

Denso Robotics
HSR J3 & J4
Brake
Replacement

****Attention****

Read this resource material carefully and in its entirety before use to ensure it is understood and used properly. Failure to properly follow the instructions in the resource materials DENSO provides may result in damage to your equipment. As a result, by using the resource materials, you are assuming the risks associated with modifying your equipment. DENSO holds no liability, implied or otherwise, for damage, injury or any legal responsibility incurred, directly or indirectly from the use of the resource materials, including any loss of data or damage to property which may occur by your use of the resource materials. The use of the resource materials is not recommended unless you have technical knowledge and functional experience with the equipment and related software. DENSO is unable to provide support, remote or otherwise, for the information included in the resource material, nor for the ancillary topics relating to the information included in the resource materials. Therefore, if you are not fully comfortable with it, we strongly recommend that you send your unit to one of our Regional Support Centers for repair. The information contained in the resource materials are subject to change at the sole discretion of DENSO.

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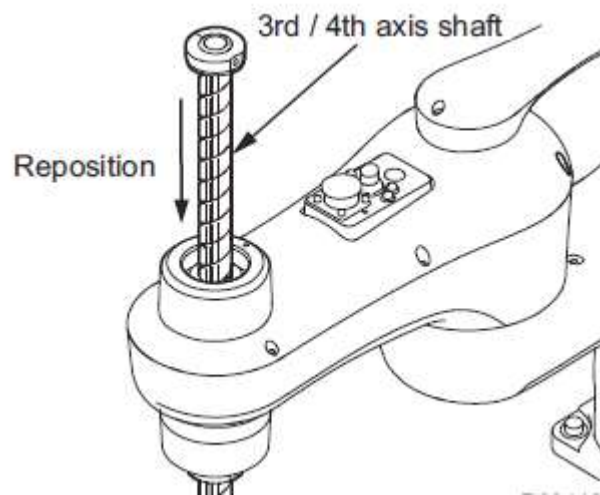
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1.0 HSR J3 Brake Replacement

1.1 J3 Brake Removal

Parts needed for the J3 brake replacement- J3 Brake Assembly Denso Part Number **410634-0180**

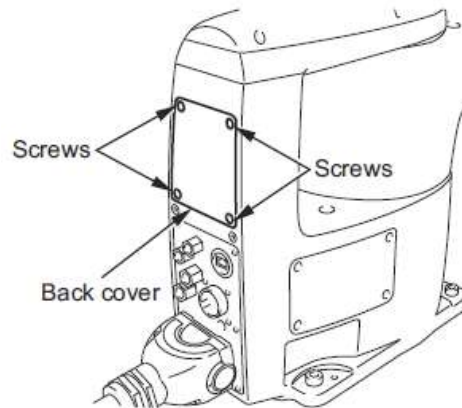
Step 1- Using the Teaching Pendant, release the brake on J3 and move the shaft all the way downward to the lower hard stop. To release the brake using the pendant: Arm->Shift->Maint->Brake->J3->OK-> (Hard Green OK on pendant)



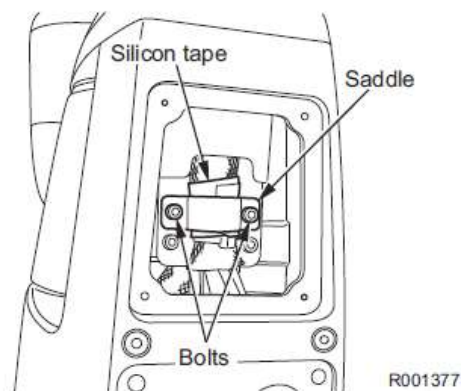
Caution- Before Continuing

1. Turn off the power to the Robot Controller and remove the CN22 Connector (M/E Cable).
2. Remove the Power and Air to peripheral equipment connected to the robot.

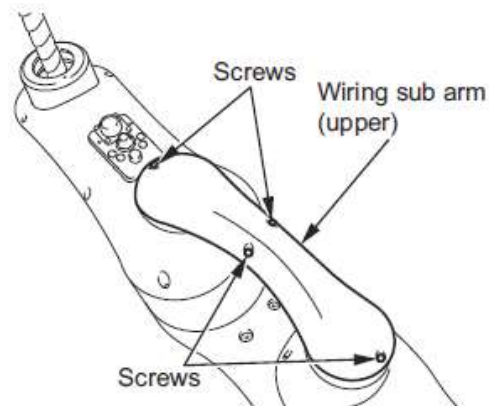
Step 2- Remove the (4) screws holding the back cover then remove the cover. Store any screws/bolts that are removed in a safe location such as a magnetic bowl.



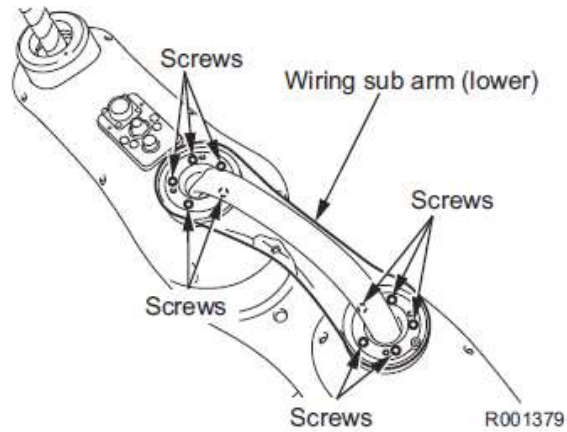
Step 3- Remove the two bolts holding the wiring harness saddle, next remove the saddle and the silicon tape.



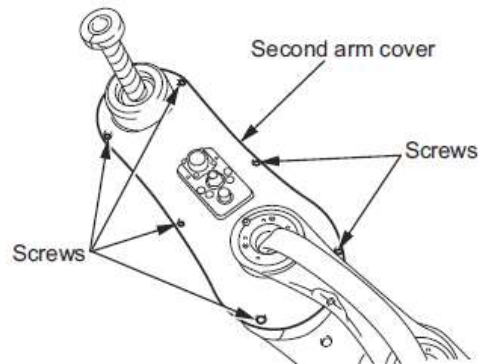
Step 4- Remove the four screws holding the wiring sub arm (upper), then remove the wiring sub arm (upper).



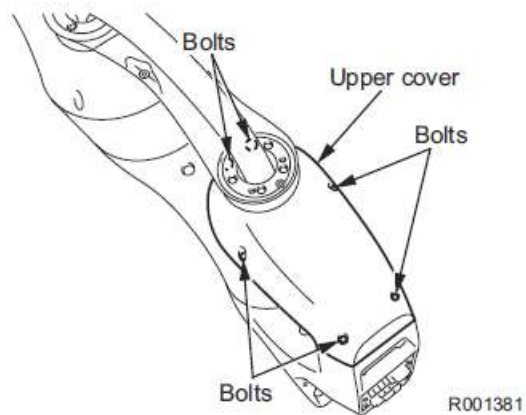
Step 5- Remove the ten screws holding the wiring sub arm (lower).



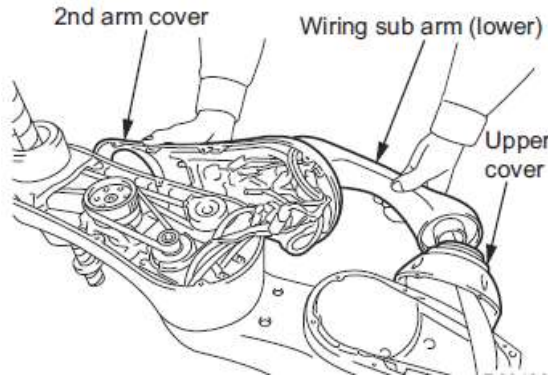
Step 6- Remove the six screws holding the 2nd arm cover.



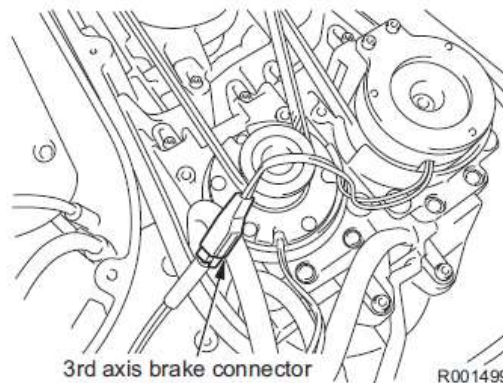
Step 7- Remove the six bolts holding the upper cover.



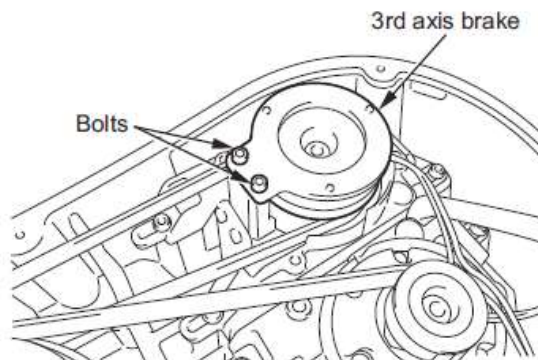
Step 8- Carefully remove the covers so that the 2nd arm assembly can be accessed. As you remove the covers take note of where the airlines and wiring are stored under the 2nd Arm Cover. ***Be sure to support these covers while work is being performed, too much stress on the wiring can cause breaks or damage to the wires.**



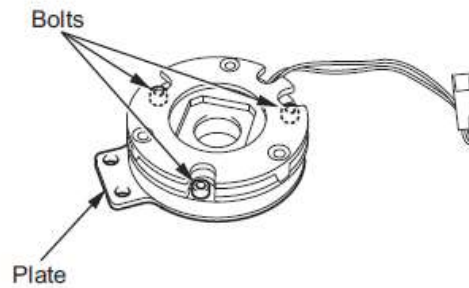
Step 9- Disconnect the 3rd axis brake connector (white connector, 2-pins). ***Make note of where the wiring was stored within the housing so that once the work is complete the wiring can be secured in the correct/safe location.**



Step 10- Remove the two bolts holding the 3rd axis brake, and then remove the 3rd axis brake from the 3rd axis motor.



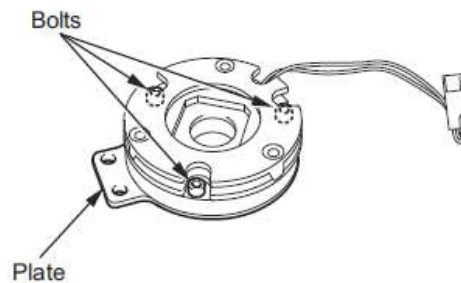
Step 11- Remove the three bolts holding the plate on the J3 brake, then remove the plate. ***Careful as these bolt heads can strip easily if you are not careful or if you have a wrench that is worn.**



1.2 J3 Axis Brake Reassembly

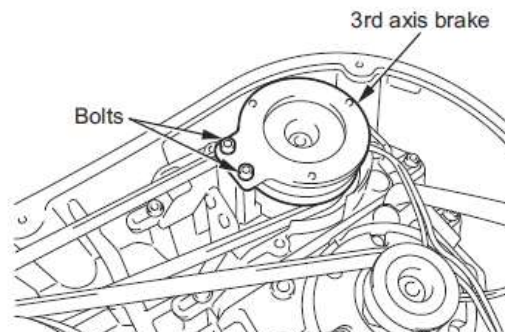
Step 1- Attach the new brake (Denso Part Number **410634-0180**) to the plate, and then tighten the three bolts (M3 x 10) holding the plate. Be sure the orientation is correct.

Tightening torque of plate fixing bolts:
 $2.0 \pm 0.4 \text{ Nm}$ ($20 \pm 4 \text{ kgf}\cdot\text{cm}$)

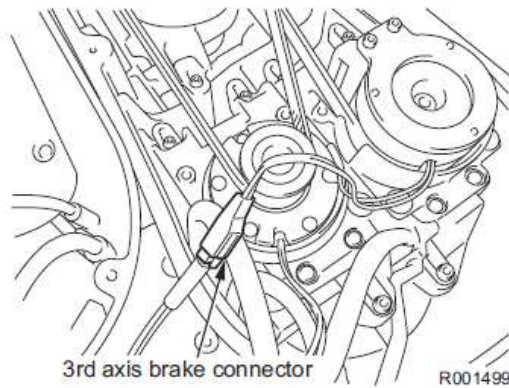


Step 2- Attach the 3rd axis brake to the 3rd axis motor, and then tighten the two screws (M3 x 8) holding the 3rd axis brake.

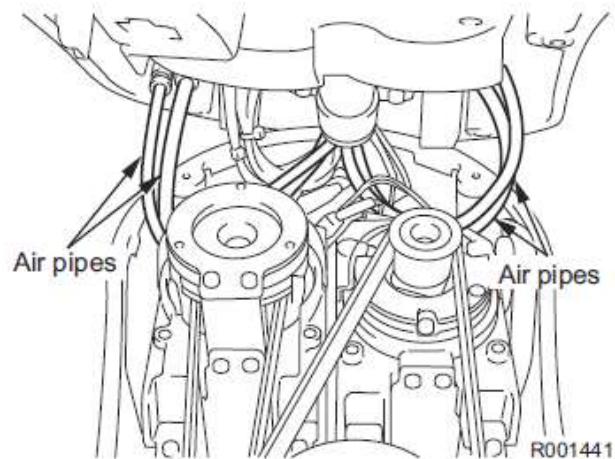
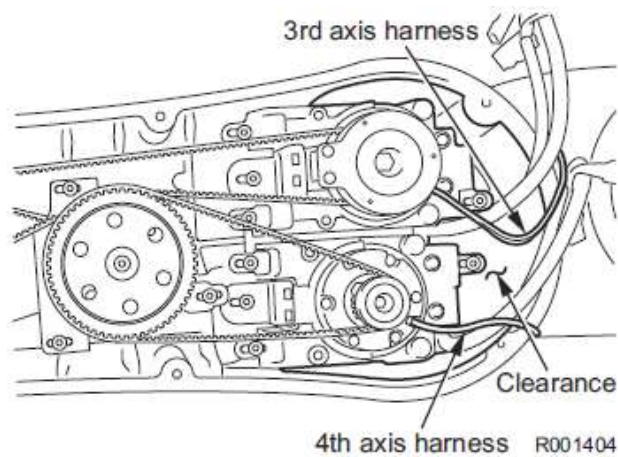
Tightening torque of 3rd axis motor fixing bolts:
 $1.0 \pm 0.4 \text{ Nm}$ ($20 \pm 4 \text{ kgf}\cdot\text{cm}$)



Step 3- Connect the 3rd axis brake connector (white, 2-pin). ***Be sure to store the wiring in a safe/secure location as noted when the wiring was disconnected in step 9 of the J3 Brake Removal.**

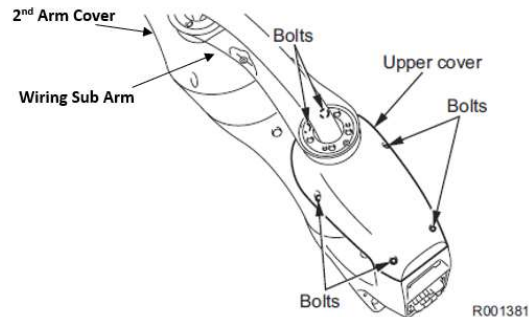


Step 4- Place the 3rd axis harness, 4th axis harness and air lines into the open space/clearance as you replace the 2nd Arm Cover. ***Be careful that no wires or airlines are pinched.**



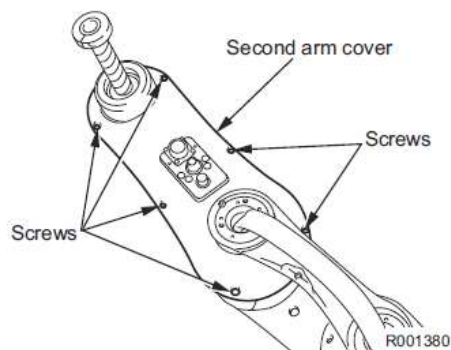
Step 5- Attach the 2nd arm cover, the wiring sub arm (lower) and the upper cover, and then tighten the six bolts (M3 x 8) holding the upper cover. ***Be sure that no wires are pinched.**

Tightening torque of upper cover fixing bolts:
 $1.6 \pm 0.32 \text{ Nm}$ ($16 \pm 32 \text{ kgf}\cdot\text{cm}$)



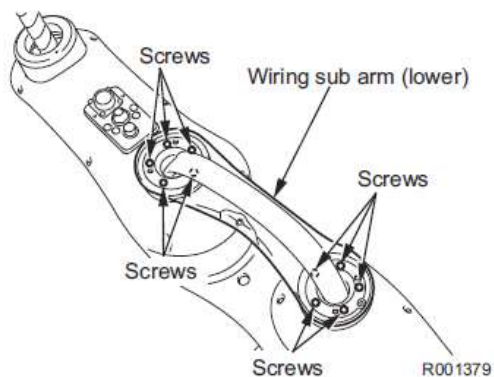
Step 6- Tighten the six screws (M3 x 8) holding the 2nd arm cover.

Tightening torque of the 2nd arm cover fixing screws:
 $0.59 \pm 0.12 \text{ Nm}$ ($6 \pm 1.2 \text{ kgf}\cdot\text{cm}$)



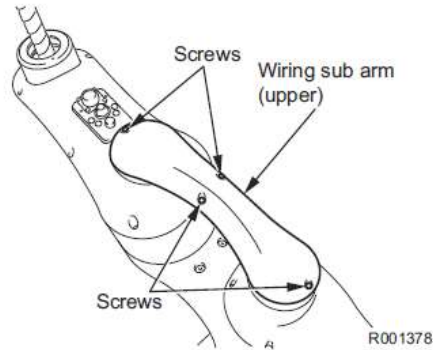
Step 7- Tighten the ten screws (M3 x 8) holding the wiring sub arm (lower).

Tightening torque of the wiring sub arm (lower) fixing screw:
 $0.59 \pm 0.12 \text{ Nm}$ ($6 \pm 1.2 \text{ kgf}\cdot\text{cm}$)



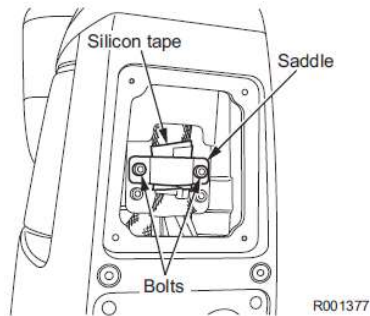
Step 8- Attach the wiring sub arm (upper), and then tighten the four screws (M3 x 8) holding the wiring sub arm (upper).

Tightening torque of the wiring sub arm (upper) fixing screws:
 $0.59 \pm 0.12 \text{ Nm}$ ($6 \pm 1.2 \text{ kgf}\cdot\text{cm}$)



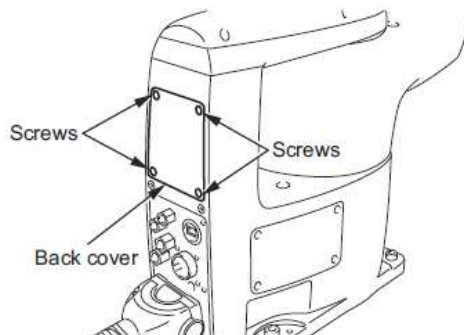
Step 9- Wrap the guard net of the wiring harness with the silicon tape just above the wire tie as seen below, attach the saddle and tighten the two bolts (M4 x 8) holding the saddle. ***Apply medium strength Loc Tite to the saddle fixing bolts.**

Tightening torque of saddle fixing bolts:
 $2.9 \pm 0.58 \text{ Nm}$ ($30 \pm 6 \text{ kgf}\cdot\text{cm}$)

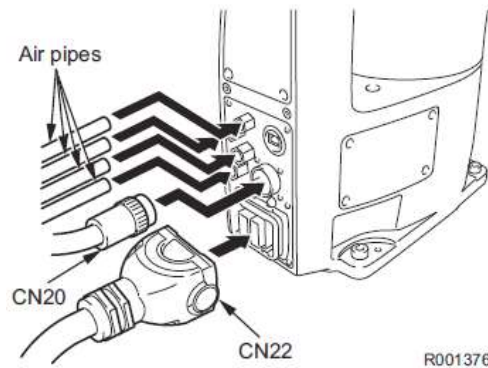


Step 10- Attach the back cover, tighten the four screws (M3 x 8) holding the back cover.

Tightening torque of the back cover fixing screw:
 $0.59 \pm 0.12 \text{ Nm}$ ($6 \pm 1.2 \text{ kgf}\cdot\text{cm}$)



Step 11- Connect the cables (CN20, 22) and air pipes (AIR1, AIR2, AIR3 and AIR4) to the robot, and turn on the power to the controller and peripheral devices (equipment) of robot, and air supply.



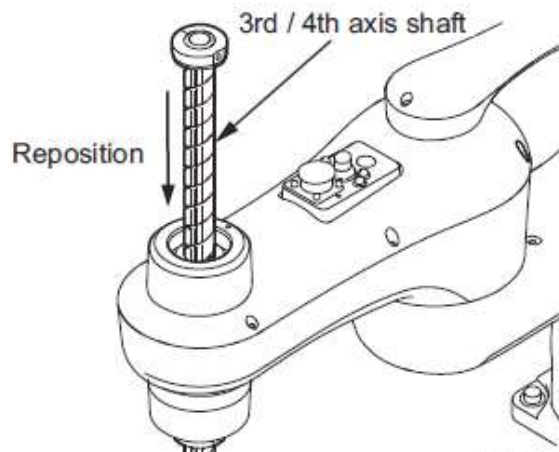
Step 12- Perform 3rd **and** 4th axis CALSET. Visit <https://www.densorobotics.com/knowledge-base/> for the HSR Calibration Video.

2.0 HSR J4 Brake Replacement

2.1 J4 Brake Removal

Parts needed for the J4 brake replacement- J4 Brake Assembly Denso Part Number **410634-0190**.

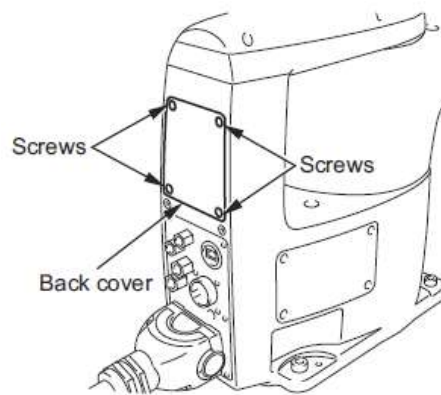
Step 1- Using the Teaching Pendant release the brake on J3 and move the shaft all the way downward to the lower hard stop. To release the brake using the pendant: Arm->Shift->Maint->Brake->J3->OK-> (Hard Green OK on pendant)



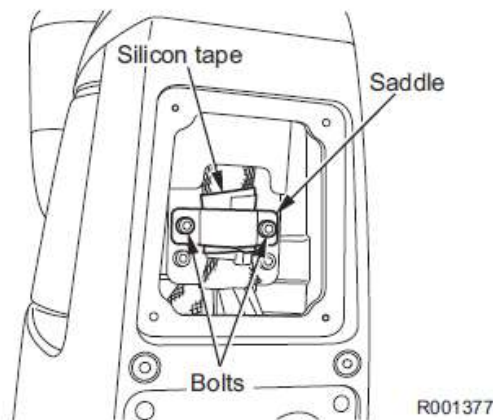
Caution- Before Continuing

1. Turn off power to the Robot Controller and remove the CN22 Connector (M/E Cable).
2. Remove Power and Air to peripheral equipment connected to the robot.

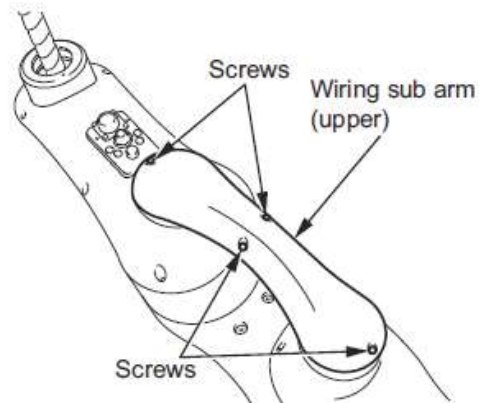
Step 2- Remove the (4) screws holding the back cover then remove the cover. Store any screws/bolts that are removed in a safe location such as a magnetic bowl.



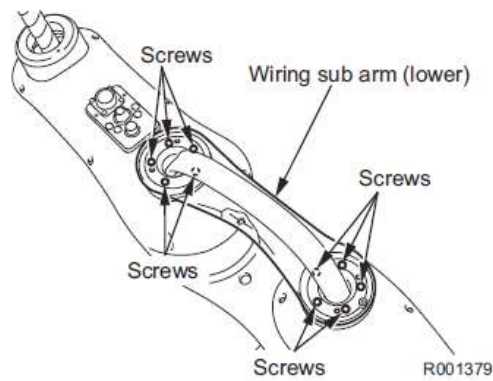
Step 3- Remove the two bolts holding the wiring harness saddle, and then remove the saddle and the silicon tape.



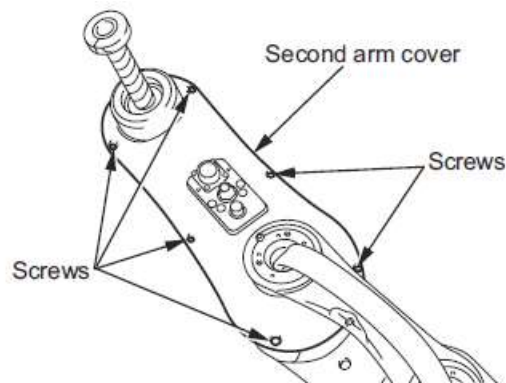
Step 4- Remove the four screws holding the wiring sub arm (upper), and then remove the wiring sub arm (upper).



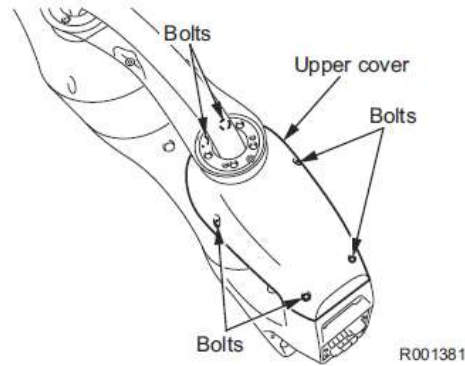
Step 5- Remove the ten screws holding the wiring sub arm (lower).



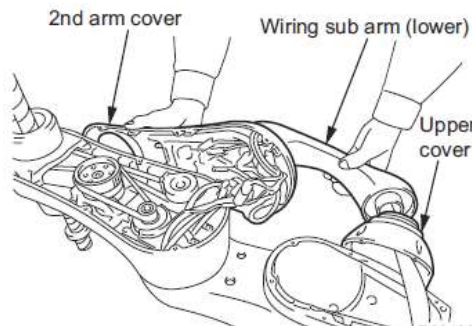
Step 6- Remove the six screws holding the 2nd arm cover.



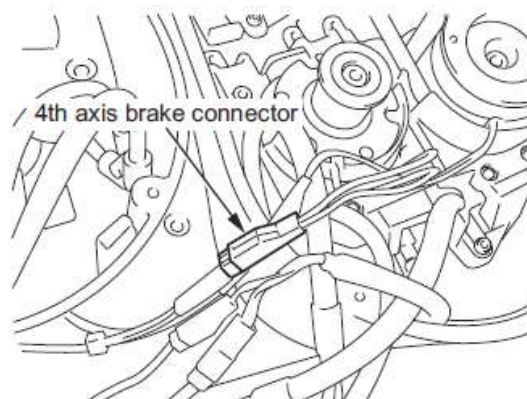
Step 7- Remove the six bolts holding the upper cover.



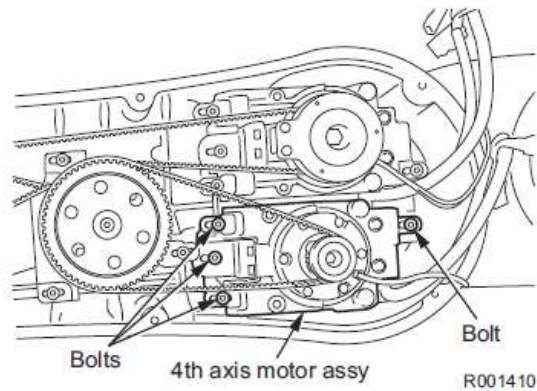
Step 8- Carefully remove the covers so that the 2nd arm assembly can be accessed. As you remove the covers take note of where the airlines and wiring are stored under the 2nd Arm Cover. ***Be sure to support these covers while work is being performed, too much stress on the wiring can cause breaks or damage to the wires.**



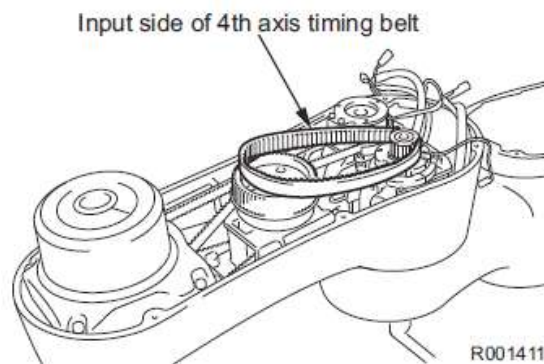
Step 9- Disconnect the 4th axis motor brake connector (black, 2-pin). ***Make note of where the wiring is stored within the housing so that once the work is complete the wiring can be secured in the correct/safe location.**



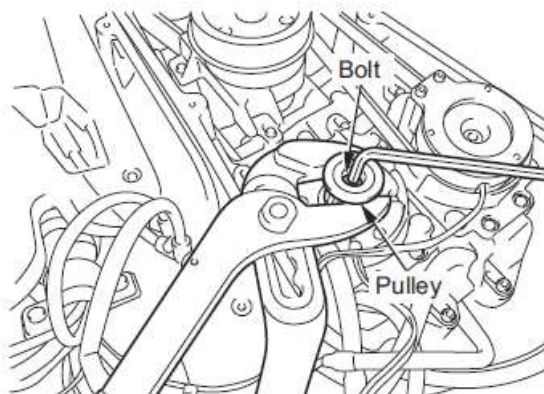
Step 10- Loosen the four bolts holding the 4th axis motor assy.



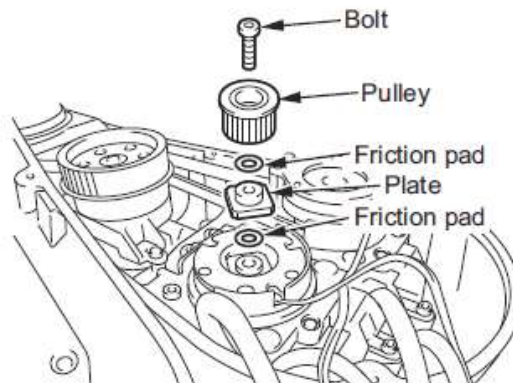
Step 11- Remove the input side of 4th axis timing belt.



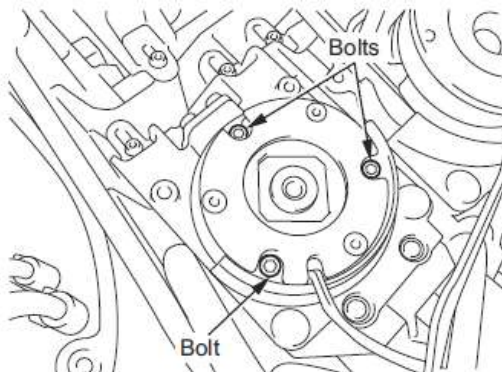
Step 12- Use pliers to hold the pulley while removing the center bolt. ***Be sure to use pliers with soft/plastic jaws to prevent damage to the pulley.**



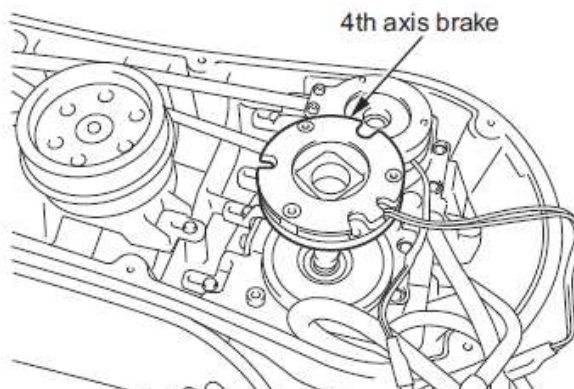
Step 13- Remove the pulley, the friction pad and the plate from the 4th motor assy.



Step 14- Remove the three bolts holding the 4th brake.

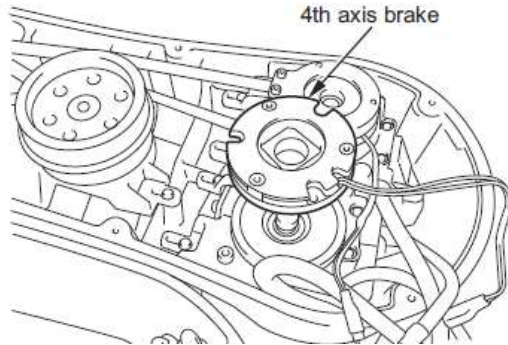


Step 15- Remove the 4th axis brake. Before installing the new brake clean any dust that may be present on or around the shaft.



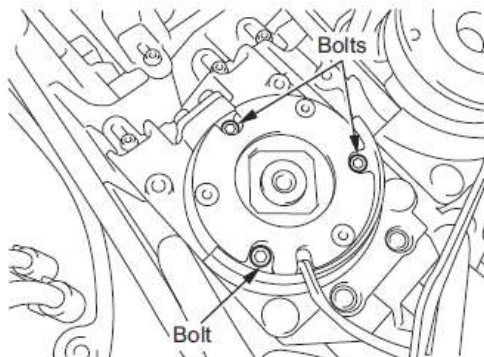
2.2 J4 Brake Reassembly

Step 1- Attach the new 4th axis brake. (Denso Part Number **410634-0190**)

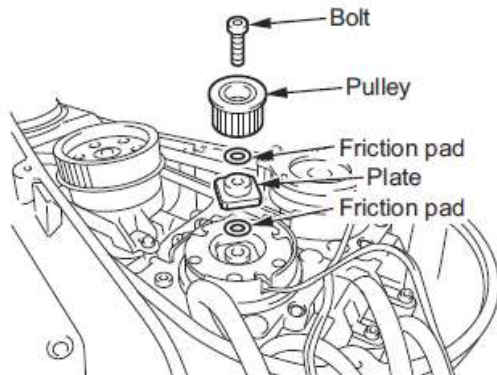


Step 2- Attach the three bolts (M3 x 10) holding the 4th brake.

Tightening torque of 4th axis brake fixing bolts:
 $1.0 \pm 0.4 \text{ Nm}$ ($20 \pm 4 \text{ kgf-cm}$)

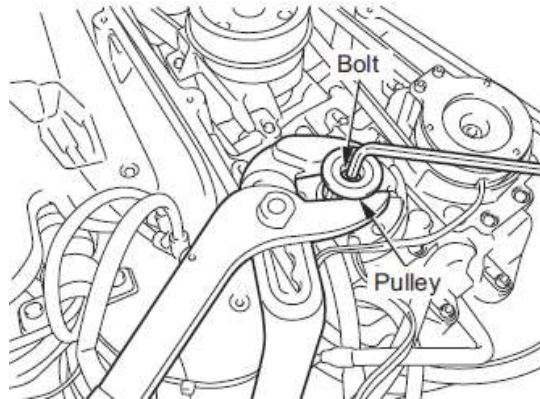


Step 3- Attach the pulley, the friction pads and the plate to the 4th motor assembly as pictured below.

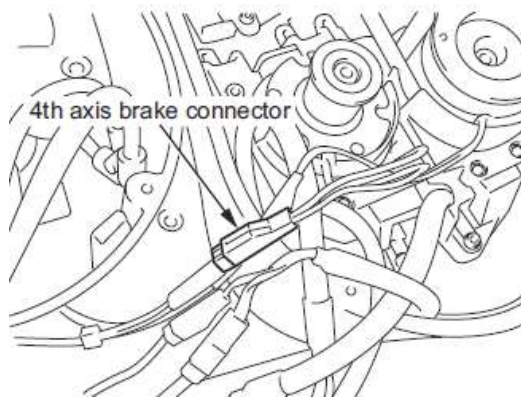


Step 4- Use pliers to hold the pulley while tightening the bolt (M5 x 18) holding the pulley.
 (1) Use the pliers with soft/plastic jaws. (2) Apply screw lock to the pulley fixing bolts.

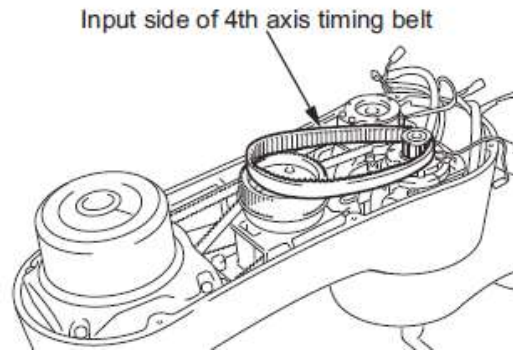
Tightening torque of pulley fixing bolts:
 $5.9 \pm 0.6 \text{ Nm}$ ($60 \pm 6 \text{ kgf}\cdot\text{cm}$)



Step 5- Connect the 4th axis brake connector (black, 2-pin). *Be sure to store the wiring in a safe/secure location as noted when the wiring was disconnected.



Step 6- Attach the input side of 4th axis timing belt.



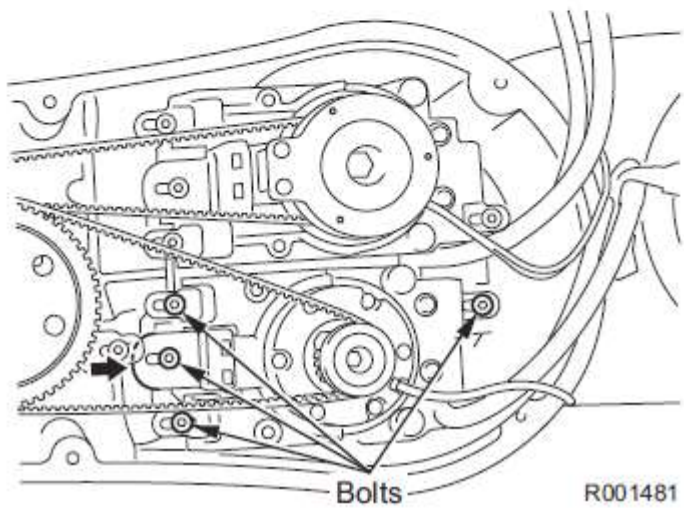
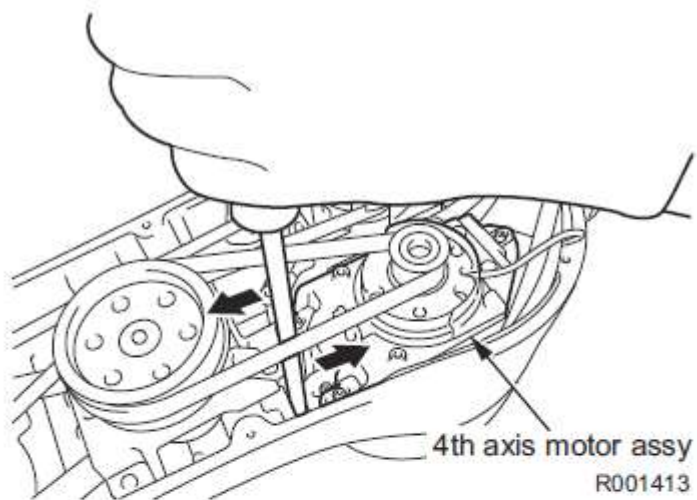
2.2.1 J4 Input Belt Tensioning

Step 7- Use a flat-head screwdriver to tension the belt to 188 Hz - 230 Hz. Tighten the four bolts (M3 x 8) holding the 4th axis motor assembly.

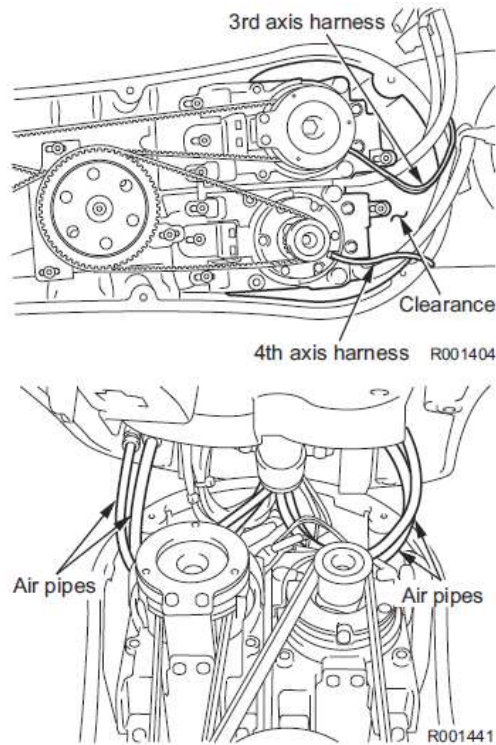
***Be careful not to over tighten the motor bolts.**

Timing belt tension specification:
188 Hz - 230 Hz

Tightening torque of 4th axis motor assy fixing bolts:
 $2.0 \pm 0.4 \text{ Nm}$ ($20 \pm 4 \text{ kgf}\cdot\text{cm}$)

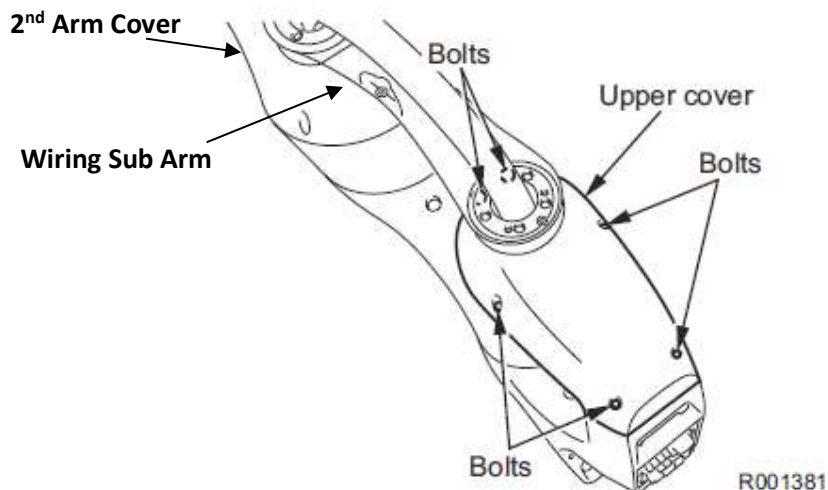


Step 8- Put the 3rd axis harness, 4th axis harness and air pipes into the open space/clearance as you replace the 2nd Arm Cover. ***Be careful that no wires or airlines are pinched.**



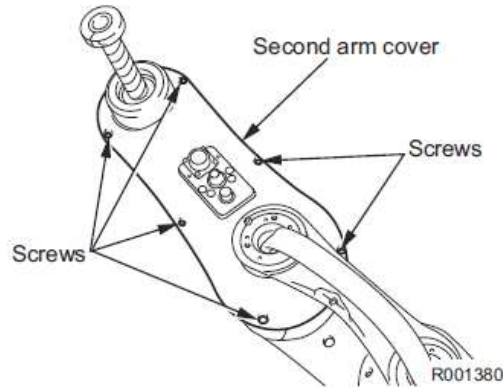
Step 9- Place the 2nd arm cover, the wiring sub arm (lower) and the upper cover, onto the robot and then tighten the six bolts (M3 x 8) holding the upper cover. ***Be sure that no wires or airlines are pinched.**

Tightening torque of upper cover fixing bolts:
 $1.6 \pm 0.32 \text{ Nm}$ ($16 \pm 32 \text{ kgf}\cdot\text{cm}$)



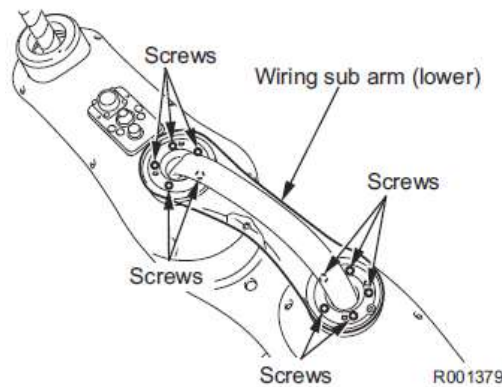
Step 10- Tighten the six screws (M3 x 8) holding the 2nd arm cover.

Tightening torque of the 2nd arm cover fixing screws:
 $0.59 \pm 0.12 \text{ Nm}$ ($6 \pm 1.2 \text{ kgf}\cdot\text{cm}$)



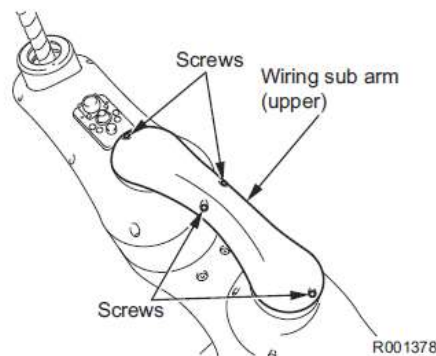
Step 11- Tighten the ten screws (M3 x 8) holding the wiring sub arm (lower).

Tightening torque of the wiring sub arm (lower) fixing screw:
 $0.59 \pm 0.12 \text{ Nm}$ ($6 \pm 1.2 \text{ kgf}\cdot\text{cm}$)



Step 12- Attach the wiring sub arm (upper), and then tighten the four screws (M3 x 8) holding the wiring sub arm (upper).

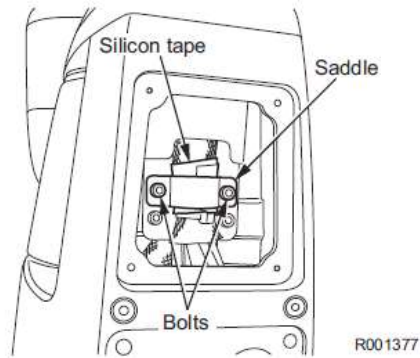
Tightening torque of the wiring sub arm (upper) fixing screws:
 $0.59 \pm 0.12 \text{ Nm}$ ($6 \pm 1.2 \text{ kgf}\cdot\text{cm}$)



Step 13- Wrap the guard net of the wiring harness with the silicon tape just above the wire tie as seen below, attach the saddle and tighten the two bolts (M4 x 8) holding the saddle. ***Apply medium strength Loc Tite to the saddle fixing bolts.**

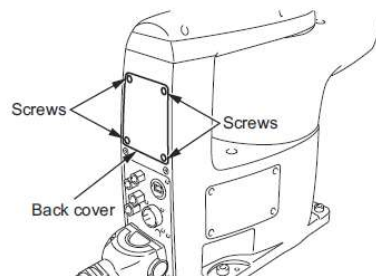
Tightening torque of saddle fixing bolts:

$2.9 \pm 0.58 \text{ Nm}$ ($30 \pm 6 \text{ kgf}\cdot\text{cm}$)

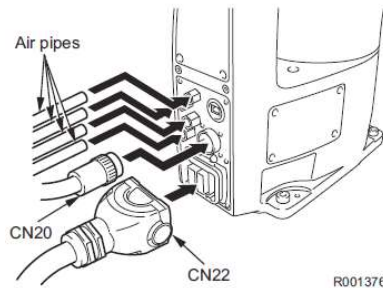


Step 14- Attach the back cover and then tighten the four screws (M3 x 8) holding the back cover.

Tightening torque of the back cover fixing screw:
 $0.59 \pm 0.12 \text{ Nm}$ ($6 \pm 1.2 \text{ kgf}\cdot\text{cm}$)



Step 15- Connect the cables (CN20, 22) and air pipes (AIR1, AIR2, AIR3 and AIR4) to the robot, and turn on power to the controller and peripheral devices (equipment) of robot, and air supply.



Step 16- Verify and or p erform the 3rd axis **and** 4th axis CALSET. Visit <https://www.densorobotics.com/knowledge-base/> for the HSR Calibration Video.