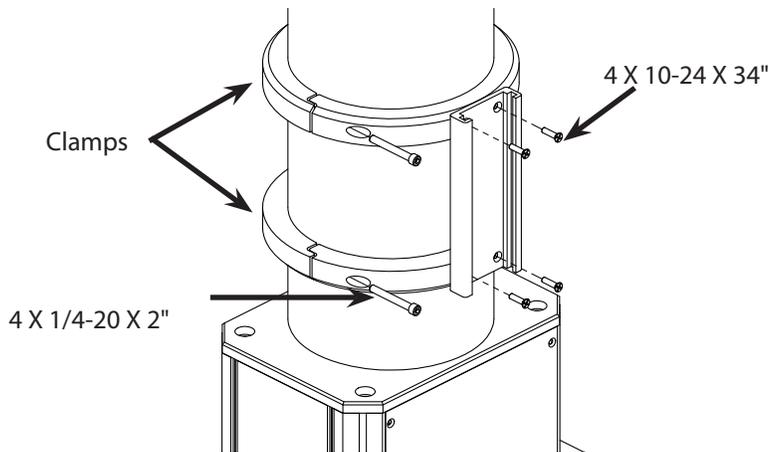


**WARNING** Low voltage plates, medical gas, and video connection plates cannot be installed in the same side module as electrical outlets. Reference the project drawing for specific locations to install data or other low voltage plates. Contact a Field Engineer for any deviations to the project drawing for approval

### 8.1.5 Installing Other Accessories

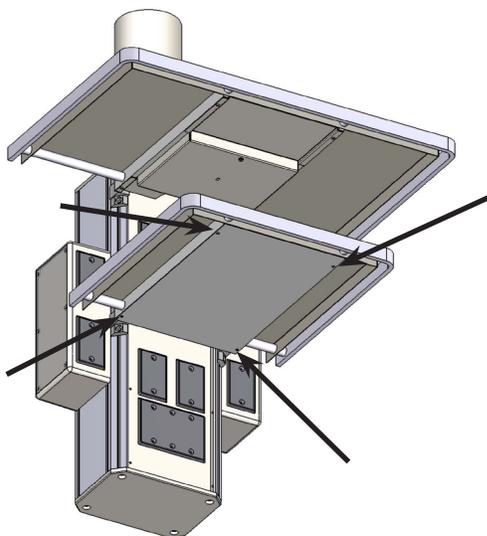
For installation instructions on all other accessories, such as for GCX, IV transfer poles, StrykeVac, etc., please refer the manufacturer's instructions. For instructions on installing a SHAPE Arm, refer to 1004400065 and P25927.

### 8.1.6 Installing GCX Accessory Track on OSC600 Down Tube

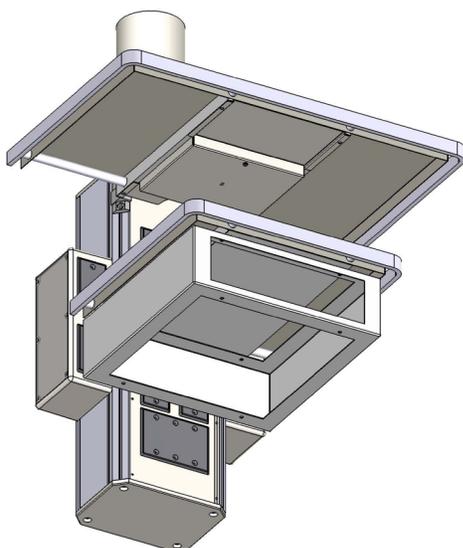


1. Attach track to clamps with four 10-24 X 3/4 FHMS. The clamp beveled edges should be oriented toward the top of the upper clamp and toward the bottom of the lower clamp.
2. Attach assembly to service head down tube with mating clamps and four 1/4-20 X 2 SHCS. Position and orient assembly on tube where desired.

### 8.1.7 Drawer Installation



1. Pull drawer unit to the edge of the frame, tilt drawer upward, and remove from frame.
2. If the shelf has a bottom plate, remove the four screws from the plate. Use tape to hold the plate in place. Make sure that the brake lines and StrykeVac leads (if applicable) are not pinched between the bottom plate and the shelf frame.



3. Align the four screw holes on the drawer from with the bottom of the plate (if applicable) and shelf frame.
4. Secure the frame using the four M6 X 16 Cheese Head Screws, four lock washers, and four felder washers included with the drawer.
5. Tilt the drawer at an angle, and insert into the frame.

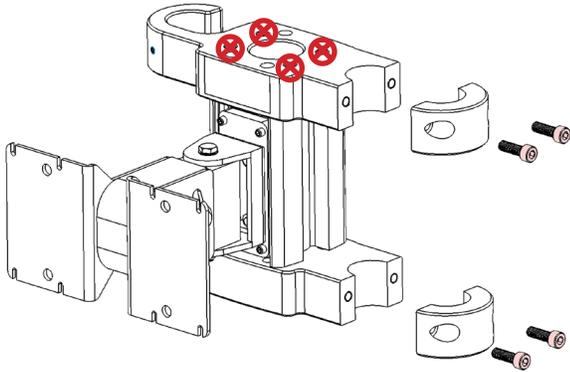
**Note**

For instructions on installing a drawer on a FLEXiS System, refer to the FLEXiS Operations Manual (P13742).

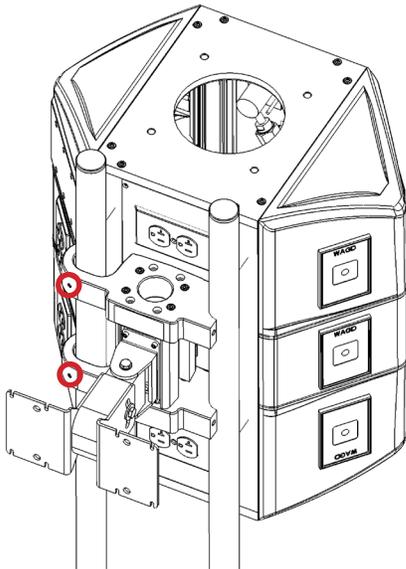
### 8.1.8 Installing the LS Mount to a FLEXiS Service Head

1. Remove the LS Mount from its packaging along with the LS Mount VESA plate and all hardware.

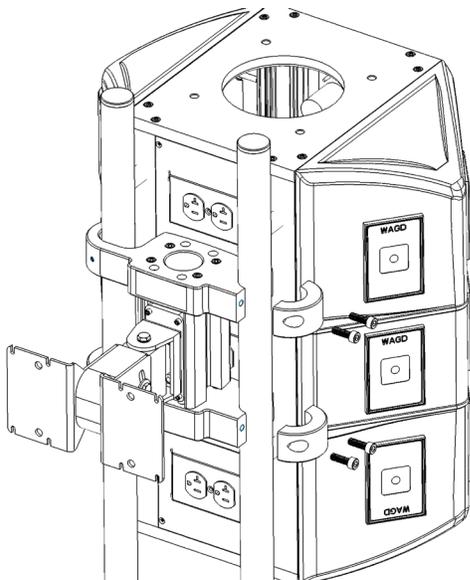
 **Note** The screws that assemble the GCX extrusion to the MFR adapter are fastened with loctite and shall not be removed, as demonstrated in the following figure.



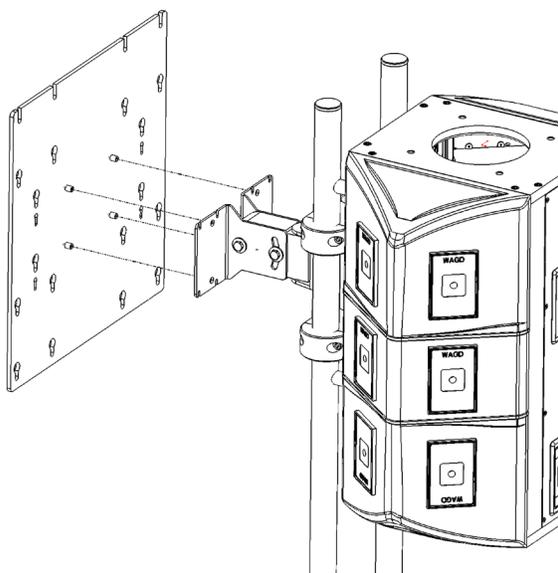
2. Remove the MFR Clamps from the LS Mount by removing four M8 screws. Keep screws available for the next steps.



3. Align the MFR Mounts onto the service head MFRs.
4. Tighten both M6 set screws on the MFR Mounts.



5. Install both MFR clamps using four M8 screws that were removed earlier.
6. Fully tighten all four M8 bolts.



7. Align the four threaded studs of the LS Mount VESA plate with the four holes of the LS Mount interface. Ensure the plate is oriented as shown with the slots oriented at the top of the plate. Assemble these two components with four 5/16-18 Nylon Locknuts.
8. Fully tighten the four locknuts.
9. The monitor will now be installed by the customer or monitor supplier per the instructions in P16302.

### 8.1.9 Adjusting the Tilt of the Large Screen Monitor Mount



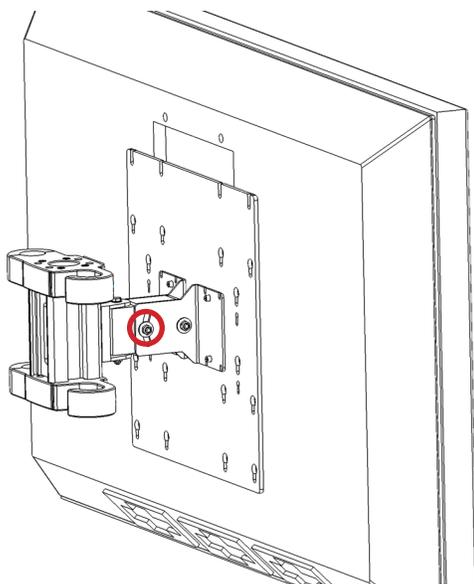
#### Caution

The tilt bolt and nut are torqued initially out of the box to ensure the weight of a monitor will be supported. If the tilt is adjusted, ensure the bolt and nut are fully re-tightened to support the weight of the monitor.



#### Note

If the monitor is installed on the LS Mount, support the weight of the monitor before adjusting the tilt or the monitor could be damaged.



1. Loosen the tilt adjustment bolt and nut as shown.
2. Adjust the tilt to the desired level.
3. Fully retighten bolt and nut.

### 8.1.10 Installing the Night Light

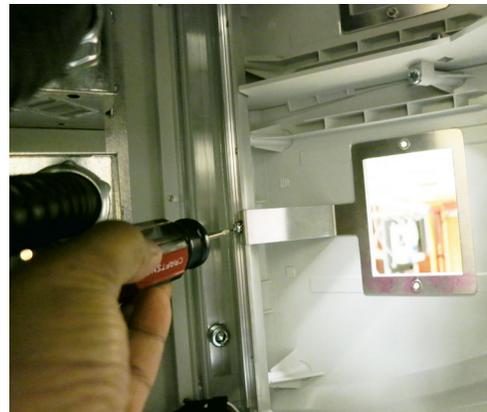
The night lights have two components: the light and the PCB assembly (which includes the controlling switch).

To install a night light:

1. Remove any side module cover from the service head and locate the PCB assembly.



2. Install the grounding bracket to the corner module as shown.



3. Separate the light from the PCB assembly by removing the red and black light wires from the PCB terminal block, if connected, by depressing the white tabs and pulling the wires free.



4. Open the FLEXiS Service Rear Plate by loosening the captivated screws. Leave the front/back plate hanging off to the side of the service head.

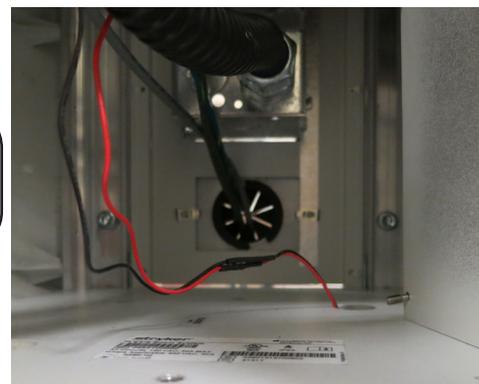


5. Route the red and black wires of the light through the center hole in the bottom plate of the service head from underneath the service head.



Note

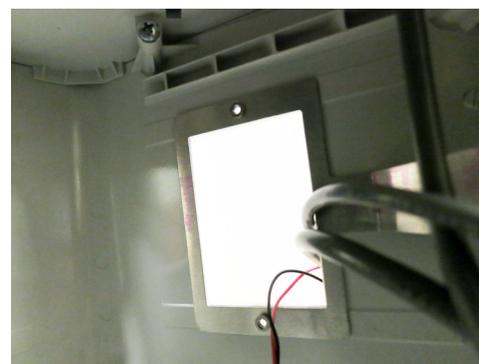
The hole in the bottom plate is typically centered, but is shown located atypically in the figure.



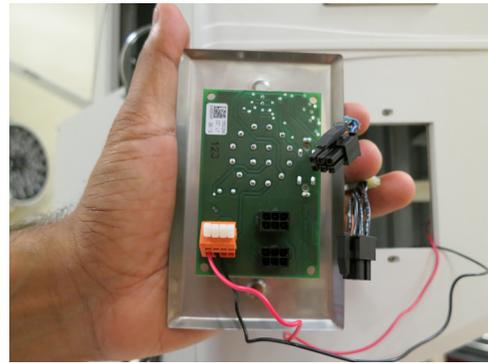
6. Peel the sticker off the back of the light and affix it to the underside of the service head so it covers and is concentric with the hole the wires were just routed through.



7. Route the EP Box cable and 2nd handle cable inside the service head through the back opening of the grounding bracket in the side module, as needed. Leave the wires hanging out of the module.
8. Route the red and black wires inside the service head through the back opening and grounding bracket on the service head side module. Leave the wires hanging out of the corner module.



9. Hold the PCB assembly close to the service head side module that has the red and black light wires hanging out. Connect the red and black wires to the terminal block of the PCB assembly. Connect the red wires to the positive terminal, and the black wires to the negative terminal.



10. Connect the EP box cable (Item 1) and 2nd handle cable (Item 2)(if necessary) to night light PCB. Either 6-pin cable can be used with either cable.



11. Test light.
  - a. Turn the knob to 'On' and ensure the light comes on.
  - b. Turn the knob to 'Off' and ensure the light turns off.
  - c. Turn the knob to 'Auto', cover the sensor on the PCB assembly and ensure the light turns on.
  - d. Uncover the sensor on the PCB assembly and ensure that the light turns off.

 **Note** If the light does not come on, check the position of the red and black cables and the connection of the EP box cable.

12. Install the night light cover plate and PCB assembly into the service head side module.
13. Reinstall the FLEXiS Service Rear Plate.

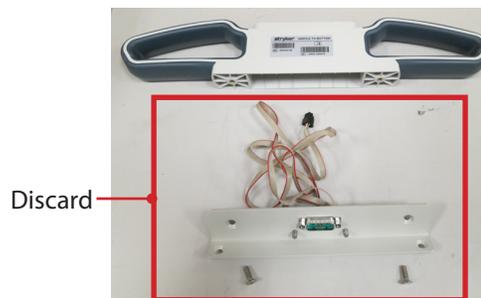
### 8.1.11 MCS Boom System Installation (MMP200 Arm Set)

The Stryker MMP200 boom ships to the customer site as an armset with a drop tube and a FLEXiS handle assembly on the pallet. The adapter plate and handle clamp assembly used to install the monitor and FLEXiS handle ship separately, and will be installed by third-party personnel after the Stryker boom installation.

1. Install the MMP200 boom as usual per boom installation instructions.
2. Plug the brake line which is hanging out of the drop tube using a Y splitter and short loop of brake tubing provided in the pneumatic tubing kit. This will allow the brakes to be tested without testing the drop tube bladder since there is no bottom bearing surface.



3. Remove the bracket and intermediate cable assembly from the FLEXiS handle. Discard the bracket and cable, as they will not be used in this application.
4. Connect the handle and verify the articulation of the MMP200 boom up and down. Record results on the installation QIP.



5. Verify the brake functionality and record results on the installation QIP.
6. Leave the boom articulated in a position where the lower arm is parallel to the floor. This will leave the boom in the preferred position for third-party installers to pull cabling through the boom.
7. Secure the handle to the drop tube using cable ties to ensure the handle is not lost from the time Stryker leaves to the time the third party performs their installation.



## 8.2 Boom Arms

### 8.2.1 OSC400

#### 8.2.1.1 Mounting Flange

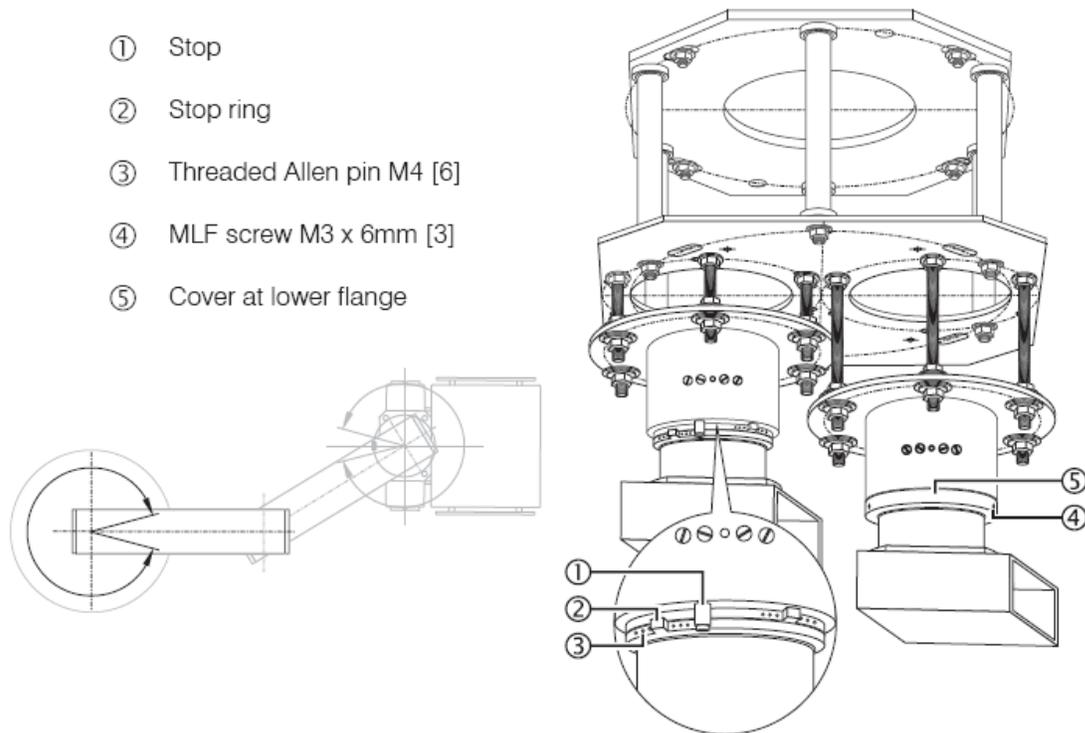
1. Loosen the six set screws (3) in each stop ring (2).
2. Rotate the stop ring (2) to the desired position relative to the fixed stop (1).
3. Tighten the six set screws (3) in each stop ring per stop (2).
4. Ensure that stop rings are in desired position and securely fastened by moving the boom



**WARNING** To prevent the internal supply lines from being twisted off, at least one stop ring (2) must be locked.

#### 8.2.1.2 Tandem (Long-Flange) Booms

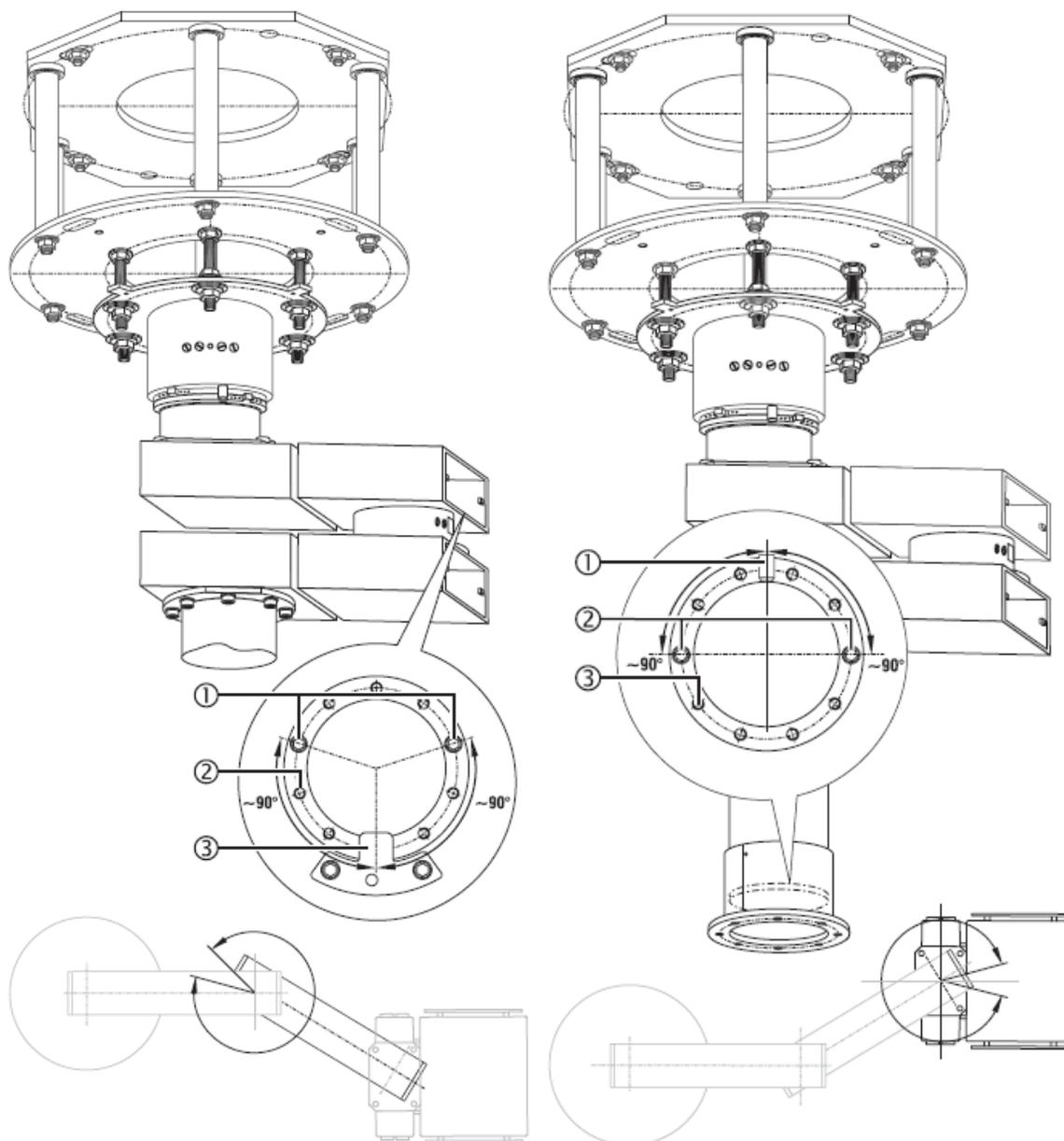
1. To set the stops at the lower flange, the cover (5) must be removed.
2. Remove the three (M3 X 6mm) screws (4) and slide the cover (5) down.
3. Set the stops as described above for the Single (Regular-Flange).
4. Slide the cover (5) up and replace and tighten the three retaining screws (4).
5. Ensure that the cover (5) and the retaining screws (4) are fixed securely.



*Adjusting the Mounting Flange*

### 8.2.1.3 Middle and Service Head Bearings

The middle bearing and service head bearing mechanical stops are adjusted by shifting the locations of socket-head screws (1) located on the bearing, inside the upper arm and inside the down tube, respectively.



- ① Stop screw M5 x 15 mm [2]
- ② Threaded hole [10 x 36° = 360°]
- ③ Stop

*Middle Bearing Adjustment*

- ① Stop
- ② Stop screw M5 x 15 mm [2]
- ③ Threaded hole [10 x 36° = 360°]

*Service Head Bearing Adjustment*



**Note** The two preinstalled stop screws (1) limit the lower extension arm swiveling range to approximately 180 degrees.

1. Remove the stop screw (1).
2. Install the stop screw (1) in the desired threaded hole (2) relative to the fixed stop (3) and tighten it.
3. Move or remove second stop screw if necessary.
4. Ensure that stop screws are in desired position and securely fastened by moving the boom



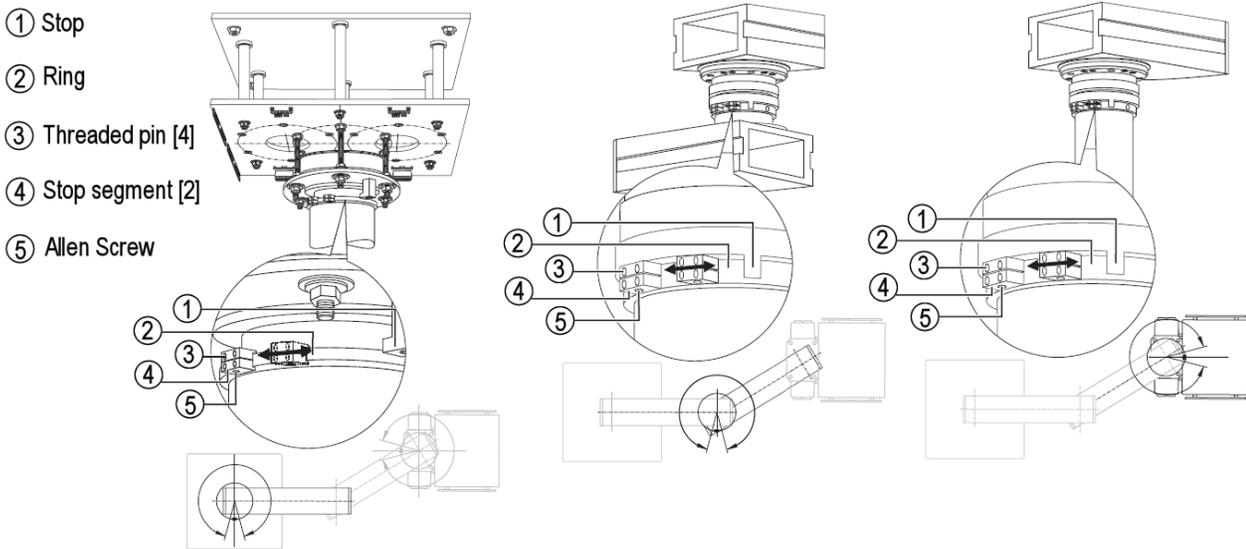
**Caution** To prevent the internal supply lines from being twisted off, at least one stop screw (1) must be installed.

**8.2.2 OSC600**

1. Loosen the socket-head screws (5) and four threaded pins (3) in the mounting flange mechanical stops.
2. Slide mechanical stops (4) on ring (2) to the desired position and tighten socket-head screws (5) and four threaded pins (3).
3. Ensure mechanical stops are seated securely.
4. Repeat for mechanical stops in middle bearing (if available).
5. Repeat for mechanical stops in service head bearing.



**Note** Adjust pneumatic brakes prior to installing covers.



*OSC600 Adjustment*



**Caution** All tubing used inside Service Head is 4mm (5/32 inch) and uses quick release press-in fittings. To remove the tubing, press in on the ring next to the tubing and carefully pull the tubing out. **DO NOT** pull on the tubing without pressing in on the release ring or you could damage a component.

6. Connect the tubing for supplying the brakes to the pressure regulator mounted above the Ser-

vice Head.

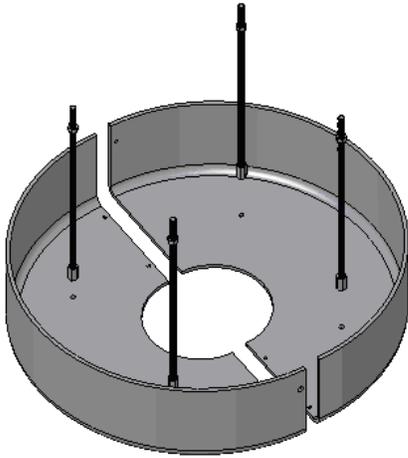
7. Adjust the regulator for 80 ( $\pm 5.0$ ) PSIG.
8. Test the brakes:
  - Verify the arms remain in place with moderate force applied.
  - Press and hold down both brake buttons.  
You should hear a short hissing sound as the brake bladders bleed off. Ensure the Booms can be easily moved.
  - Individually check each arm by pressing one button at a time.

**Note**

If air seeps continuously when a button is pressed, the lines connected to it may be reversed. The button should connect the source of air to the bladder when not pressed and shut off the air supply on Port One of the valve while venting Port Two to atmosphere.

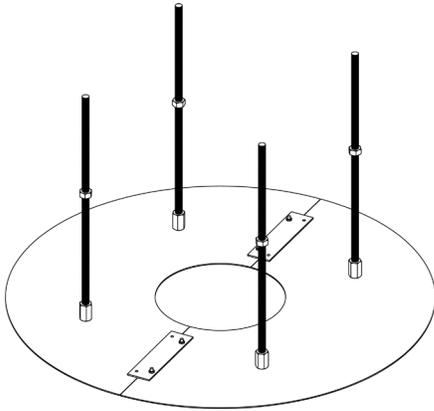
## 9. Installing Covers

### 9.1 Booms

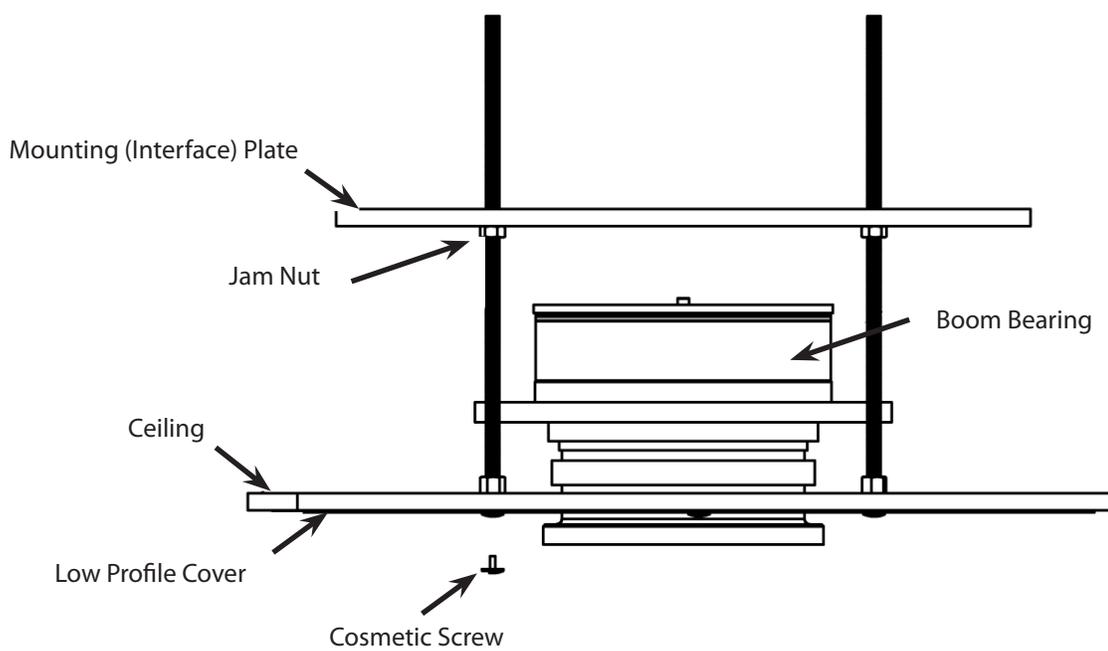


1. Install the four threaded rods into the Mounting (Interface) Plate
2. Use one-half of the ceiling cover as a guide to adjust the height of the four threaded rods. Tighten jam nuts against ceiling plate to secure rods in place.
3. Attach the ceiling cover to the four threaded rods with the supplied cosmetic screws.
4. Assemble two halves of the ceiling cover with remaining cosmetic screws.

*Round, Single Suspension Ceiling Cover*



*Low Profile Single Suspension Ceiling Cover*



*Cross-Section View of Cover Installation  
(Low-Profile Cover Shown)*



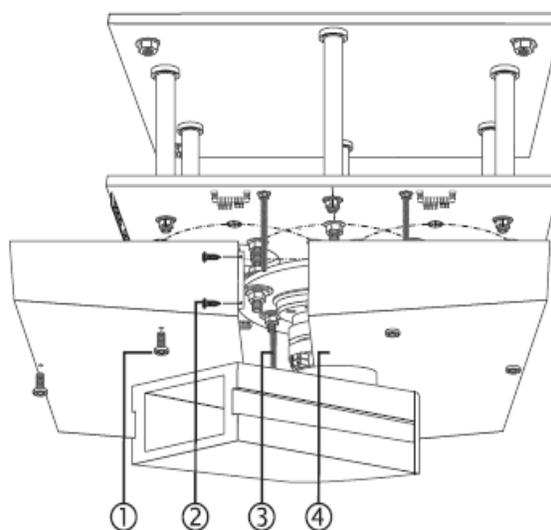
**Warning**

**Failure to properly attach the ceiling cover may result in the ceiling cover falling during use!**

## 9.2 Tandem

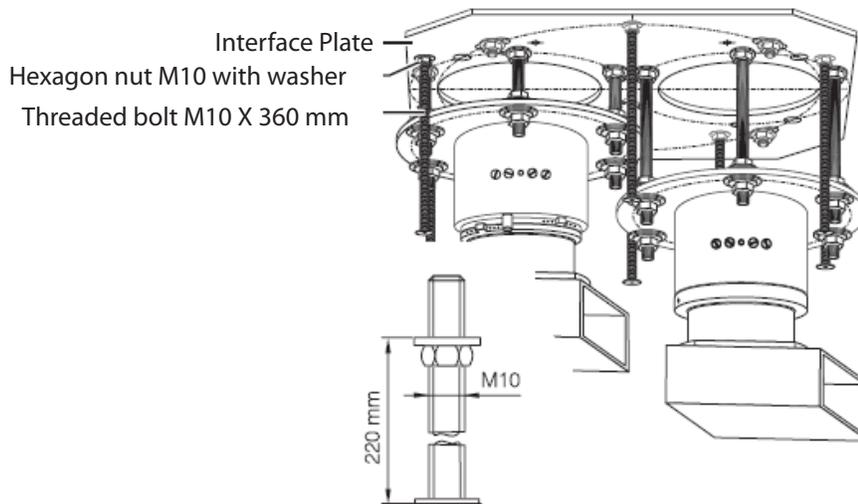
1. Screw (M10) hex nuts with washers (#2 in figure below) on (M10 X 360mm) bolt (#3 in figure below).

- ① Cover retaining screws [6x]
- ② Self-tapping screws [4x]
- ③ Threaded bolts M10 x 360 mm [6x]
- ④ Ceiling cover halves [2x]



*Ceiling Cover Installation*

2. Screw bolts (#3 in previous figure) to interface plate and tighten. The washers and internal thread of the bolts should point downward. If installation site includes a false ceiling, bolts should extend approximately 4.1-4.7 inches (104-120mm) past the interface plate.



### Ceiling Cover Installation

- Align the mounting holes of the ceiling cover halves (#4 in the figure) with the threaded bolts (#3 in the figure) and join the two halves (#4 in the figure) using the cover tabs. The tops of the ceiling cover halves should be flush with the ceiling.

**Note** Covers have two holes for tandem configurations. Use reducer rings to match cover diameter to mounting flange diameter. Use hole cover when single boom is mounted.

- Secure the ceiling cover halves (#4 in the figure) by screwing the six cover retaining screws (#1 in the figure) into the threaded bolts.
- Check ceiling cover halves (#4 in the figure) for secure fastening.

**Note** If cover does not fit due to interference with boom parts, the boom may need to be repositioned on the all-thread rods.

**Note** Ceiling cover may be circular.

**Warning** Improper installation of the Ceiling Covers may result in them potentially falling into the sterile field.

## 9.3 Cable Covers

### 9.3.1 MMP200, OSC400, and OSC600

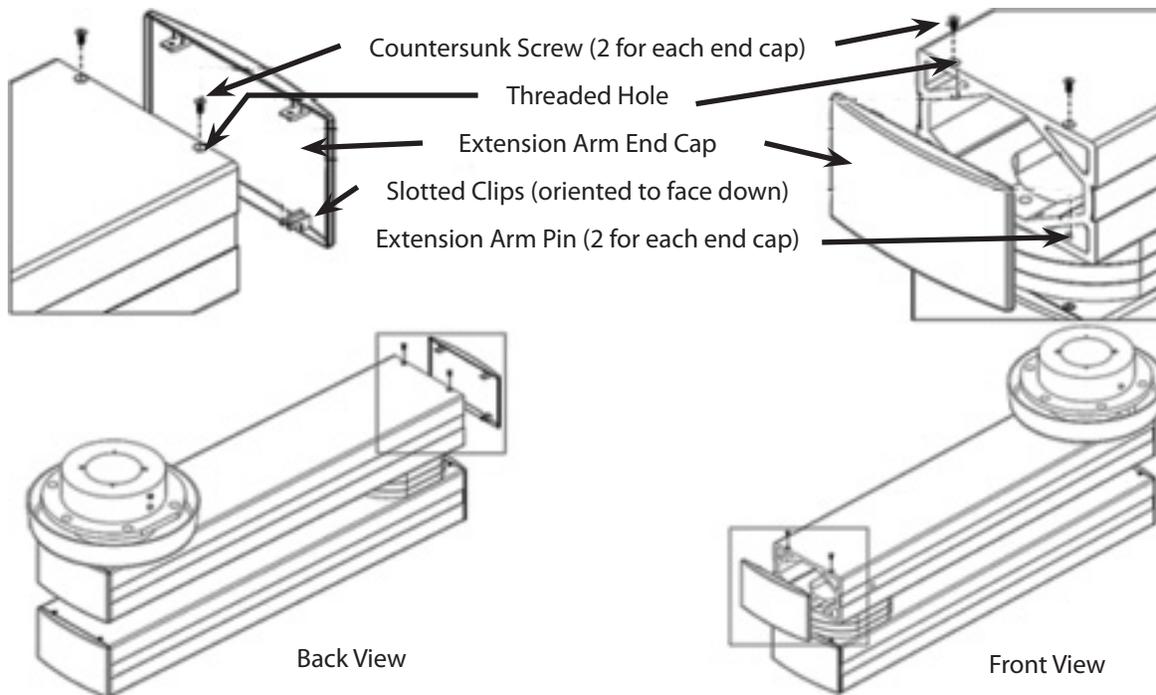
**Note** When removing the extension arm end cap, be sure to remove the two counter-sunk screws, securing it in place from the top of the extension arm. Be aware that the ceiling cover may have to be removed in order to access these screws.

- Orient the cap so that the slotted clips are facing downward and align them with the pins in the extension arm.
- Push the end cap onto the end of the extension arm, snapping the slotted clips and pin together.

3. Secure the end cap with two countersunk screws.
4. Ensure that the end cap is securely attached to the extension arm.
5. Repeat for each end cap.

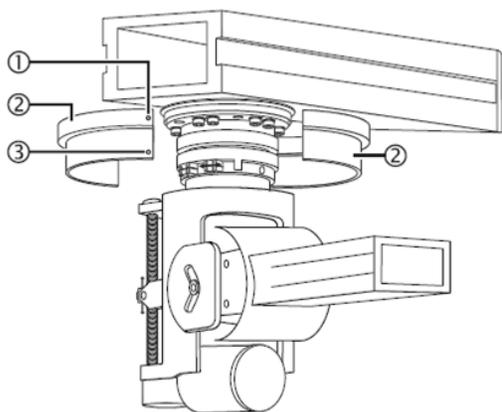


**Warning** Improper installation may result in the end cap falling into the sterile field.



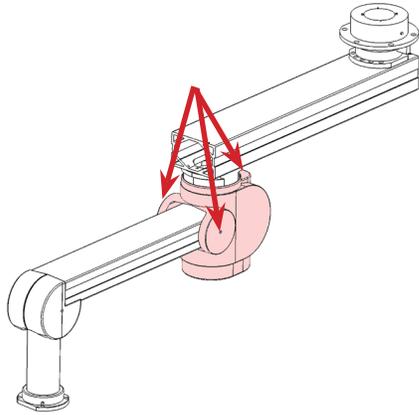
*MMP200/OSC600/OSC400 End Cap Installation*

### 9.3.2 Mounting Motor Ring Covers



1. Place the semicircular covers around the motor arm bearing and fix into place by screwing in two plastic screws M3 X 8 mm and two MLF screws M3 X 6 mm
2. Check that the semicircular covers are securely in place.

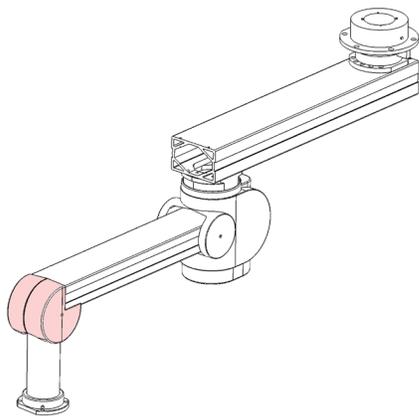
### 9.3.3 Motor Covers



*Only three screw locations are shown in figure*

1. Place the cover halves around the motor and secure with four M6x20 screws. The screws are located symmetrically on the cover halves.
2. Ensure the covers are securely in place by gently pushing and pulling on them.

### 9.3.4 Lower Arm Covers

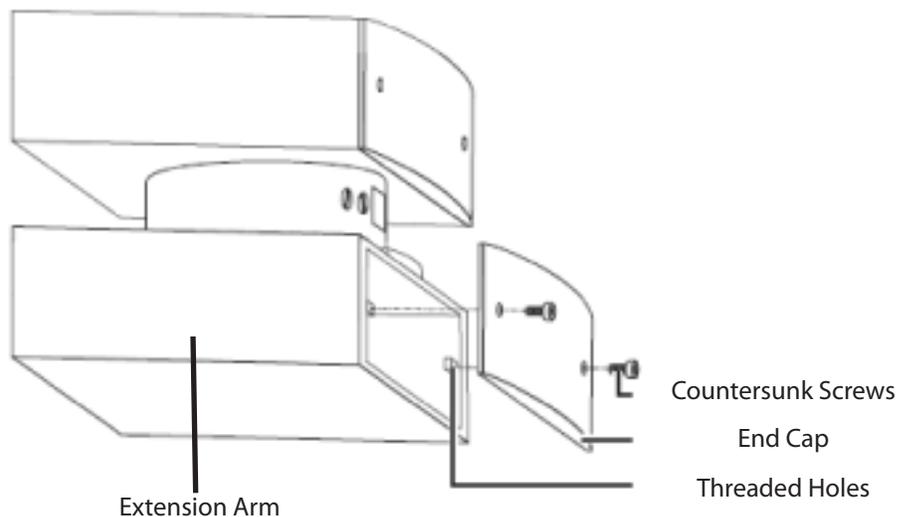


1. Place the cover halves around the lower arm and secure with two M6x20 screws. The screws are located symmetrically on the cover halves.
2. Ensure the covers are securely in place by pushing and pulling on them gently.

## 10. Legacy

### 10.1 Variant

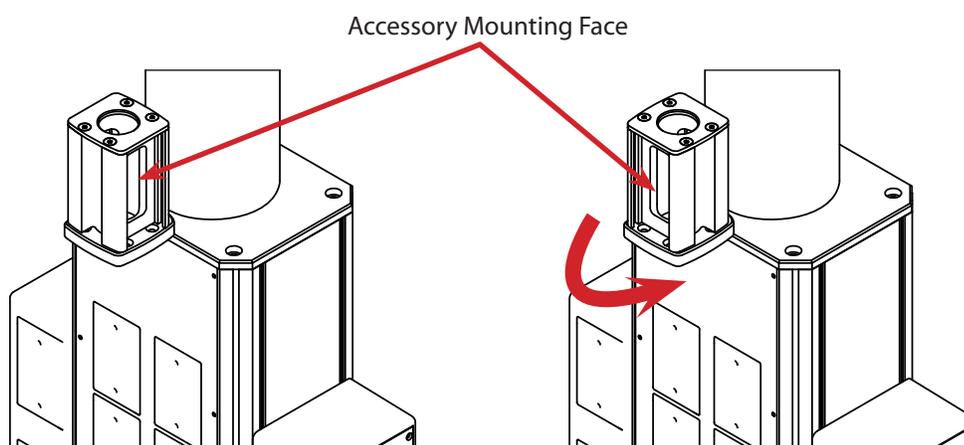
1. Place the end cap onto the extension arm and secure it using two countersunk Phillips screws.
2. Check the extension arm end cap and countersunk Phillips screws to ensure they are securely fastened.
3. Repeat for each end cap.

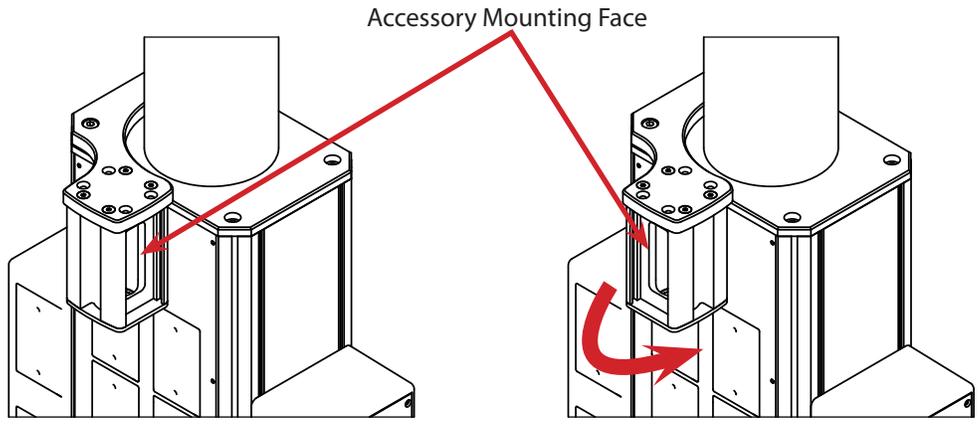


*Variant End Cap Installation*

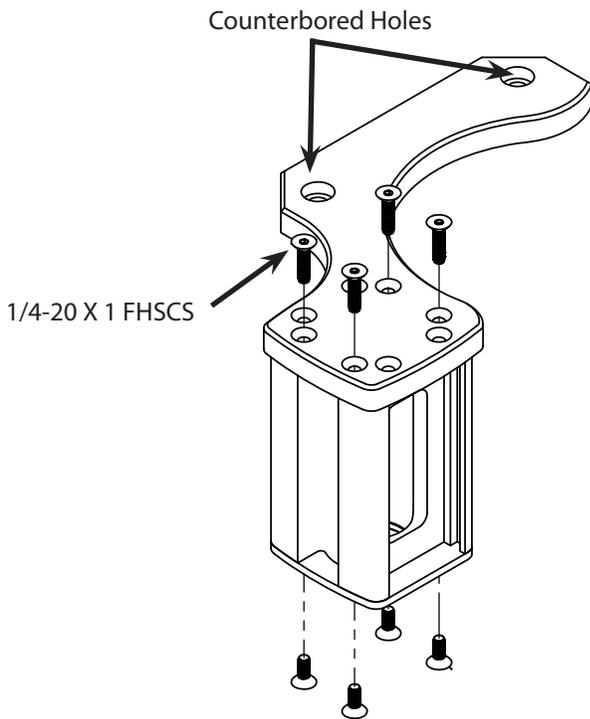
### 10.2 Installing GCX Accessory Track on OSC400 Service Head

1. Determine the desired mounting configuration, as shown in the preceding figure. The track can be oriented upward or downward and can be rotated so that the accessory mounting faces point to the sides or forward.



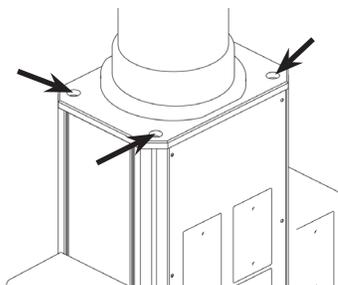


*Accessory Mounting Interface*



2. Attach the accessory track to the mounting bracket in desired configuration with four 1/4-20 X 1 FHSCS. Note that the counterbored holes on the mounting bracket will point upward when mounted on the service head.
3. Remove all equipment from service head, including equipment on shelves, flat panel monitors, accessory arms (SHAPE Arms, other GCX accessories), IV poles, etc.

**WARNING** Failure to remove all equipment from service head before installation can result in injury or damage to the service head and equipment.



4. Remove and save cosmetic caps from screws in top of service head.
5. Determine the direction in which the mounting bracket will be oriented and remove the screw and washer from the hole in the top plate that will be under the rear of the mounting bracket. Save washer, but discard screw.

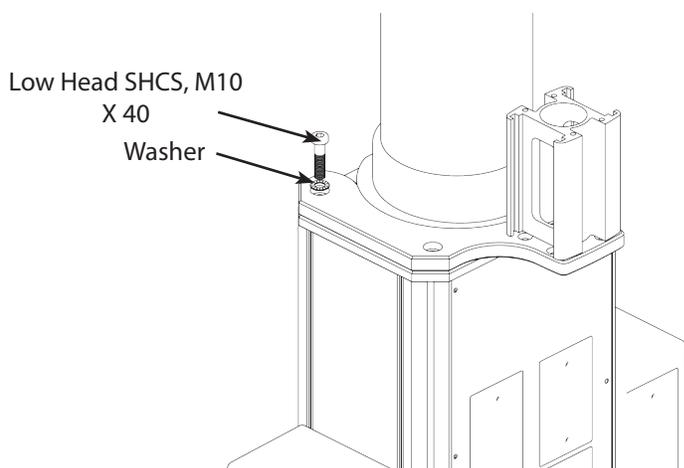


**WARNING** Remove only one screw from service head top plate. Simultaneous removal of multiple screws can result in injury or damage to the service head and equipment.

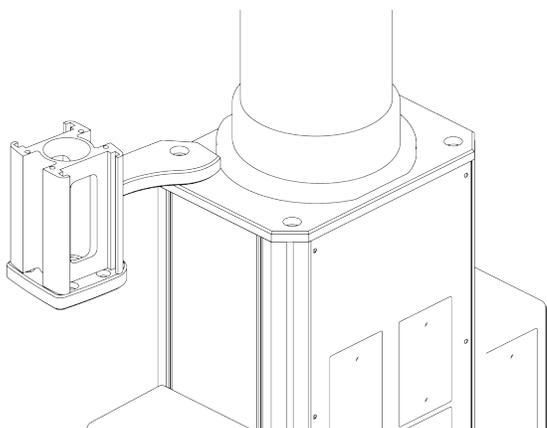
- Use the Low Head, M10 X 40 SHCS that is supplied with the bracket to attach back of bracket to the service head and tighten. Do not reuse the screw that was removed from the service head.



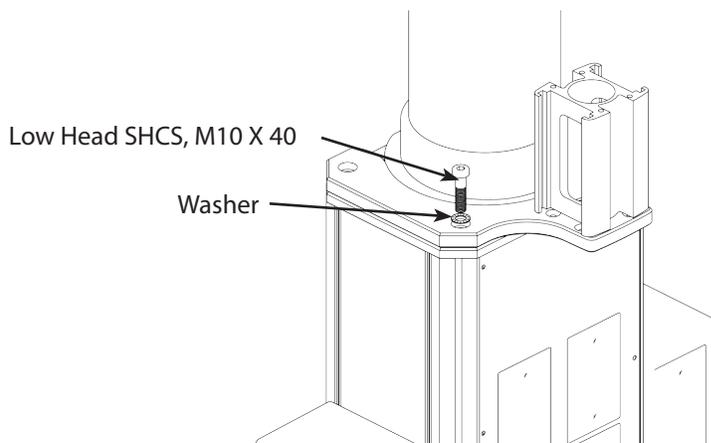
**WARNING** Reusing the 30mm screw that was removed from the service head to attach the bracket can result in injury or damage to the service head and equipment. Use the Low Head, M10 X 40 SHCS that is supplied with the bracket.



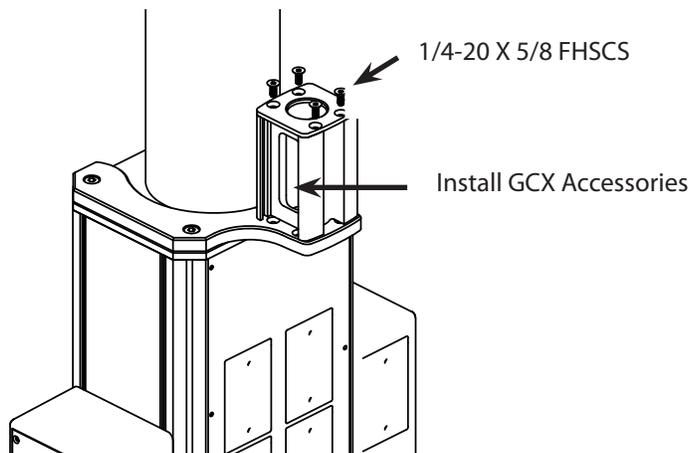
- Rotate the bracket away from service head and remove the opposite screw and washer. Save washer but discard screw.



- Use the Low Head, M10 X 40 SHCS that is supplied with the bracket to attach front of bracket to the service head. Do not reuse the screw that was removed from the service head.



- Tighten both mounting screws with 7mm Hex Wrench and attach cosmetic caps.



10. Install GCX accessories in track and install track cap with (4) 1/4-20 X 5/8 FHSCS.

## 11. Cleaning and Completion

---

On a ladder, start cleaning at the top of the suspension addressing the ceiling cover and the down tube.

1. Contact the shipping and receiving representative and notify them that the crates are ready for waste removal.
2. Perform the appropriate QIP for the installation and return to Stryker Communications.
3. Fill out a DHR and mail it to the Designate at Stryker.

## 12. Servicing Booms



### Caution

Be very careful as hazardous voltage may be present inside of the EP module. There are also low voltage cables as well as gas hoses attached to this module. If it is difficult to extract the EP Module, ensure there is sufficient slack in the control cables, brake hosing and electrical conduits.

### 12.1 System operation

The Stryker EDS Boom System uses an electrical pneumatic braking system. The system is intended to act as a friction brake, holding the boom in position after desired movement. The brakes require a source of compressed air to function. For proper operation the regulator should be set to 80 ±5.0 PSI.



### Caution

To avoid potential damage to the brake bladder, do not set the pressure above 85.0 PSI.

Pressure is supplied to the brake bladders to engage the brakes. To release the brakes, an air valve is pressed, which vents the brake bladder to the atmosphere. The bladder then collapses and releases the brake.

The system consists of the following components:

- A pressure regulator supplied with the boom pre-install kit.
- 5/32 inch (4mm) plastic tubing between the various components.
- Two push buttons - one for the upper brake, one for the lower brake (and service head for articulating systems), both mounted on one of the shelves on the Boom Service Head. In some systems, there may be a second set of controls on the back of the Service Head.



### Note

For Classic systems, the push buttons are air valves.

- Two brake bladders for non-articulating systems (OSC400). Three brake bladders for articulating systems (OSC600/MMP200).
- A Tee fitting to split the supply line into both air valves.
- For Booms that have StrykeVac, an additional Tee is used to supply air to the StrykeVac.

All components feature quick disconnect style fittings.

To remove a tube:

- Press around the fitting of the tube and pull it out.  
Minimal force is required on the tubing.



### Caution

Turn off the air for the braking system prior to disconnecting the plastic tubing.



### Note

Damage to the fitting or tube can occur if you pull too hard on the tubing. When replacing or reconnecting tubing, the end of the tubing must be cut flush and perpendicular to the tubing.

## 12.2 Troubleshooting

There are two main categories of problems:

- Air leaks
- Air supply issues

Refer to the Stryker Documentation System for the most accurate schematics:

- Brake Hose wiring – DHD10609 PNEUMATIC SCHEMATIC, BOOMS WITH ELECTRO-PNEUMATIC CONTROL MODULE, 0557
- MMP200 motor wiring – DHD10582 WIRING SCHEMATIC, PNEUMATIC CONTROLLER, MMP200, SH2.
- MMP200 motor wiring w/ E-Stop – DHD10583 WIRING SCHEMATIC, E-STOP, MMP200, SH2

### 12.2.1 Air Leaks

Identify the source of the leak to the component. This can usually be done by listening for air.



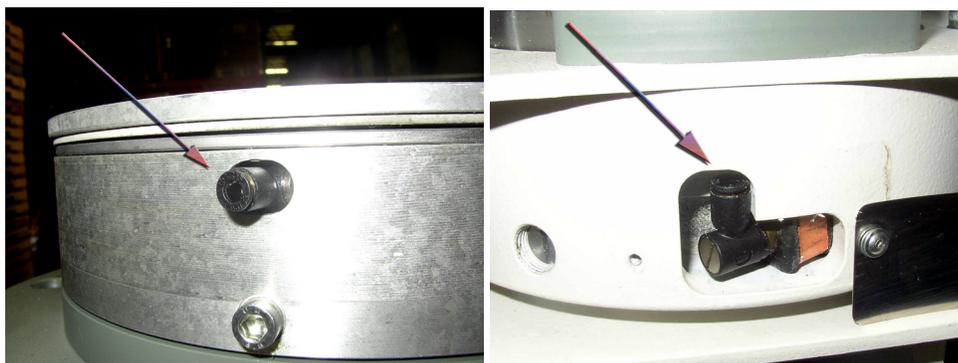
#### Caution

To adjust the air supply regulator you must pull out on the regulator handle to unlock it prior to rotating. Clockwise rotation reduces pressure and counterclockwise rotation increases pressure.

The following pictures show the various connection points:



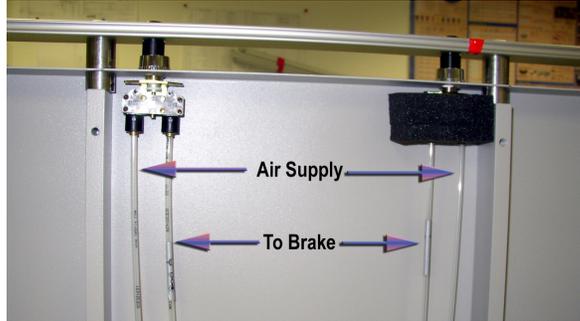
*Air release valve showing connections Brake bladder with hose connected (Classic only)*



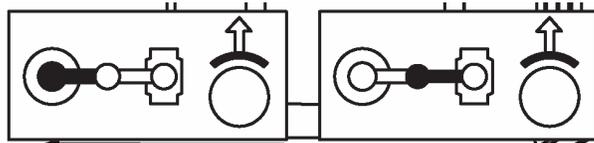
*Upper connection point (above ceiling) Lower connection point behind small cover (Variant only)*

These are the actual hose connection points. To access the lower arm you must remove the arm covers and the end caps for the upper arm.

**Note** The mounting of the air valves on the shelf has one valve reversed. This causes both outside lines to be supply lines and the inner lines to be bladder connections. The foam around the valves is for noise reduction while venting.



*Foam removed from Left Air Valve for illustration purposes (Classic only)*



*Classic Service Head*

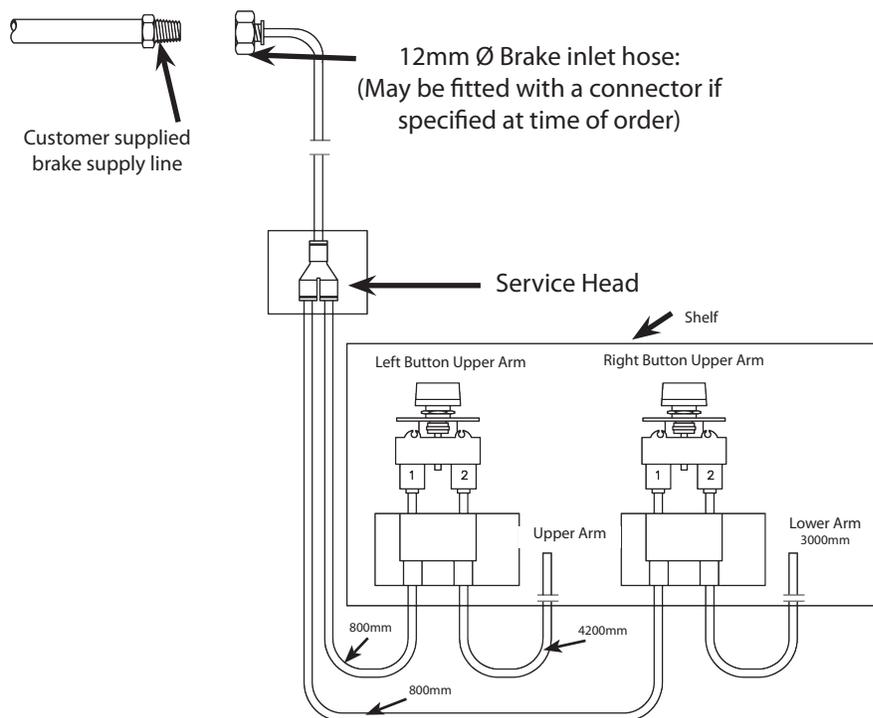


*FLEXiS 1st Generation Service Head Handle*



*FLEXiS 2nd Generation Service Head Handle*

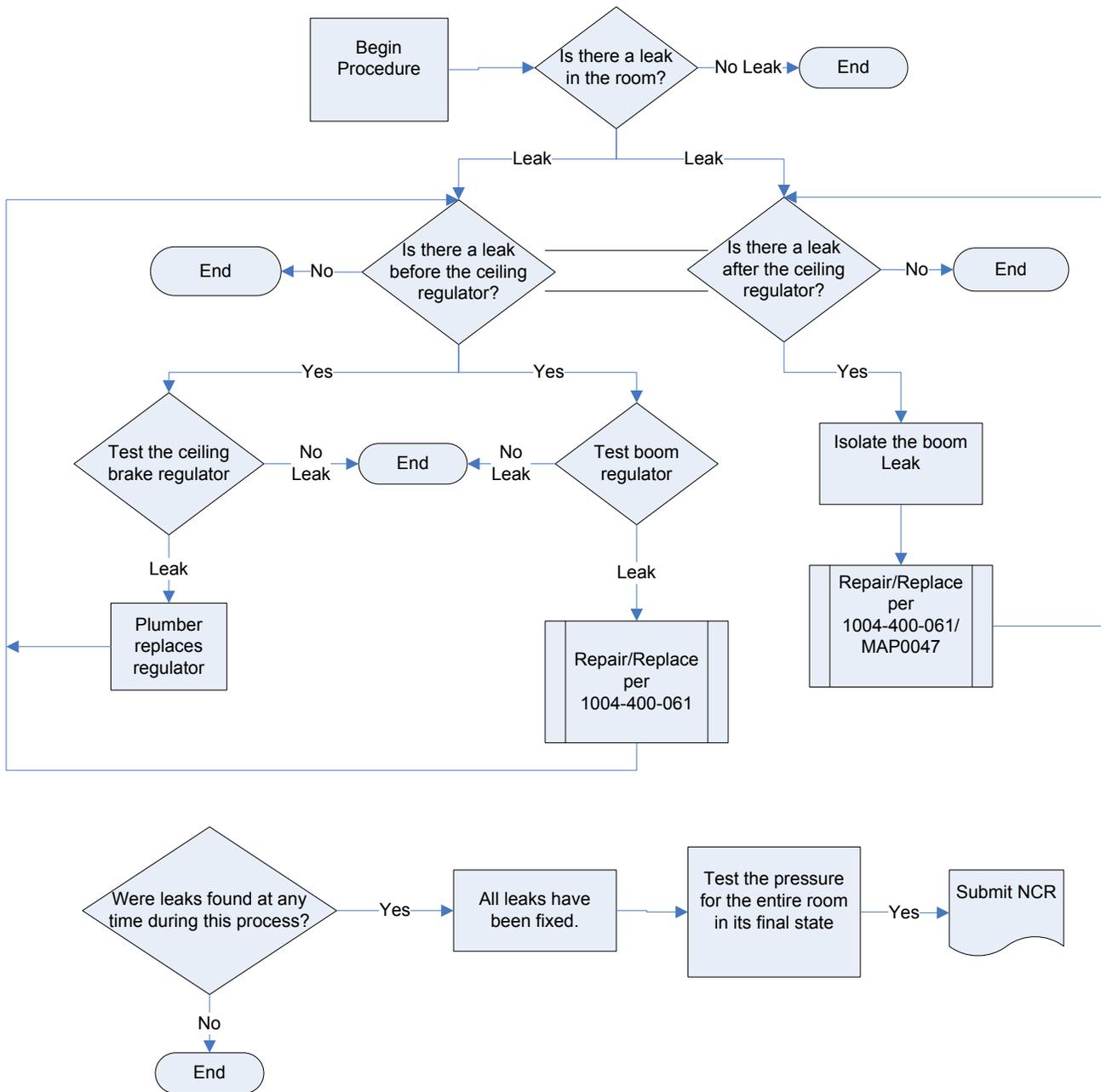
The symbols above are used to identify each brake. The Left hand symbol refers to the upper brake. The symbol on the right indicates the lower brake. These are used to label the air valves and the tubing.



*Diagram of Brake System for Stryker Articulating Equipment Booms for Classic Systems*

### 12.2.2 Gas Leaks

The following section applies to troubleshooting any medical gas. Specifically this section discusses leaks from nitrogen gas system because it is the most complex; however, these principles apply to all medical gasses using the appropriate pressures and flow rates.

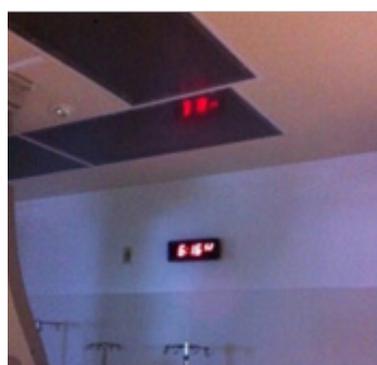


Perform the following to test for gas leaks:

1. Post notes to prevent tampering by others during testing. Failing to do so could skew testing results and will make a leak more difficult/impossible to find, and could exhibit signs of a leak where there is not one.
2. Brake regulators (0682-310-001) may leak because the top plastic valve housing is not fully tightened to the bottom aluminum housing. Soap the joint, and if a leak is found tighten the connection; then retest. This will address the leak unless the top plastic housing was damaged.
3. Cut the 4mm plastic tubing. Make sure each end has a clean, square cut, so it seats properly in

the quick connect valve. Failing to do so can lead to leaks.

4. It is important to note the layout of the room, as each room may have different valves and configurations, as such, troubleshooting should be tailored to the room.
5. It is important to note any drop in pressure. Use a camera to note the needle at the beginning and end of the test. The pictures below give an example of good way to note the test room and pressure.



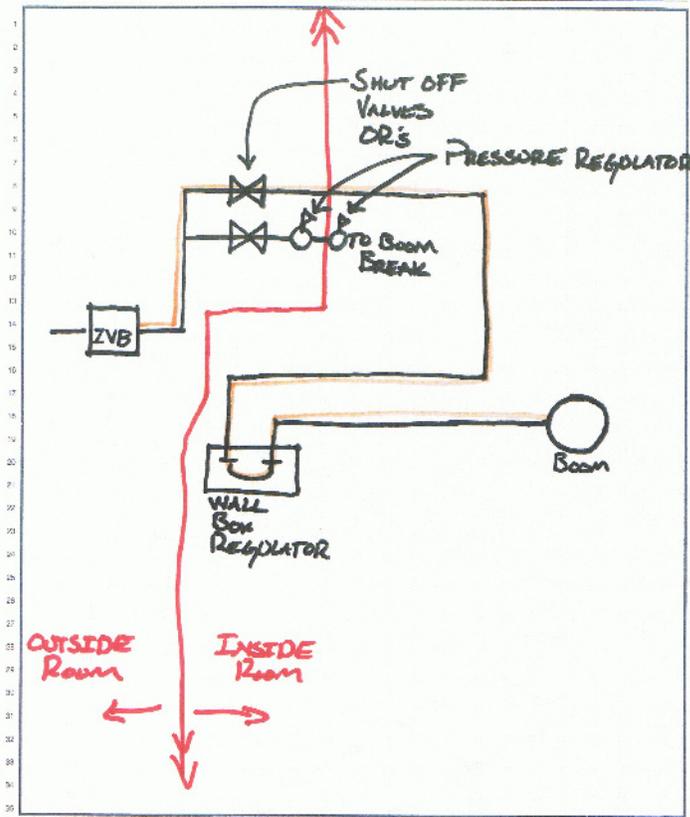
6. When working with the ceiling brake regulator (0682-310-001 - BRAKE REGULATOR, 0-160 PSI):
  - If a nitrogen tank is available, Test The Rooms Gas Pressure Without The Brakes as one system and Test The Boom Brakes as a different system simultaneously. If a nitrogen tank is not available, Test The Rooms Gas Pressure Without The Brakes, and after confirming there is no leak, you can Test The Boom Brakes for leaks.
7. When working with the ceiling brake regulator (0682-400-351 - PKG, BRAKE REGULATOR KIT W/ N2 DISS)
  - If a nitrogen tank is available, Test The Rooms Gas Pressure Without The Brakes as one system and Test The Boom Brakes as a different system simultaneously. If a nitrogen tank is not available, you can use the ball valve to segregate the systems or Test The Rooms Gas Pressure Without The Brakes, and after confirming there is no leak, you can Test The Boom Brakes for leaks.
8. If you have any questions during this procedure please contact your field engineer.

#### 12.2.2.1 Begin The Procedure

1. Record the room in which you are working.
2. If possible, talk with the plumber who installed the nitrogen lines in the room, or someone at the facility who knows the room setup.

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PROJECT Room 304



SHEET \_\_\_\_\_ OF \_\_\_\_\_

3. Confirm the layout by tracing the nitrogen lines and make sure all shutoff valves (from the zone shutoff to the booms and nitrogen regulators) are open and you understand the layout.
4. Some rooms will have nitrogen wall regulators that act as a “pass-through” for other nitrogen lines. Knowing the layout will make finding a leak easier.

### 12.2.2.2 Confirm The Gas Leak

1. Confirm the nitrogen gas leak by isolating the room as its own system. If a room does not show signs of leaking in this step then this procedure is complete. This step should be done simultaneously with Step 2 of this section to save time.
  - a. Ensure the room is actively charged at the zone valve. Open the valve and charge the room.
  - b. Go through the room and ensure all hoses are disconnected from nitrogen regulators. Make note of any running nitrogen devices for your records.
  - c. Ensure all shutoff valves are open (including in the ceiling and wall nitrogen regulators) and all the nitrogen regulators are charged to 80PSI.
  - d. Close the zone valve in the hallway. Take a picture of the room number, the zone pressure gauge, and of the time (ensure the same clock is used every time). This order of pictures can be used to confirm and compare the time and pressure.
  - e. Take notes concerning the room. (Example: Were nitrogen devices left on by the hospital that lead to leaking? Were pressures higher than the standard?)
  - f. If at any time there is a drop in pressure, continue to the next step. Test for at least one hour and no longer than 24 hours. The longer the test, the less likely a leak exists. A drop in pressure less than or equal to 1% in 24 hours is considered a good system.
  - g. If there is no drop in pressure this procedure is complete and there is no leak and no need to continue.
2. Confirm the integrity of the nitrogen tank by isolating the tank as its own system. Troubleshooting is only effective after ensuring good troubleshooting equipment. This step should be done simultaneously with Step 1 to save time.



- a. Build a closed loop with the 0682-000-033 kit. From this point forward this will be referred to as a pigtail.
- b. Insert the pigtail into the quick connect on the nitrogen tank and charge the system to 100PSI. Test tank at a pressure greater than will be used while testing the boom brakes.
- c. Close the valve on the nitrogen tank and monitor the gauge for 1-2 hours.



- d. The volume of gas in this closed system is minute, thus testing for an hour is enough time to ensure a good tank with good connections.
- e. If there is no drop in pressure the tested nitrogen tank is good to use for troubleshooting.
- f. If there is a drop in pressure during Step 1 of this section, Test The Rooms Gas Pressure Without The Brakes as one system and Test The Boom Brakes as a different system. This should be conducted simultaneously to save time.



**Note**

Gas pressure changes with temperature. The nitrogen tank needs to be in a stable state to use it for testing. As temperature increases gas expands. Thus, if a nitrogen tank is sitting outside in extreme conditions and then moved into a colder/warmer environment just before testing, the pressure may change during the test. If this is affecting the test, leave the nitrogen tank in the same temperature for a day and allow it to stabilize.

**12.2.2.3 Test the Room Gas Pressure without Brakes**



1. Separate the nitrogen brakes from the rest of the system and test the room's nitrogen (including nitrogen regulators) without the brakes in the equation.
2. Build a closed loop with the 0682-000-033 kit. From this point forward this will be referred to as a pigtail.

3. Insert the pigtail into the ceiling regulator. This will replicate a "perfect" boom. Cut the 4mm plastic tubing with standard wire cutters. Do not cut on an angle. Failing to make a good, square cut can prevent the hose from fully seating in the quick connect.

4. If testing room gas pressure with nitrogen regulator (p/n: 0682-400-351) with ball valve, ensure the ball valve is set to the open position (as shown in the figure).

5. Retest the room with the same procedure used to Confirm the Gas Leak.
6. If the pressure does not drop, the leak is from the boom brake system. Continue with the next section.
7. If the pressure drops, there is a leak in the in the ceiling regulator or before the ceiling regulator. Identify Leaks in Stryker Nitrogen Regulators.



**Note**

Note the pressure drop. Even if it looks like the pressure drops the same amount, still test the boom to eliminate it as a leak source.

**12.2.2.4 Test Boom Brakes for Leaks**

1. Testing boom brakes for leaks can only be done with a portable nitrogen tank (or the ball valve on the 0682-400-351 brake regulator). The purpose of this step is to actively look for and confirm the origin of the leak while Testing the Room Gas Pressure without Brakes. If you do not have a nitrogen tank (or the 0682-400-351 brake regulator) then Test Boom Brakes for Leaks after you Test the Room Gas Pressure without Brakes.



2. Insert the 4mm tubing lead from the boom into the quick connect on the nitrogen tank and charge the system to 80PSI. If the lead is not long enough use the 0682-000-033 kit to add a female to female connection to increase the length.
3. Close the valve on the nitrogen tank and monitor the gauge for 1-4 hours. The longer the better.
4. Remember, the volume of gas in this closed system is smaller than the entire room, so testing a drop in pressure will be more obvious.
5. If there is a drop in pressure, continue with the next section.
6. If there was no pressure drop in When Testing the Room Gas Pressure without Brakes, there will most likely be a drop in pressure in this section. If there is no drop in pressure in either system, the problem may have been in the connection between the boom and regulator.
  - a. Re-cut the tip of 4mm tube and reinsert into the ceiling regulator.
  - b. Retest the room with the same procedure used to Confirm the Gas Leak.

#### 12.2.2.5 Isolate Leak in the Boom

1. With the nitrogen tank valve open, open the boom near all brake bladders and connections and listen for leaks. If leaks are not audible test each joint individually.
2. It is not required to completely open the boom and get to the bladder to isolate the line. With a precision screw driver it is possible to properly release the quick disconnect.



- a. Use the tip of the screw driver and trace the hose to the quick connect. Use the tip of the screw driver and push down on the connection tip to release the barbs on the connection.
- b. While pushing down with the screw driver, pull up on the hose to release it from the connection. Do not use excessive force. If the hose does not release easily, then rework the screw driver and attempt again. Improperly removing the hose can damage the brake bladder connection.
3. Create a pigtail with the end of the hose that connects to each bladder, one at a time, and retest the system with the same procedure used to Test Boom Brakes for Leaks.
4. For each brake bladder/connection, the closed loop will act as a brake bladder replacement. Below are examples and comments for different bladder configurations.



The FLEXiS electro pneumatic brake box (EP brake) is located in the upper arm, directly under the flange. You can use this set up to test just the EP brake, or by using only one pigtail test half the system.

 **Note** This EP Box, actively charges brake bladders by acting as a pass-through while the electric buttons are not being pressed.



The brake for the lower arm connection is the same for both the Classic and the FLEXiS. Note that sometimes a “Y” connection exists just before this bladder. The OSC600 and MMP200 hose runs down to the service head brake (not present on all service heads).



This is the “Y” Splitter in the lower arm brake.

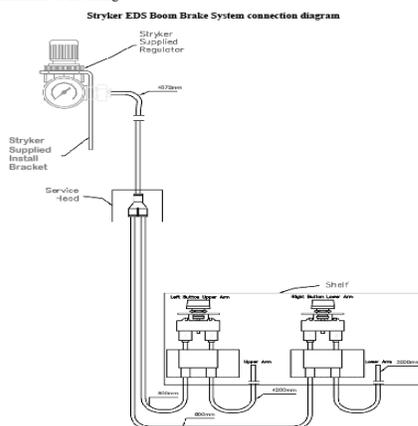


For the Classic Service Head, you can also test the brake buttons for leaks by bypassing them with a female to female connection.

The schematic below is a description of how the brake lines are setup for the Classic Service Head. There will be more “Y” connections on booms with two sets of brake buttons. These are all potential fail points. Any of these can be isolated using the steps described above; using pigtails and bypasses.

DATE 05/10/05	SIZE A	REV. A	DRAWING NO. MAP-0047	SHEET 3	OF 7
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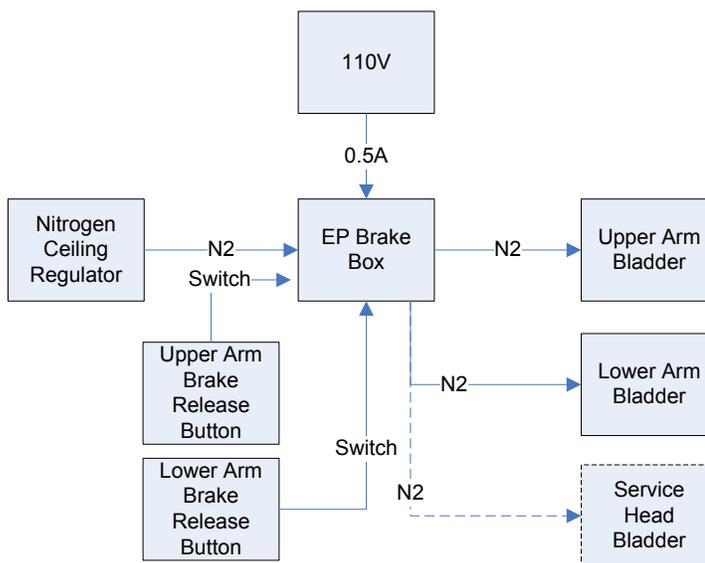
NOTE: When replacing tubing or remaking a connection the end of the tubing must be cut flush and perpendicular to the tubing.



Note: The Left button is for the upper arm and the Right button is for the lower arm.

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- The schematic below is a description of how the brake lines are setup for the FLEXiS Service Head. All connections are potential fail points. Any of these can be isolated using the steps described above; using pigtails and bypasses.



- Before replacing the bladder, attempt to re-cut the 4mm tubing and reinserting. This is more likely to cause a leak than a bad bladder.
- Test the boom again using the process in Section 12.2.2.3 to confirm there is no longer a leak.

**12.2.2.6 Identify Leaks in Stryker Nitrogen Regulators**

This step should be performed only if there was a leak When Testing the Room Gas Pressure without Brakes.

1. Test The Ceiling Brake Regulator For Leaks.
  - a. This step should be performed only if there was a leak in When Testing the Room Gas Pressure without Brakes.
  - b. Maintaining the same configuration as When Testing the Room Gas Pressure without Brakes:
  - c. Open the zone valve and charge the system. The goal is to have as much pressure as possible when you soap the boom regulator for a leak.
  - d. One at a time, soap all connections and openings, the regulator gauge, knob, the quick connect, the riser, and the ball valve. Monitor for bubbles forming. If you cannot hear a gas leak then you are only looking for small bubbles forming – use a flash light and watch closely.



Was a leak found in the ceiling brake regulator?	
No	Yes
If no leak is found in the ceiling brake regulator, there is most likely a leak before the ceiling regulator. This can include Stryker boom regulators.	If a leak is found in the ceiling brake regulator, have the plumber replace it with another Stryker supplied regulator. Retest the room with the same procedure used to Confirm the Gas Leak.
If there is a Stryker Boom Regulator in the room, continue to Step 2 in this section.	If a leak still exists after replacing the ceiling brake regulator continue to Step 2 in this section.

2. Test the Stryker nitrogen boom regulators.
3. Soap all connections with a liquid leak detector.

<b>The nitrogen riser connections</b>	If you find a leak here, contact the PM. The plumber will need to come in and reconnect/replace the riser.
<b>The hose connections in the ceiling and on the nitrogen regulator</b>	If you see a leak at the connection between the nitrogen regulator and the nitrogen hose, attempt to disconnect and reconnect the hose (Refer to Section 12.5.1).

4. If neither of the last two steps found a leak, soap the actual regulator itself.
5. If you do not see a leak using a liquid leak detector.
6. If a leak is found, replace the Nitrogen Boom Regulator (per Section 12.5.1) with a known working boom regulator.
7. Retest the system with the same procedure used to Test the Room Gas Pressure without Brakes.

8. If a leak still persists, contact the PM. There is likely a leak in the room before the riser. The plumber will have to be contacted to fix the issue.
9. If the plumber finds no leak, replace the riser, nitrogen hose, and nitrogen regulator and retest the room with the same procedure used to Confirm the Gas Leak.
10. If there is still a leak, it is before the ceiling regulator it is not Stryker's responsibility to fix or troubleshoot any further. Contact the PM.

#### 12.2.2.7 Repair Leak

1. Repair or replace the necessary parts to fix the leak.
2. Recheck for leaks.

#### 12.2.2.8 Retest Room

1. Once leaks have been repaired, reconnect the entire room as it was in its finished state and retest the room with the same procedure used to Confirm the Gas Leak.
2. If each system (the isolated boom and the isolated room) both show no signs of leak independently, but have a leak when connected:
  - a. Remove the plastic 4mm tube from the ceiling regulator.
  - b. Use a pair of wire cutters to give it a clean, square, perpendicular cut.
  - c. Inspect the clipped end and reinsert and retest the room with the same procedure used to Confirm the Gas Leak.
  - d. If the system still has a leak, replace the brake regulator in the room, and retest the room with the same procedure used to Confirm the Gas Leak.

### 12.3 Miscellaneous Hardware Parts List

#### Legend:

- SHCS - Socket Head Cap Screw
- OHMS - Oval Head Machine Screw
- PHMS - Pan Head Machine Screw

All screws should be stainless-steel.

#### OMS-200



Location: Elbow Cover (Top)  
Generic Name: M6 X 12 Phillips OHMS



Location: Elbow Cover (Side)  
Generic Name: M6 X 12 Phillips (OHMS)

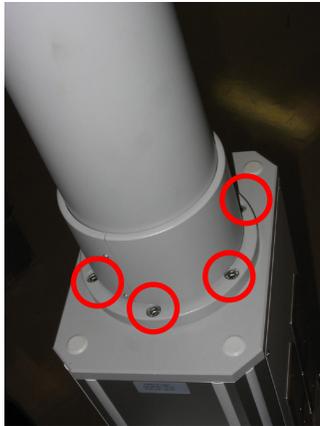


Top of Service Head  
M8 X 25 Low Head SHCS and Serrated Washer



Knuckle Cover  
M6 X 12 Phillips OHMS

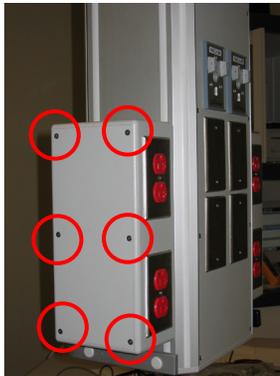
**OndaScope Variant**



M8 X 30 Low Head SHCS and Serrated Washer



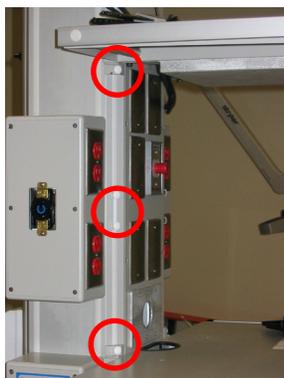
#4 X 0.25 inch Pan Head Sheet Metal Screw  
M4 X 14 Phillips PHMS



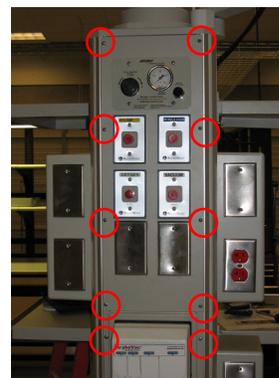
Location: Module Box  
Generic Name: #8-18 X 5/in OHMS



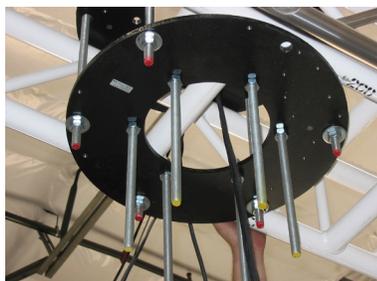
Location: Top of Service head  
Generic Name: Plastic Cap; Screw: M10 X X 30 Low Head SHCS



Location: Shelves  
 Generic Name:  
 Screw: M6 X 16 SHCS; Plastic Cap:  
 Washer: Serrated Belleville for M6 Screw



Location: Front and Rear Service Head  
 Panels  
 Generic Name: M4 X 10 Phillips OHMS



Location: Mounting (Interface) Plate  
 Generic Name: M16 Hex Nuts, flat washers,  
 and standard lock washers.



Location: Service Head  
 Generic Name: Spacer, Fairfield Spacer

## 12.4 Replacing the Trim Strip



1. Slide the strip with your thumbs so the strip extends from boom arm.



2. Pull out strip.



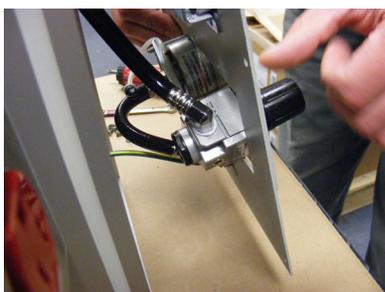
3. Insert strip in channel on boom arm.



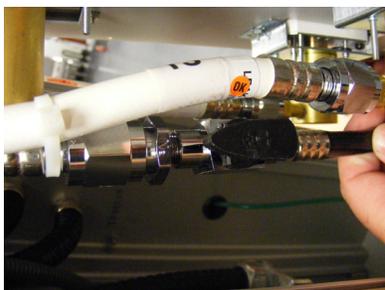
4. Slide strip in channel on boom and make sure strip is flush in channel.

## 12.5 Replacing Med Gas/Electrical Outlets and Gas Regulators

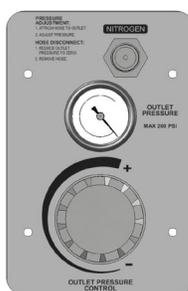
### 12.5.1 Replacing a Nitrogen Regulator



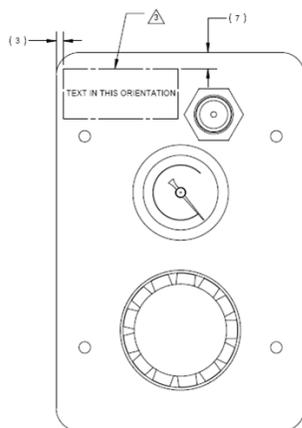
1. Turn off main nitrogen supply to the OR and disconnect.
2. Remove Service Head panel.



3. Remove the black nitrogen hose on the regulator.

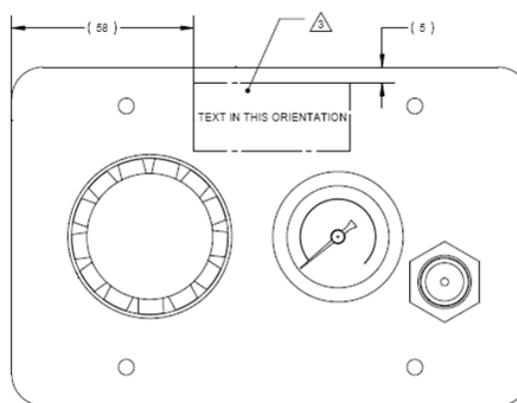


4. Remove the four Phillips head screws and washers that attach the regulator to the service head.
5. Using the diagrams below, apply the label as shown dependent upon whether you are working with a Classic or FLEXiS Service Head.



DETAIL A  
FLEXiS SERVICE HEAD ORIENTATION

*FLEXiS*



DETAIL B  
CLASSIC SERVICE HEAD ORIENTATION

*Classic*



6. Replace the regulator and attach it to the Service Head back panel.
7. Connect the nitrogen hose regulator.
8. Attach the back panel to the Service Head.
9. Turn on the main nitrogen supply to the OR and set the pressure to 160 psi.
10. Request that the hospital recertify the nitrogen system for leaks.

### 12.5.2 Replacing Med Gas Plates



**Caution**

Passive AGSS outlets can only be installed in the bottom most position on a front or back plate.



1. Shut off the respective gas, if it has not already been done.
2. Remove the screws attaching the gas plate to the back body. The screws will have a captive band on the opposing side, so it does not have to be completely removed.

3. Using a thin, flat head screwdriver, carefully pry the gas plate away from the plastic frame and back body.



**Note**

Note the differences between Standard, Slim Profile, and Diamond Care Trim Plates, as illustrated in the following figures.



*Standard Trim Plate*

*Slim Profile Trim Plate*



*Diamond Care Trim Plate*



4. With the gas plate removed, two additional screws holding the back body onto the service head face plate are visible. Remove these screws by holding onto the nut in the back. Save these for re-installation.

**Note**

All plates (Standard, Slim, and Diamond Care) attach same manner and are secured with the nut.



5. With a crescent wrench, remove the gas hose from the back body.
6. Replace (pull) new gas hose.
7. Connect the [new] gas hose to the [new] gas back body.
8. Tighten the gas hose onto the corresponding back body until hand tight. Continue tightening with a wrench for an additional ¼ turn. Tightening any further may cause damage to the fitting and result in a gas leak.



*Passive AGSS (steps 9 & 11)*

9. **For Passive AGSS-only:** Slide clamp over hose before inserting the hose over the pipe. Tighten the clamp over the hose and onto the pipe until “hand tight.”
10. Attach the back body to the service head face plate by inserting and tightening the respective screws.
11. **For Passive AGSS-only:** Ensure the beaded chain is looped through the bottom screw holding the gas plate onto the back body.
12. Insert the gas plate into the back body and tighten with the two screws.



**WARNING** For passive AGSS outlets **DO NOT** remove the cap attached to the med glass plate. See image above.

**Note**

It is at the discretion of the hospital to determine whether they will need to re-certify the new gas assembly.

### 12.5.3 Replacing Electrical Plates

**Caution**

Ensure the electrical system has been shut off. Use a multimeter, or a similar device, to verify there is no power flowing to the outlet.

**Note**

Replaced electrical-related components must be inspected by a third party to verify the system has been installed properly. Adding outlets, or moving outlets to a new location, is prohibited without contacting Stryker Communications Customer Support. There are rules governing the amount of conduit and wiring allowed through a Boom System and physical separation of Gas and Electrical services.



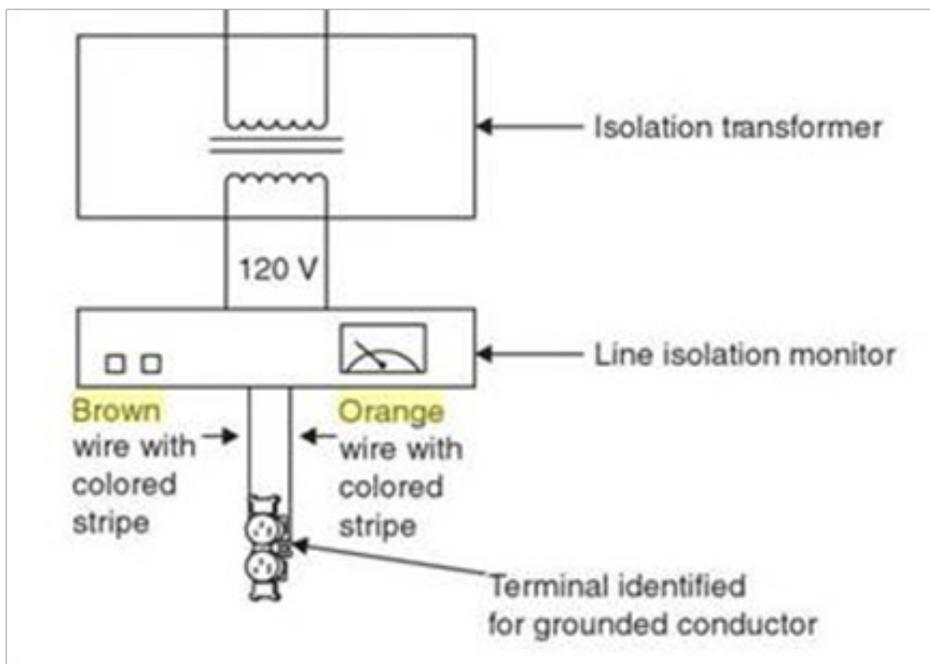
1. Remove the single screw located in the center of the cover plate. Save the screw and cover plate for re-installation.
2. Remove the two screws on either end of the electrical outlet attaching it to the structure. Save the screws for re-installation.
3. Remove the electrical wires from the outlet

**For Standard Outlets:**

1. Connect the white wire (neutral) to the silver colored screws.
2. Connect the black wire (hot) to the bronze colored screws.

**For Isolated Outlets**

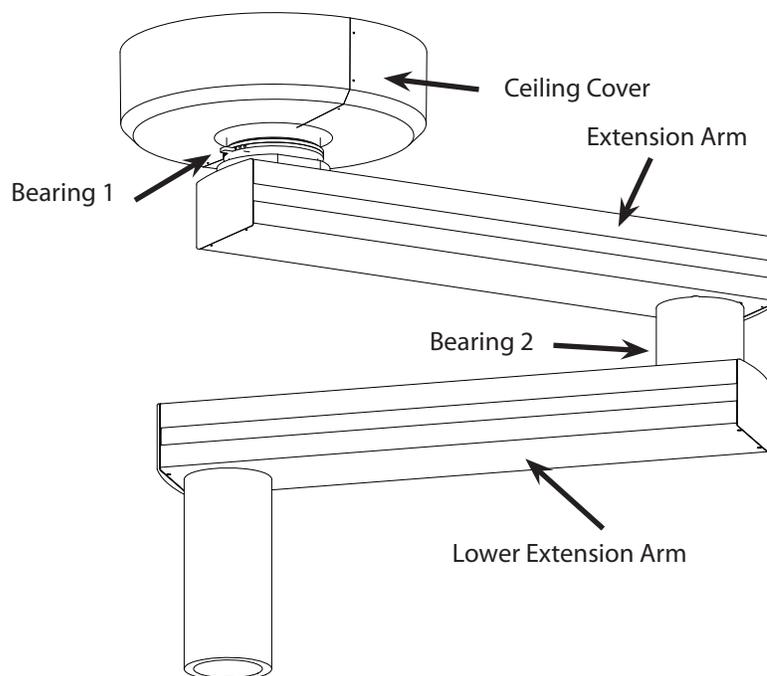
1. Connect the orange wire to the terminal screws along the same side as the ground connection.
2. Connect the brown wire to the remaining terminal screws [on the opposite side]



3. Re-attach the outlet to the supporting structure; 2x screws.
4. Re-attach the cover plate to the outlet; 1x screw.

## 12.6 Replacing the Brake Bladder

This section applies to replacing the Bearing 2 brake bladder in an OSC400 Non-Articulating boom.



*Boom Configuration*

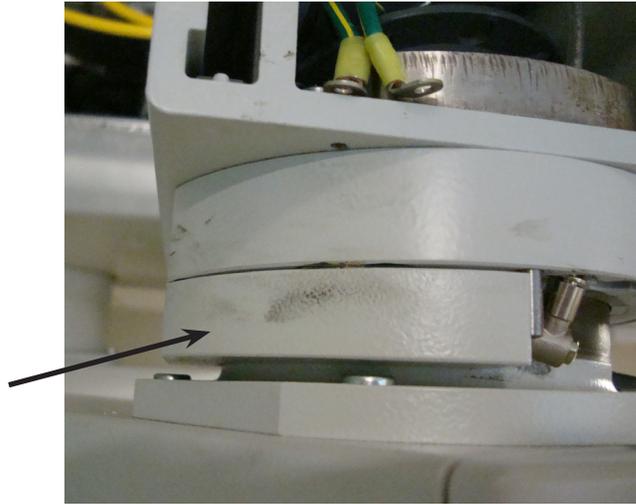


### Note

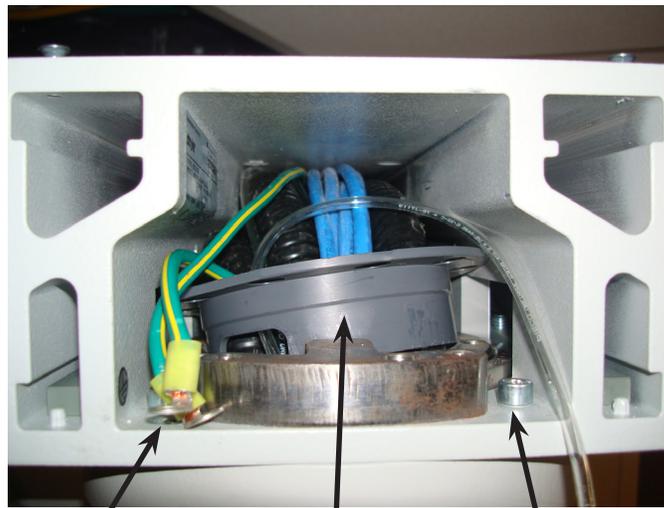
If possible, have the account shut off the nitrogen supply to the brakes. If this is not possible, release the brake line pressure by isolating the gas to the individual boom to be serviced. Then press the brake buttons until all gas has been released.



**Note** Please ensure to keep all removed hardware in a safe location, since it will be used again to assemble the components.



*Brake Bladder Raceway with Half of Raceway Removed*



M6-40 Screw

Plastic Protective Collar

M6-40 Screw

1. Remove the upper extension arm end cap by following the instructions in the End Cap Installation section of this manual.
2. Remove the two M6-40 screws located in front of the bearing using a 5mm metric Allen wrench.
3. Depending on the age of the arm set, there may be access holes located on the top of the arm set. If there are access holes, remove the rubber plugs using pliers or a flat head screwdriver.
4. Using a 5mm long handle ball-end Allen screwdriver, completely loosen but do not remove the other two M6-40 screws located at the rear of the bearing by inserting the Allen screwdriver through the access holes and engaging the screws. To access these screws, the screwdriver will need to be inserted at an angle.
5. If the access holes are not present, reach through the opening of the upper arm with an Allen wrench to engage the wrench with the screws. The screws are located on the backside on each side of the bearing.



**Note** These two screws are typically hard to locate since the boom is filled with hoses, conduit, etc. Take extra care when removing these screws. Only unthread screws to a point where the raceway is no longer engaged to these screws. **DO NOT** remove the screws from their housing, otherwise retrieval of these screws can become difficult.



6. Once the two front M6-40 screws have been removed and the rear two M6-40 screws have been completely loosened, the raceway should be free to remove. A small flat head screwdriver may be needed to gently lift the rear M6-40 screws to allow the raceway to become free. The raceway consists of two halves. Place the two halves in a safe place for later reassembly.
7. With the raceway removed, remove the brake bladder by depressing the quick-connect fitting while pulling the brake line.
8. With the brake line removed, the bladder can now be inspected/replaced.

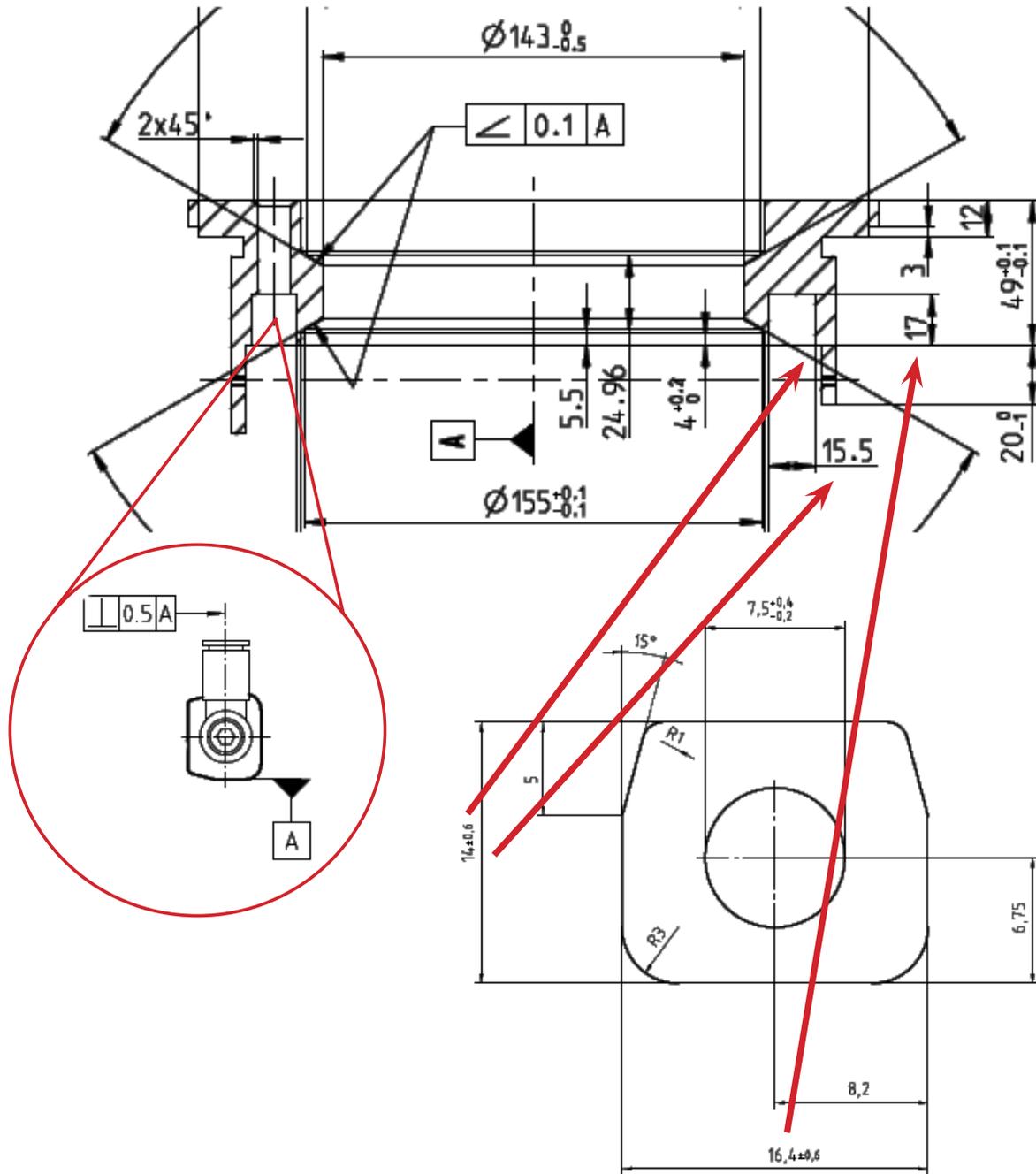
To replace the brake bladder, do the following:

1. Insert brake line back into quick-connect fitting on brake bladder



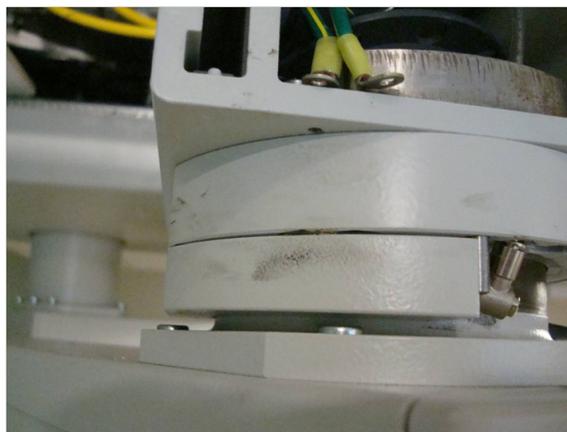
**Note** Ensure brake line is inserted fully into fitting and that hose has a 90° edge and not a hose that has been cut at an angle.

2. Ensure bladder is fitted around bearing in proper orientation. Using the diagrams below, route the bladder with the shorter flat edge against the bearing surface and the 14mm side up.



*Schematics of Bladder Installation at Bearing 2 Raceway*

3. While wrapping bladder around bearing, place bladder fitting into hole where brake line is protruding.
4. With brake bladder wrapped around bearing, place half of the raceway back into position with bladder housed in raceway.
  - Using a small flat blade screwdriver, slightly lift the rear M6-40 screw so that the raceway can fit back into its specified location
5. Align threaded holes on raceway with holes from screws.



**Note** DO NOT remove the screw from its housing, otherwise retrieval of this screw can become difficult.

6. Tighten M6-40 screws without stripping head
7. Repeat steps outlined above for the other half of the raceway.
8. Replace upper extension arm access hole plugs (if applicable) by inserting into location.
9. Turn supply brake line gas back on pressurizing boom to  $75 \pm 5$  psi and run through functionality of brakes to ensure no audible leaks can be heard.
10. Replace end cap cover by following steps outlined in 1004-400-061

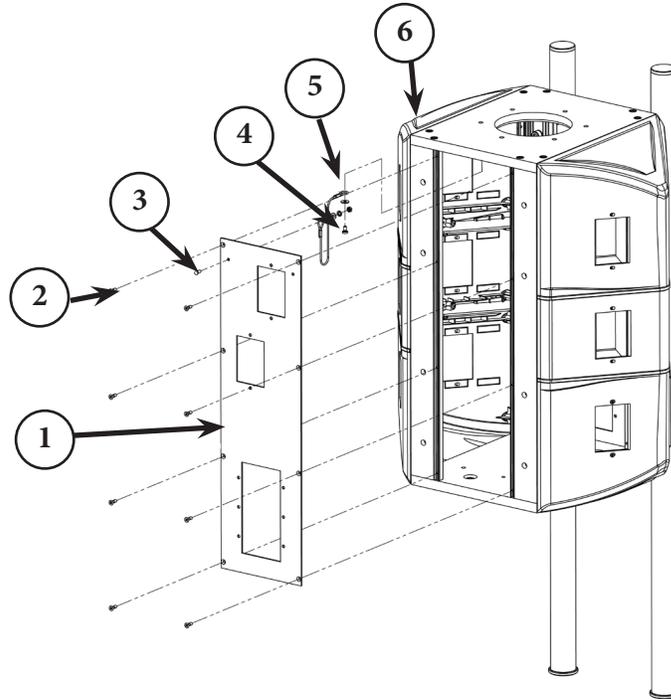
## 12.7 Reassembling the Service Head



**Caution**

Power should be cut from the boom system prior to removing any modules.

### 12.7.1 Removing and Attaching the Front and Back Plates



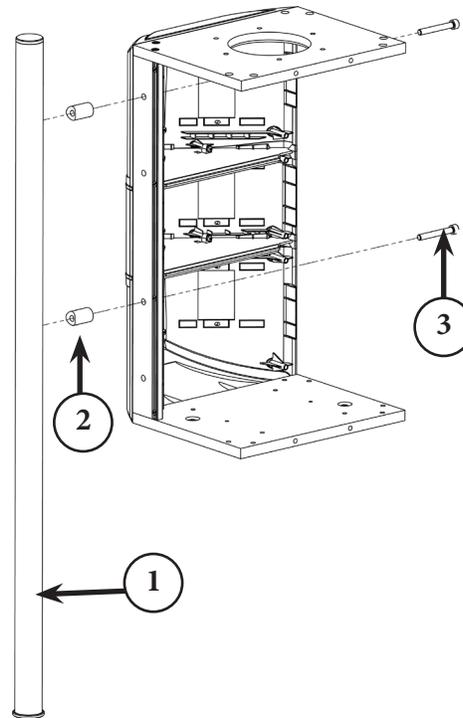
To remove the front and back plates:

1. Use a Phillips head screw driver to loosen the eight M4x12 screws (Item 2 in the figure above) holding the plate to the FLEXiS Service Head. Do not remove the screws completely, as they are captive and should remain attached to the face plate.
2. Note the tether (Item 5) attached to the face plate (Item 1) and top plate (Item 6). Do not remove the tether, to prevent damage to ground wire.

To attach the front and back plates:

1. Align the face plate so that it is flush and fitted into the open service head.
2. Attach the face plate by loosely threading the eight M4x12 screws.
3. Tighten all screws completely.

## 12.7.2 Removing and Attaching the MFR



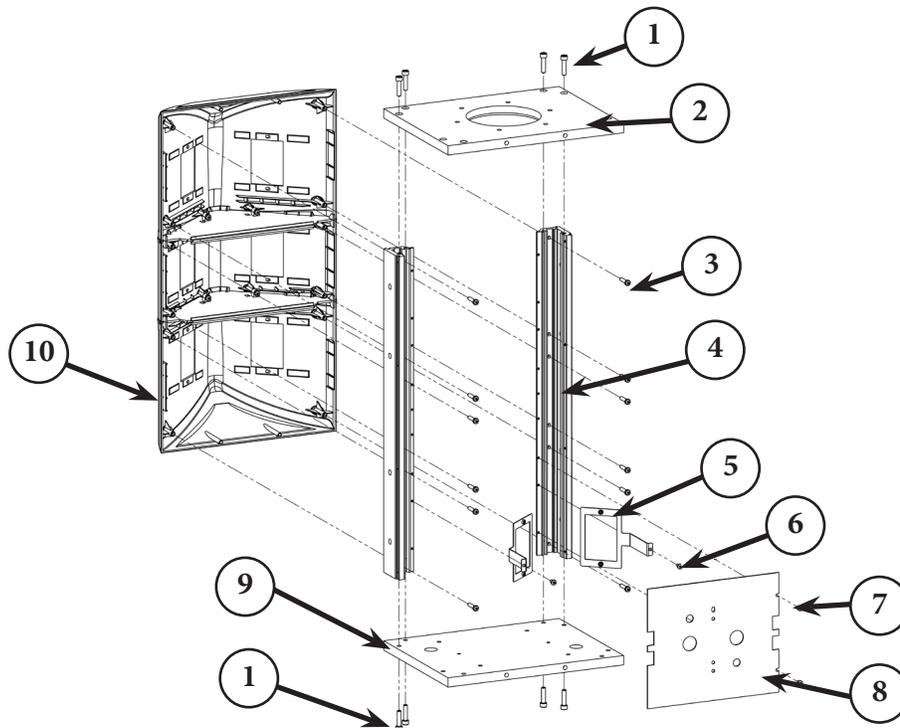
To remove the MFR:

1. Remove the two M8x3060 screws using an M6 Allen wrench (Item 3 in the figure above).
2. Catch the MFR support spacer (Item 2), to prevent it from falling once the screws have been removed from the assembly.
3. Do not remove the end stop on the lower end of the MFR.

To attach the MFR:

1. Position the MFR with the screw holes towards the top. The rail will hang lower than the service head. Replace MFR's in the same orientation as the original.
2. Thread one of the M8x30 M8x60 screws through the spacer and into the rail. Do not tighten.
3. Thread the second M8x30 M8x60 screw through the spacer and into the rail.
4. Tighten all screws.

### 12.7.3 Removing Extrusions



#### Caution

**There is a potential for shock since a vertical separator needs to be removed prior to taking off an extrusion.**

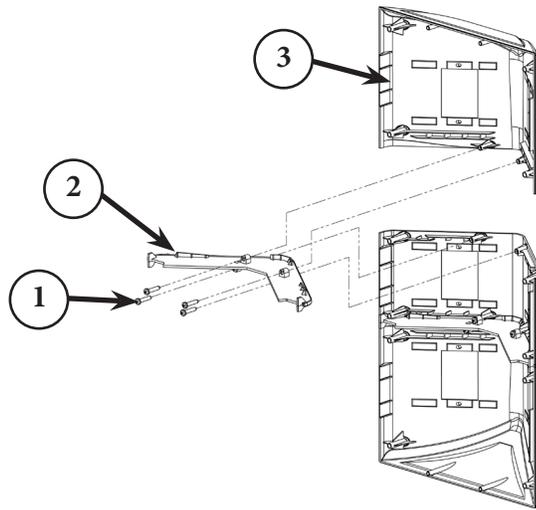
1. Use an M5 Allen wrench to remove the two M6x25 screws (Item 1 in the figure above) that attach the top plate (Item 2) to the extrusion.
2. Remove the two M6x25 screws that attach the bottom plate (Item 9) to the extrusion.
3. Use the M5 Allen wrench to loosen the four M6x25 screws attaching the top and bottom plates to the extrusion.
4. Use a Phillips screw driver to remove the two screws connecting the Vertical Separator (Item 8) to the extrusion. Each separator has two M4x8 screws on the same side.
5. Slide the separator out of the opposite extrusion.
6. Only remove the screws on the extrusion to be replaced. Use a Phillips screw driver to remove the screws (Item 6) connecting any UL brackets to the extrusion (Item 5). Each bracket has one M4x8 screw.
7. Remove the M5x25 screws using a Phillips screw driver that attach the side modules to the service head. There are two screws per module, per extrusion (Item 3).
8. Slightly slide the extrusion (Item 4) away from the side modules and then remove from service head.

### 12.7.4 Installing Extrusions

1. Insert the new extrusion in the same orientation as the original, with the threaded rail facing toward the face plate. Position the extrusion so that it is flush in the corner between the side modules and bottom/top plates.
2. Thread two M6x25 screws (Item 1) through the top plate (Item 2) into the extrusion and tighten.
3. Thread two M6x25 screws through the bottom plate (Item 9) into the extrusion and tighten.

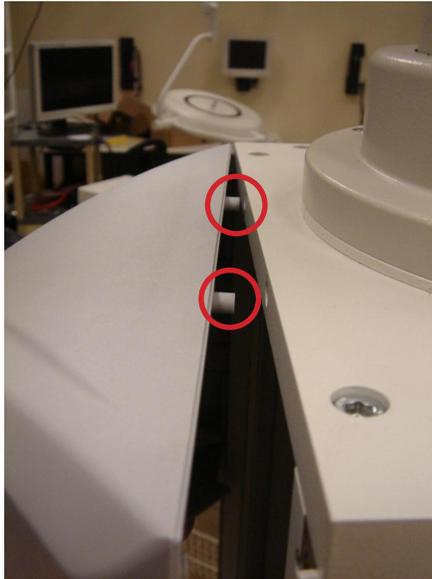
4. Retighten the M6x25 screws on the opposite extrusion.
5. With a Phillips screwdriver, tighten the M5x25 screws attaching the side modules to the service head. Note that there are two screws per module, per extrusion. (Item 3) Repeat for all remaining screws.
6. Re-attach all UL brackets (one screw each).
7. Insert Vertical Separators into groove of extrusion on the opposite side and replace the two screws in each.

### 12.7.5 Removing Modules



#### End Module

1. Using a Phillips screw driver, remove any vertical separators or UL brackets from the extrusions (see Section 12.7.3 - Removing Extrusions).
2. Remove the four M5x25 screws on both sides of the module attaching it to the extrusions.
3. Remove the two M4x16 and M4x25 screws attaching the horizontal separator to the side module (Item 1 in the figure above).
4. Remove any latch valves or electrical outlets from the module.
5. Tilt the open end away from the service head to release the set pins (Figure X, #4) and pull the module away, as shown in the following figure.



### Side module

1. Loosen either one of the end modules.
2. Remove any vertical separators or UL brackets from the extrusions (see Section 12.7.3 - Removing Extrusions).
3. Remove the M5x25 screws and on either side of the module attaching it to the extrusions.
4. Remove four M4x16 and M5x25 screws attaching the horizontal separators to the side module (Item 1 in the figure above); there are two screws attached to each horizontal separator.
5. Remove any latch valves or electrical outlets from the module.
6. The side module will be tucked into each separator, so carefully extract the side module from the separator and then from the service head.

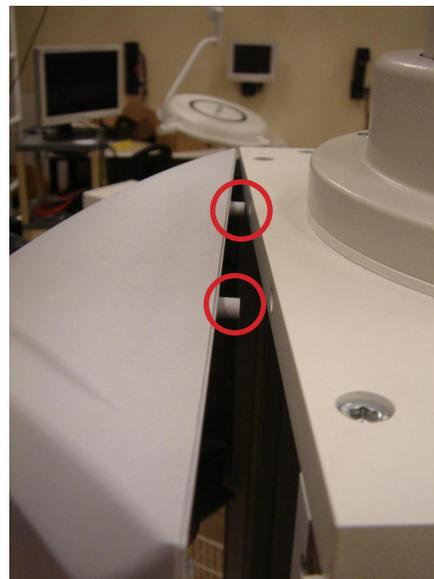
## 12.7.6 Installing Modules



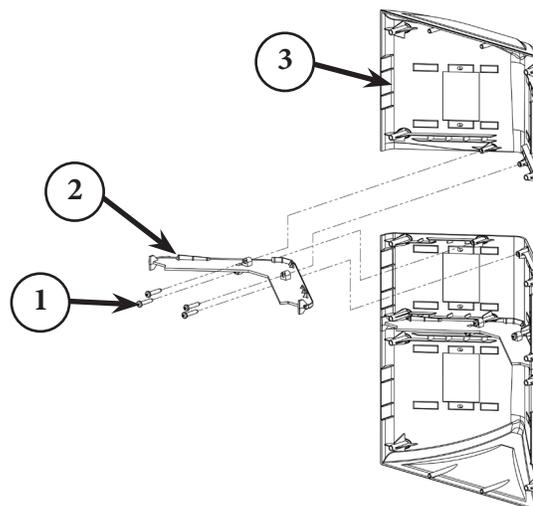
**WARNING** Power should be cut from the boom system prior to removing any modules.

### End Module

1. Fit the end module into the horizontal separator groove and then insert the set pins into the top/bottom plate.
2. Reconnect and reattach any latch valve assemblies or power outlets.



3. Attach two M4x16 and M5x25 screws with a Phillips screw driver through the horizontal separator to the side module (Item 1 below)
4. Attach the two sets of four M5x25 screws on either side of the module, attaching it to the extrusions.
5. Reconnect and reattach any latch valve assemblies or power outlets, or other low voltage plates..
6. Reinstall any vertical separators or UL brackets into the extrusions (mentioned in Section 12.7.3, Removing Extrusions).



### Side module

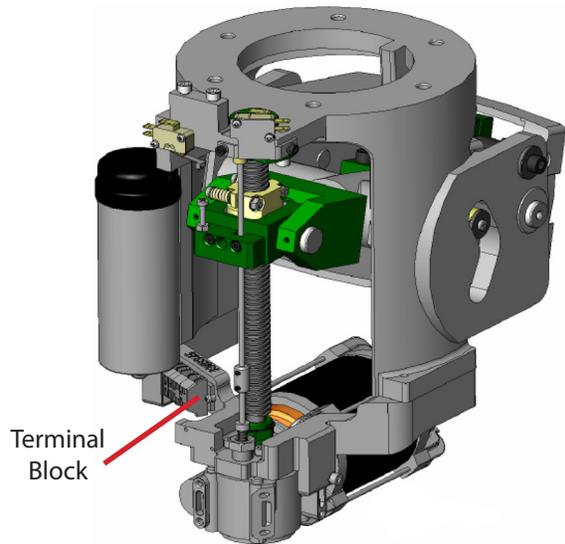
1. With either end module loosely fitted, insert the side module into both horizontal separators.
2. Reconnect and reattach any latch valve assemblies or power outlets.
3. Using a Philips screwdriver, attach the four M4x16 and 5x25 screws through the horizontal separators to the side module (Item 1 in the preceding figure); there are two screws attached to each horizontal separator.
4. Attach both sets of four M5x25 screws on either side of the module attaching it to the extrusions.
5. Reconnect and reattach any latch valve assemblies, power outlets, or other low voltage plates.
6. Reconnect and reattach any latch valve assemblies or power outlets.

7. Reinstall any vertical separators or UL brackets into the extrusions (mentioned in Section 12.7.3, Removing Extrusions).
8. Tighten all screws in the end modules.

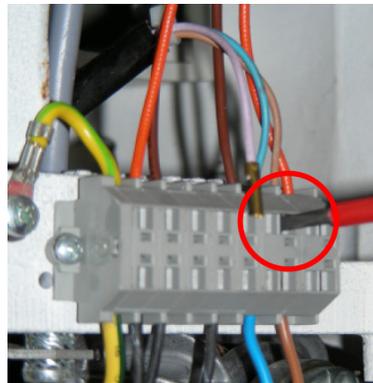
## 12.8 Replacing the Motor

 **WARNING** Power should be cut from the EP module.

1. Dismantle the motor cover halves.



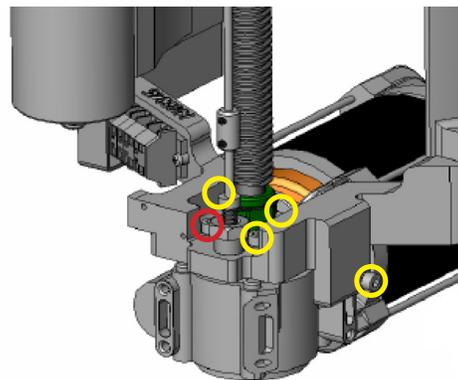
2. Remove the purple, blue, and brown wires.
3. Remove the cable clip at the capacitor. The motor connection cable will now hang loose.



4. Loosen three of the four Allen screws from the top (shown in yellow) with a 4mm Allen wrench.

 **Caution** Do not lose the removed Allen screw.

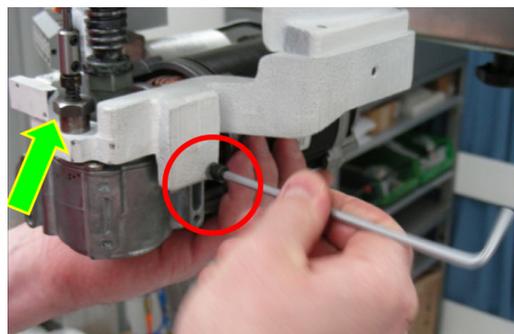
5. Loosen the side Allen screw.



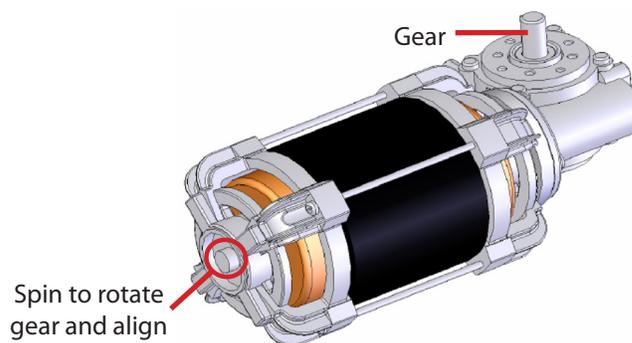
- Loosen the remaining Allen screw from the top (shown in red).



**Caution** Hold the motor while removing the Allen screws to prevent it from falling.



- Install new motor. It is a keyed entry into the drive screw; also known as the worm gear. Spin the knob on the back of the motor to move the gear and line up key.
- Attach the motor by re-installing the five Allen screws that were previously removed.

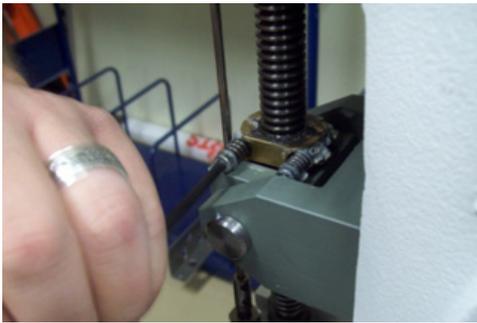
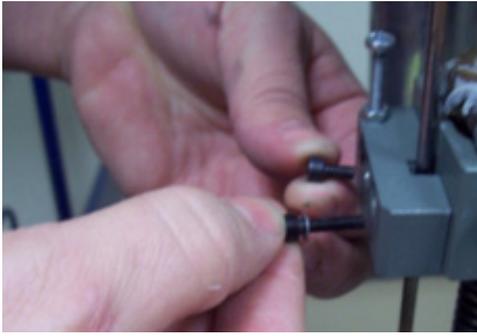


- Plug cables back into terminal block in the same location as before. Refer to DHD10582.

## 12.9 Replacing the Drive Nut on the MMP 200

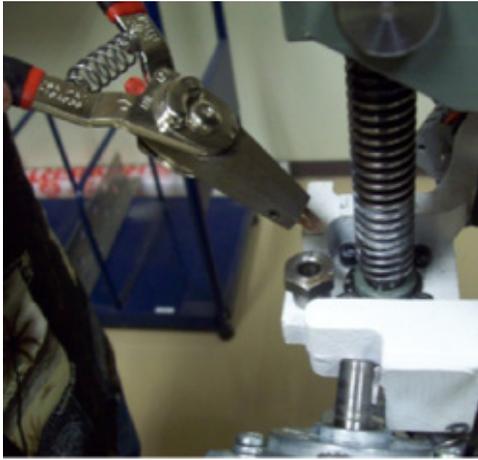


- If replacing the motor refer to section 12.8. If not proceed to step 2.
- Dismantle cover halves as described in Section 12.8 step 1.
- Remove the five screws retaining the motor as described in section 12.8 steps 4-6. Using a tie strap let the motor rest supported off to the side of the boom arm.
- Remove the upper limit switch by loosening the two screws going through the upper limit switch and the metal plate.
- Remove the drive nut guide block screws and washers. There are two hex head screws with washers and one set screw.



6. Loosen the outer drive nut screw (1).
7. Remove the rod by loosening the hex head. The rod will slide out of the drive nut guide block.

8. Turn the threaded shaft clockwise to get the drive nut block out in the open. Be careful not to grip on the threads so damage can be prevented.



9. Use circlip pliers to loosen the circlip. Work the circlip onto the threaded shaft threads.



10. Remove the two set screws on the c bracket. Remove the side pins in the c bracket. Remove the entire threaded shaft by pulling the shaft down and the out.



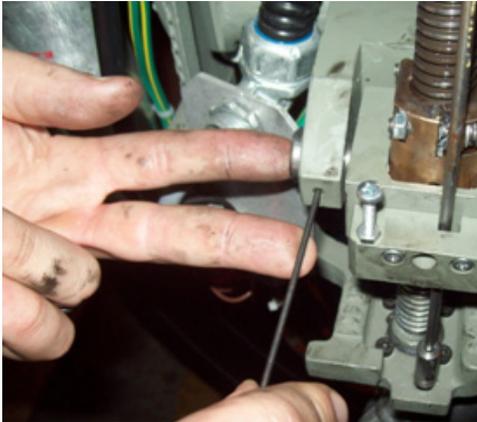
11. Remove the set screw on the back of the drive nut guide block. Remove the drive nut from the threaded shaft by turning threaded shaft while holding the drive nut.
12. Put a new drive block on the threaded shaft



13. Reinstall the drive nut guide block around the drive nut. Tighten the set screws (the center forward facing set screw mates with the drive nut block) and the 2 forward facing screws.



14. Ensure that the circlip is still on the threads at the bottom of the threaded shaft. Reinstall the threaded shaft by putting the bottom of the threaded shaft into position first and then pulling the threaded shaft up into position.



15. Align the drive nut with the drive nut guide block to the C bracket by reinstalling the two side pins and setting screws.



16. Reinstall the circlip. Replace the rod. It will thread through the drive nut guide block and into the material at the top of the threaded shaft.



17. Tighten the bottom hex head into place.



18. Set the guide on the rod so that when the arm is raised or lower it will not get in the hex head. The guide is position-able by loosening and tightening the 2 set screws on the rod.
19. Replace the limit switch by tightening the two screws to the holes on the boom arm.
20. Remove the tie strap supporting the motor and replace the motor per section 12.8 items 7 & 8.

## 12.10 Electro-Pneumatic (EP) Module

### 12.10.1 Removing the Electro-Pneumatic (EP) Module



1. Remove the end cap by unscrewing the two (2) screws attaching the top portion of the end cap.



2. With a flat head screwdriver, gently press down on the two tabs keeping the EP Module in place.
3. Extract the EP Module by carefully pulling the module away from the boom arm.



#### Caution

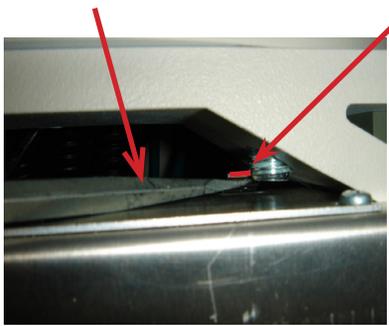
Be very careful as hazardous voltage may be present inside of the EP module. There are also low voltage cables as well as gas hoses attached to this module. If it is difficult to extract the EP Module, ensure there is sufficient slack in the control cables, brake hosing and electrical conduits.



4. Rest the EP Module to the side so that you may work in the arm set.
5. Articulate the boom arm to ensure the EP module was correctly replaced.

### 12.10.2 Installing an Electro-Pneumatic (EP) Module

Flat Head  
Screwdriver



1. Insert the EP module into the arm set opening. Pay close attention to the slots allocated in the arm set to fit the EP Module box.
2. Ensure the tabs on the top of the EP module are securing it in place. In some cases, you may need to insert a flat head screwdriver to push the tabs up.
3. Reinstall the end cap where the open tabs are located on the bottom.

### 12.10.3 Replacing an Electro-Pneumatic (EP) Module Conduit



**Note** Conduit from the EP Module to the motor is required to be a specific length to avoid the conduit from being damaged by the motor housing during movement.

1. Remove the damaged conduit from the EP Module.
2. Install the replacement conduit, cutting it to the length directed in the following chart.

Boom Arm Length	Conduit Length
1200mm Arm	1700mm
1000mm Arm	1450mm
800mm Arm	1250mm
600mm Arm	1050mm

## 12.11 Generation 1 Service Head

### 12.11.1 Replacing a Shelf with Brake



1. Remove air pressure at the source (regulator located on the Riser Bracket above ceiling) by turning ball valve to the CLOSED position (perpendicular to the assembly). To release pressure in the system, press the brake buttons several times until all gas has been relieved.
2. If boom has StrykeVac, customer's electrician shall verify all electrical power to boom is off.
3. Remove the four screws and washers from plate on bottom of shelf.

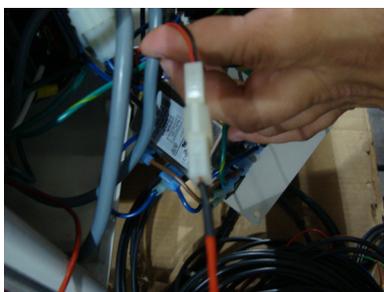




4. Label the brake lines to prevent improper reconnection.
5. Remove the two brake lines from each pneumatic brake button.



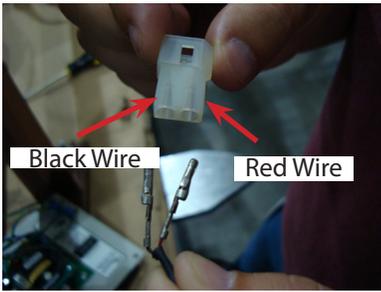
6. If boom does not have StrykeVac, skip to step 10.
7. Remove the six Phillips head screws and unplug the red wire. Then remove the wires from connector and pull through shelf.



8. Remove protective caps and four screws that attached shelf to service head.



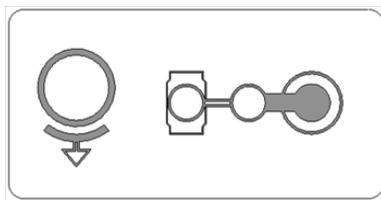
9. Remove shelf and pull air lines out of the back of the shelf.
10. If a StrykeVac is installed, pull red wire through new shelf and attach shelf.



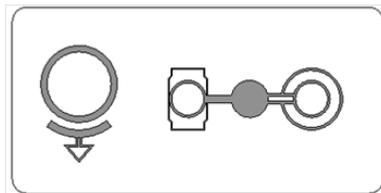
11. Place wires in connector and connect Strykvac.
12. Reattach Strykvac panel.
13. Pull air line through new shelf.
14. Reattach shelf and replace plastic covers.



15. Insert the supply tubing into the Center Solenoid Connector.
16. Insert the Brake Bladder tubing in the outboard Solenoid Connector.
17. Turn on the air supply and power to boom.
18. Verify that no leaks are heard and all power to boom works.



*Ceiling Brake*



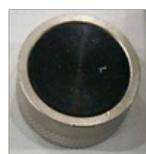
*Mid Brake*

19. Verify the operation matches the label on the rail to the tubing coming from the green port on the matching solenoid of the shelf brake.



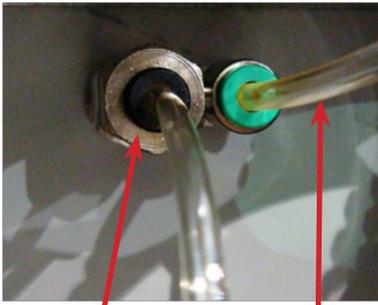
20. Reattach bottom the plate.

### 12.11.2 Replacing the Brake Button



Adjustment Nut

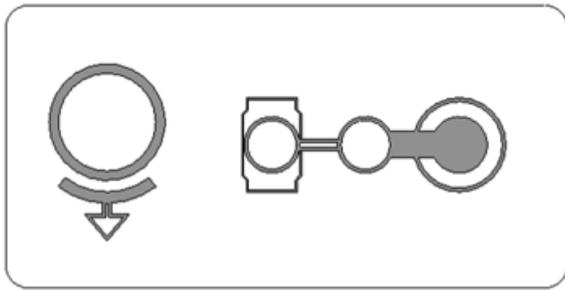
1. Make sure the air supply to the brake line (regulator located on the Riser Bracket) is off by turning the ball valve to the CLOSED (perpendicular to the assembly) position. Relieve the pressure in the brake system by pressing the brake buttons several times until all pressure is relieved.
2. Remove the four screws and washers from the plate on the bottom shelf.
3. Remove the brake tubing from the defective brake by pressing the plastic ring toward the body of brake button to release the tubing.
4. Loosen the four hex screws on the shelf rail.
5. Remove the Brake Button extension.
6. Unscrew the external ring and remove the defective Brake Button.
7. Assemble the Brake Solenoids to the shelf.
8. Thread the lock nut all of the way onto the Brake Solenoid.
9. Add the lock washer.
10. Insert the Solenoid into the shelf.
11. Screw the button onto the Solenoid.
12. Adjust the lock nut from behind to tighten the assembly.
13. Repeat the procedure for the second button.



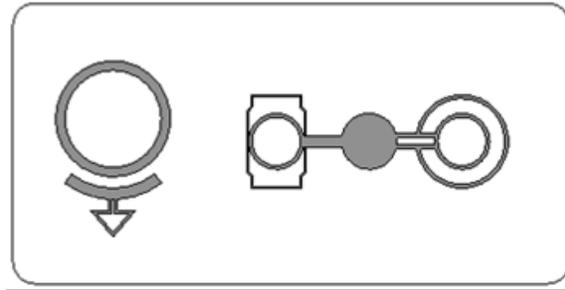
Supply or Shelf  
(if used)

To Brake

14. If there is only one button in the Service Head, insert the supply tubing into the Center Solenoid Connection.
15. Insert the Brake Bladder tubing in the outboard Solenoid Connector.
16. Turn on the air supply.
17. Verify that no leaks can be heard.



*Ceiling Brake*



*Mid Brake*



*FLEXiS 1st Generation Service Head  
Brake Buttons*



*FLEXiS 2nd Generation Service Head  
Brake Buttons*

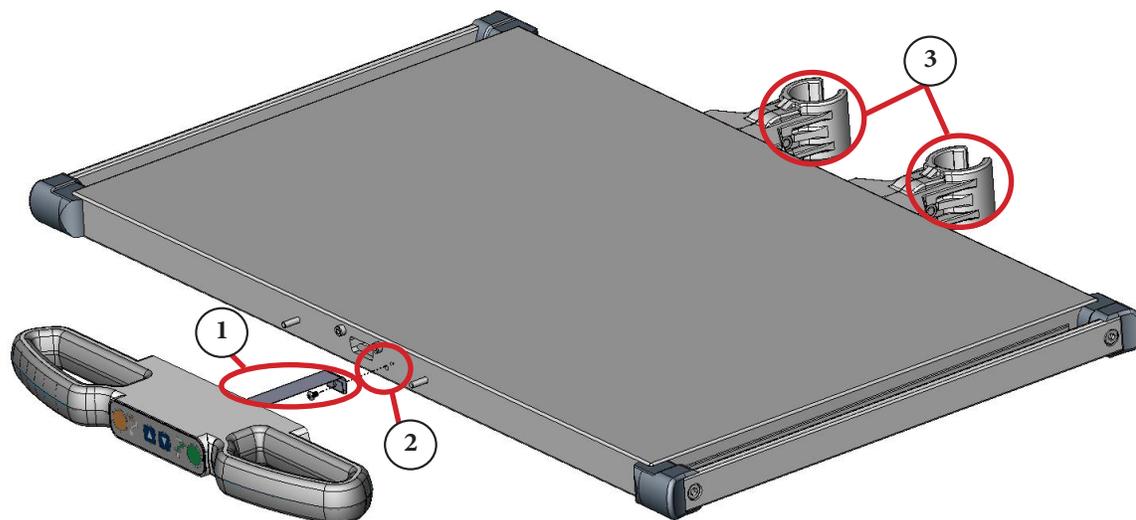
18. Verify the operation matches the label on the rail to the tubing coming from the green port on matching the Solenoid of the shelf brake.

## 12.12 Generation 2 Service Head

### 12.12.1 Replacing a Shelf Handle Assembly

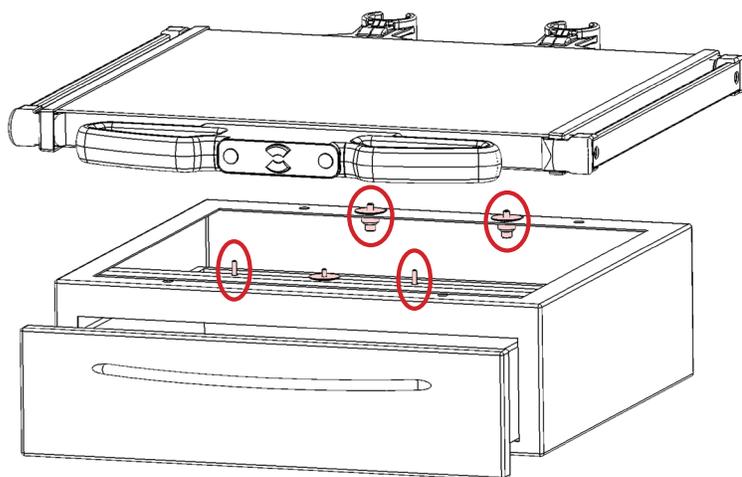
A 2nd Generation Service Head Handle must be used for all handle replacements, as the 1st Generation Handle is no longer available for replacement. To replace a 1st Generation Handle, refer to the Spare Parts Catalog (P18461) and replace with either a complete shelf with handle assembly, complete handle to MFR assembly, or complete handle-to-bottom-bracket assembly.

The new 2nd Generation Handle Assembly contains ESD features including a handle ESD ribbon (Item 1), ribbon screw (Item 1), grounding hole in the shelf extrusion (Item 2), and clamps with an unpainted interior (Item 3).



Depending on which handle is being repaired, order either repair part P17780 (two button with up/down) or P17781 (two brake only) .

1. If no drawer is attached to the shelf, skip to Step 2. If a drawer is attached, remove it by doing the following:
  - a. Slide the drawer out in order to gain access to the installation screw holes.
  - b. Remove the four screws securing the screws securing it to the shelf.

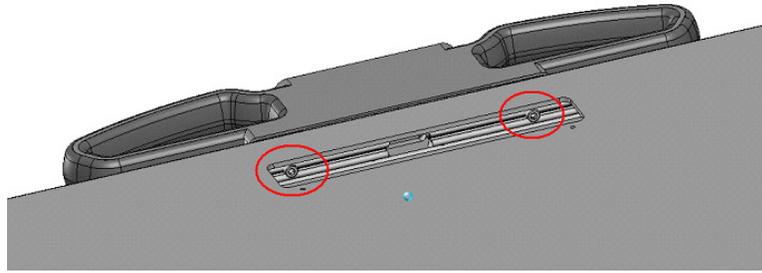


- c. Remove the drawer from the assembly.
2. Use a 4mm Allen wrench to remove the two M5 screws that secure the handle to the shelf, as shown in the following figure. The ribbon cable will still be attached to the PCB.

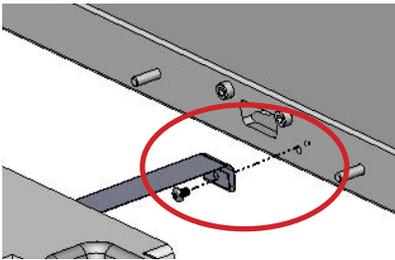


**Caution**

**Be careful not to pull on the cable or damage the connector.**



Note The inserts place pressure on the bolts to prevent them from becoming loose until they are removed.



3. Remove the screw that connects the ESD ribbon to the shelf extrusion.
4. Disconnect the ribbon cable from inside the handle.
5. Connect the new ribbon cable to the handle and fully engage the clip.
6. Fold over the end of the ESD ribbon so that the conductive side comes in contact with the shelf, and secure the it with the screw removed in Step 4.
7. Install the new handle to the shelf with the original two M5 screws. The excess ribbon cable should be coiled into the handle cavity.
8. Make sure the handle is right side up, then tighten the screws fully, making sure they are fully seated.



Note It is easier to install both screws and tighten them each progressively.

9. Reinstall the drawer by doing the following:
  - a. Slide the drawer out in order to gain access to the installation screw holes.
  - b. Align the screw holes on top of the drawer housing with the holes on the bottom of the respective shelf.
  - c. Push the screws through the top of the drawer housing.
10. Place spacers over the screws to separate the drawer housing and shelf.
11. Secure the drawer using the four screws included with the drawer.

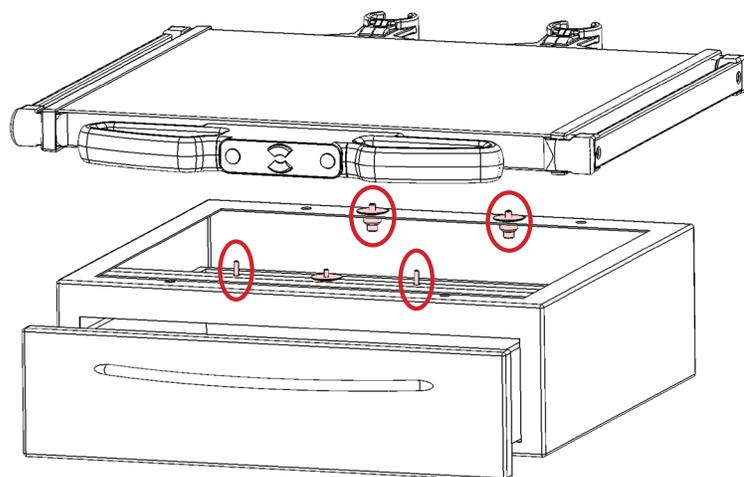


Figure 7.12 - Drawer Installation

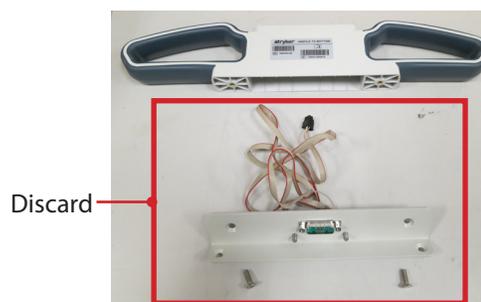
12. Tighten all screws fully.



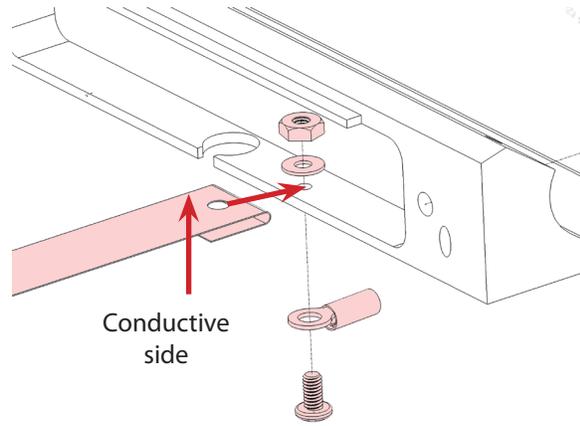
**WARNING** Be sure to fully tighten all screws to prevent the drawer from falling off.

### 12.12.2 Replacing an MFR Handle Assembly on the Philips MCS

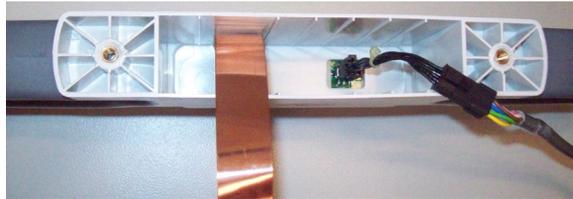
1. Remove the top clamp from the bottom clamp by removing the four M5 screws.
2. Unclamp the strain relief plug from the grey control cable that is routed through the MCS frame.
3. Unplug the 6-pin connector of the intermediate cable from the Stryker handle.
4. Gather the new handle, top and bottom clamps, intermediate cable, and strain relief for assembly.
5. Remove the sheet metal handle bracket from the assembly and the cable connected to the bracket from the handle assembly, if is not already, and discard. These components are used on a different Stryker assembly, and are not needed for this application.



6. Install the EDS ribbon to the bottom clamp.
  - a. It may be necessary to strip the ground wire and clamp the ring terminals onto the ends of the wires.
  - b. Fold over the end of the ESD ribbon so that the conductive side comes in contact with the handle, as shown in the figure below.
  - c. Secure the conductive side of the ESD ribbon and ground ring wire using the pan head screw, washer, and hex nut, as shown.
7. Install intermediate male to male cable.



8. Plug the 6-pin connector of the intermediate cable into the Stryker handle, mating female connector inside the handle housing.
9. Clamp the strain relief plug onto the grey control cable that was previously routed through the MCS frame. Note orientation shown in the figure below and positioning of strain relief at approximately 6" from cable connector.



10. While installing the strain relief component with pliers, install the strain relief plug into the bottom clamp, ensuring the small end faces the end of the cable.



11. Install the bottom clamp to the underside of the Stryker handle (as shown above), ensuring the strain relief points down, with two M5 X 25 screws. Push excess cabling into the handle cavity.





**Caution** Take care not to overtighten the M5 X 25 screws.



**Note** These are the longest of the M5 screws included in the assembly.

12. Center the bottom clamp on the MCS frame on the bottom of the bar.
13. Install the top clamp to the bottom clamp using the remaining four M5 screws. Only tighten until the handle will not slide along the MCS frame.
14. Manage the excess Stryker control cable into the MCS frame.



**Caution** Take care not to overtighten the M5 X 20 screws.



**Note** There will be a visible gap in the handle clamp assembly. This is acceptable, as it is necessary to provide the clamping force.

## 12.13 Servicing a Leaning Boom

### 12.13.1 Weight Check

Make sure that the maximum load capacity is not exceeded. Use SOP1902.02 to document the current load and confirm the capacity is not exceeded.

1. Weigh each item on or attached to the shelves. Make sure to weigh and calculate in all peripherals. If it is not possible to physically weigh the items, use the table below to find the weight of commonly used equipment. A photo of the service head with all of the equipment on it can be taken and sent to Technical Support to look up equipment weights listed on the material technical specification sheets online.



**Note** The load on each shelf cannot exceed 75 lbs. This includes every item attached to Fairfield rails or placed on a shelf such as drawers, keyboard trays, baskets, consoles, etc. Refer to FLEXiS Operations Manual, P13742 for approximate accessory weight and max load capacities.



**Note** The total load cannot exceed the remaining load capacity identified by the load capacity label on the drop tube of the boom. This includes external gas outlet regulators, monitors and their mounts, extra shelves, etc.

<b>Common Equipment on FLEXiS Shelves</b>	
<b>Equipment</b>	<b>Weight (lbs)</b>
<b>Cameras</b>	
988 CCU	13
1088 CCU	11
1188 CCU	13
1288 CCU	13
1488 CCU	13
FCU	11
<b>Light Source</b>	
X7000 LIGHT SOURCE	18
X8000 LIGHT SOURCE	16
L9000 LIGHT SOURCE	16
<b>Arthroscopy</b>	
SE5 SHAVER	13
TPS CONSOLE	6
CORE	20
SERFAS ENERGY CONSOLE	13.6
SERFAS CONSOLE	13.6
CROSSFIRE	20
ARTHRO PUMP	19
FLOWCONTROL PUMP	24.7
ISWITCH RECEIVER	13.6
ISWITCH FOOT-SWITCH	4
<b>Laparoscopy</b>	
40L INSUFFLATOR	16.5
40L INSUFFLATOR HERMES READY	16.5
30L INSUFFLATOR	23
PNEUMO SURE INSUFFLATOR	19.84
PNEUMO SURE XL INSUFFLATOR	19.84
INFRAVISION	6
<b>Peripherals</b>	
WiSE TRANSMITTER	11

2. Compare the current weight to the load limit for the boom. The load limit sticker includes compensation for shelves initially shipped with the product. If no additional shelves were attached to the service head after shipping, the boom load limit can be directly compared to the weight of all the items on the service head, excluding shelves. Example: If the number of shelves indicated on the boom load label is 2 and there are 3 shelves, you must include the weight of the extra

shelf in the calculated total boom load.

 **Note** This step may require the addition or subtraction of weight based on the configuration posted in the initial system order. Refer to FLEXiS Operations Manual, P13742 for approximate accessory weight and max load capacities.

3. If the boom or shelf load limit is exceeded, re-distribute or remove equipment until the load limit(s) are within specification. This will require hospital staff input.

 **Note** Stryker cannot guarantee the lean can be adjusted within specification if the customer insists on overloading the system.

4. Weight must be equally distributed within the system and on individual shelves. When weight is greater in one location and less in the opposite direction, the deflection of lean could be greater in positions which accentuate the weight position.

### 12.13.2 Wedge Kit Check

A wedge kit must be installed on every MMP200 boom. Make sure the service head wedge is installed and that it is oriented properly (see Section 6.1). If no wedge is installed, install one at the service head.

### 12.13.3 Taking Measurements

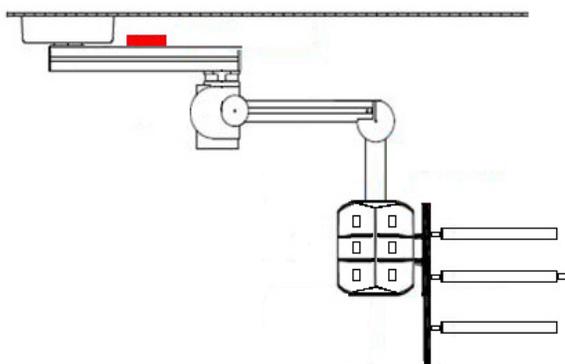
 **Note** Leave all equipment on the service head when taking measurements and making adjustments. If equipment is relocated after measurements are taken, they must be performed again.

#### Extended Arms Positions

1. Measure the service head and shelf with a calibrated digital protractor. Document the results of the measurements in SOP1902.02.

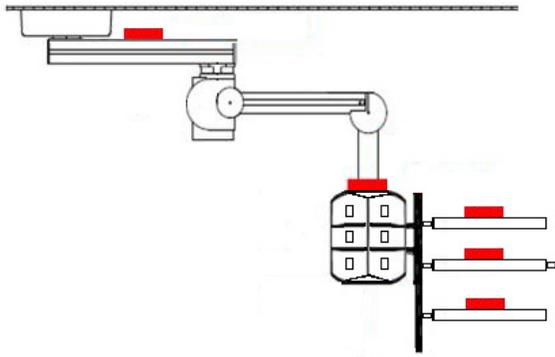
 **Note** When recording measurements make sure to note the direction of lean relative to level (i.e., 0.5 degrees left when measuring service head lean left to right or 0.5 degrees down when measuring service head front to back).

 **Note** The information collected in SOP1902.02 will be required if service escalation is required due to leaning.



2. Take a measurement of the top boom arm with a calibrated digital protractor placed in the position as shown in the figure. Record results in SOP1902.02.

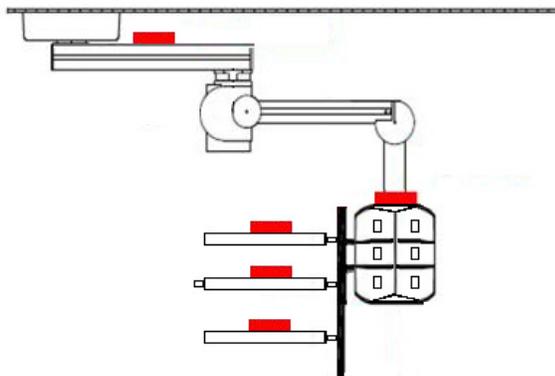
*Top Boom Arm Measurement, Position- Extend  
Boom Arms, Service Head Rotated 0 deg*



*Extended Boom Arms, Service Head 0 rotated degree position*



*Service Head Left to Right Measurement Location*



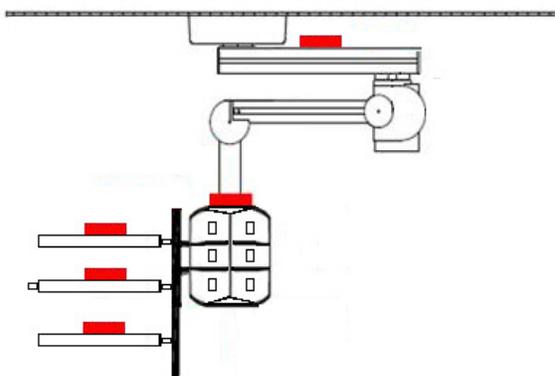
*Extend Boom Arms, Service Head Rotated 180 deg position*

3. With the boom in the same position, record angle of the service head and all shelves from front to back, placing the digital protractor in the positions shown in the figure. Shelf number can be considered 1-4 from the top to the bottom (shelf 4 is not shown in the figure). Record each measurement in SOP1902.02.

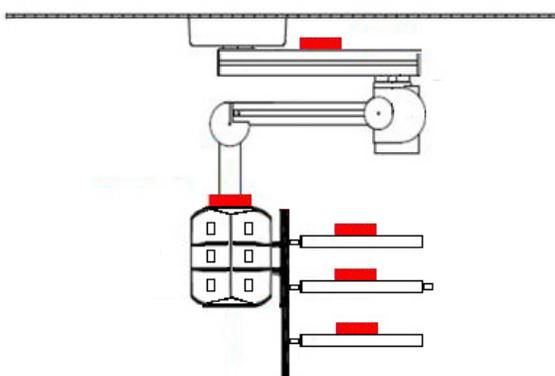
4. With the boom in the same position, record angle of the service head from left to right by placing the digital protractor in the position shown. Record this measurement in SOP1902.02

5. Rotate the service head so that the shelves face toward the arms. Record each measurement in SOP1902.02 using the same digital protractor locations.

### Folded Arms Positions



*Boom Arms Folded, Service Head Rotated 0 deg position*



*Boom Arms Folded, Service Head Rotated 180 deg position*

1. Rotate the lower arm underneath the upper arm.
2. Position the service head with the shelves facing away from the boom arms. Record the top arm, service head, and shelf measurements in SOP1902.02.
3. Position the service head with the shelves facing toward the boom arms. Record the top arm, service head, and shelf measurements in SOP1902.02.

#### 12.13.4 Making Adjustments

1. Compare the values for the top arm. If any top arm measurement exceeds 1 degree, this is an indication that the entire boom is leaning from the top plate. Correct this by installing the boom level at the top plate.
2. Compare the values for the service head front to back rotated 0 deg position with the values of the service head front to back rotated 180 position (compare row 1 to row 2, and compare row 3 to row 4). The value of the 0 rotated degree service head position should be within 2 degrees of the value of the 180 rotated degree service head position for both boom arm positions. If these values are greater than a 2 degree difference, a cam bolt adjustment may be completed. If these values are less than 2 degrees, proceed to next step.



Note

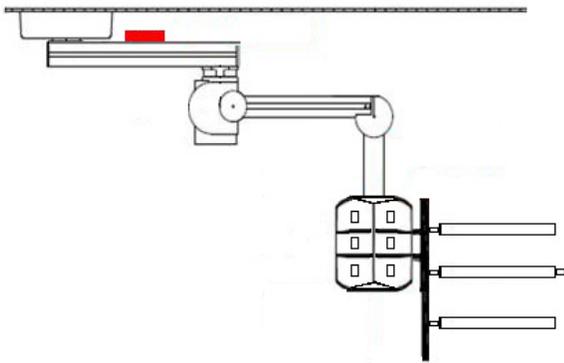
Adjust the cam bolt only after all other procedures to readjust the lean have been tried, and only if the lean at the 0 rotated degree service head position is greater than 2 degrees from the lean at the 180 rotated degree position.

3. Compare values for the service head lean left to right. If any position measures greater than 3 degrees, proceed to step 7.
4. Compare values for the shelves. Install shelf shims for any shelves that measuring greater than 3 degrees of lean at any position. Shelf shims may also be installed for a lean <3 degrees.

5. After fully completing the above steps, repeat the measurements using SOP1902.02 to document the improved values.
6. If steps 1-4 do not resolve the issue, confirm the Service Head is installed correctly. Refer to Section 6.1
7. If the above steps do not resolve the issue, remove the knuckle “pac-man” cover and the motor cover and take pictures.
8. Replace the cover according to Section 9.
9. Send the picture, measurements, and Field Service Report to technical support to escalate the service request.

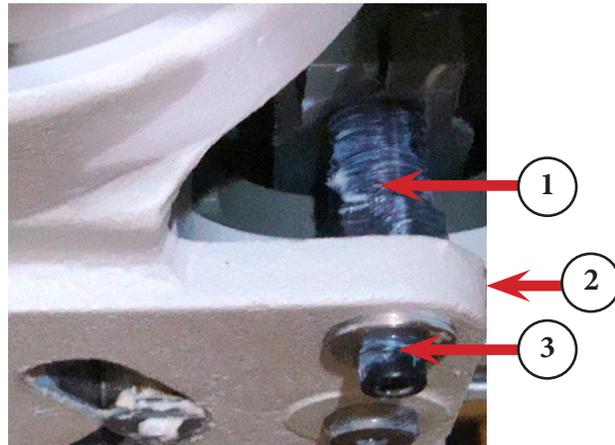
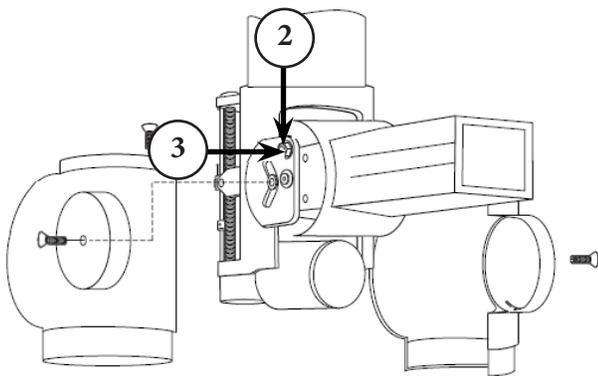
### 12.13.5 Cam Bolt Adjustment

 **Note** Adjust the cam bolt only after all other procedures to readjust the lean have been tried.



1. Place the boom in position with the arms fully extended and with the shelves facing away from the arms.
2. Remove the motor cover halves.

*Top Boom Arm Measurement, Position- Extend Boom Arms, Service Head Rotated 0 deg*



3. Loosen the set screw (Item 2).
4. Loosen the M8x70 hexagon head screw (Item 3).
5. Slightly rotate the cam SW22 adjusting screw (Item 1) a few times until the amount of lean on the service head is the same at the 0 and 180 degree rotation positions. Place a digital protractor on the shelves while making adjustments to confirm proper lean.

 **Note** The bolt will initially be hard to break loose. Make sure the weight of the service head is supported by a person or on a steady surface.



**WARNING** To prevent the boom from falling, make sure the M8x70 hexagone screw is properly tightened to 23 Nm.

6. Tighten the M8x70 hexagon screw (Item 3) to 23Nm.



**Note** Monitor the lean of the boom while tightening the M8x70 hexagon screw to ensure it the lean is not affected.

7. Tighten the M4x6 set screw (Item 1) to 2.8Nm.
8. Re-install motor covers.

## 13. Contact Information

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Contact Stryker Customer Service with questions or concerns.

Stryker Communications  
1410 Lakeside Parkway #100  
Flower, Mound, TX 75028  
Toll Free: (877) 789-7100  
1-972-410-7100

For international service locations, refer to the Stryker website at the following URL:  
**[www.stryker.com](http://www.stryker.com)**.





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