

Magnus VLF

Drum Balancer Upgrade

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Revision History

Revision	Date	Author	Comments
01	20 Dec 2004	G.Tang	Preliminary
A	14 Feb 2005	Andre Blignaut	Revised and updated procedures and photos

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OBJECTIVE

The drum balance assemblies have been redesigned to improve functionality and minimize balance weight binding. This procedure describes how to replace the balancers on the drum without removing the drum from the device engine. In summary, the drum is moved axially to one side of the engine creating enough space to replace the balancer on the other side of the drum. The drum is then moved axially to the opposite side of the engine to replace the other balancer.

Note: Extreme care must be taken during this procedure not to let the drum fall against the imaging head and damage it.

TOOLS REQUIRED

- Upgrade tool kit (Creo part number 514-00095A):
  - Drum supporting tool (92-0081A)
  - Gap adjustment tool for drum bearing preload springs (690-00482A)
  - Drum pin positioning tool – home side (690-00188A)
  - Drum vacuum tube removing tool (690-00475A)
  - Brecoflex to adjust belt tension (90-1062)
  - Drum zero position block (690-00477A)
  - Encoder shaft removal and install tool (55-1145 and 52-5068)
  - Encoder zero indicator (92-0147C)
  - Drum pin pusher (690-00356A)
  - Drum pin puller (690-00357A) with M6 x 40 shcs (2) and M5 x 65 shcs (2)
  - Backbone stabilizing endplate (690-00478A) with M8 x 20 shcs and M8 washers (2)
- Torque wrench (25 Nm) with 6 mm hex drive for M8 pillow block screws
- 6 mm Hex drive with minimum 150 mm extension for removing the drum motor assembly
- 1.5 mm non-ball tip hex key
- Vise grip pliers

Note: The tools shown in the photographs in this procedure may look different from the updated tools received in your toolkit.

MATERIALS REQUIRED

- Loctite® 242
- Loctite® 545
- O-ring grease

PARTS REQUIRED

- Upgrade kit (Creo part number 512-00216A):
  - Drum balance assembly (Creo part number 50-2529B)
  - Spare parts (two M3 set screws for encoder, two M6 x 18 hex-head screws)

REPLACING THE DRUM BALANCE ASSEMBLIES

Preparing the engine to move the drum

1. Move the thermal head to the center of the carriage tracks to minimize the risk of the drum being skewed and hitting the head.
2. Tilt the backbone to the unload position (up) to increase accessibility.
   Type `>>backbone horizontalunload`

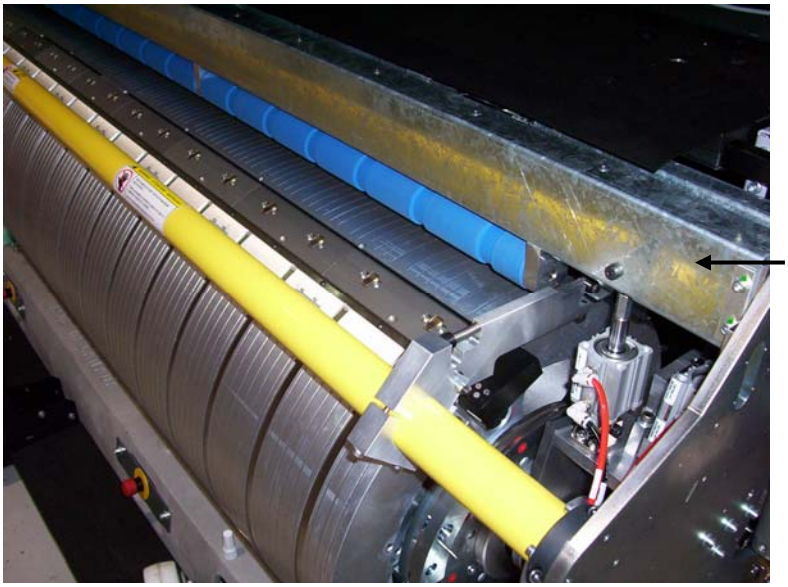


Figure 1: Backbone up

3. Turn the device power off and shut off the air supply.
4. Open the rear hood and remove the two rear side panels and the rear center panel.

On the away side of the device (drum pulley side):

5. Disconnect the unload table cylinder pivot. To remove the pivot, remove the rear rue pin on the pivot and pull the pivot out and away from the drum. This may require using a screwdriver to lever the cylinder up, relieving the load from the pivot.
   The cylinder is disconnected to provide clearance for the drum pin pusher tool in a later step.

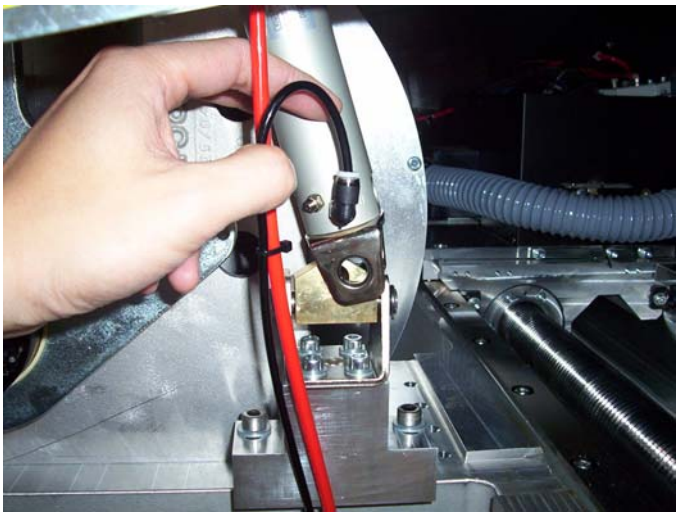


Figure 2: Unload table cylinder disconnected (home side shown)

6. Remove the collar clamp holding the drum vacuum tube coupling assembly to the drum pin. Remove the vacuum tube coupling assembly.

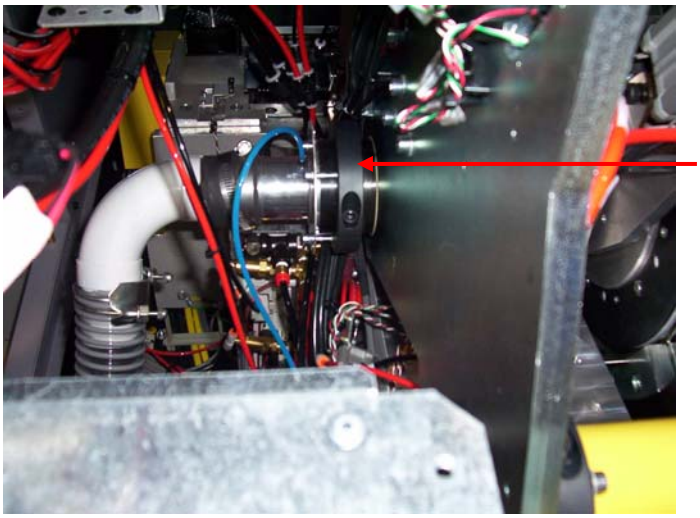


Figure 3: Vacuum tube coupling assembly

7. Using the drum vacuum tube removing tool, pull the vacuum tube out of the drum pin. The tool handle is turned to expand the tool to grip the vacuum tube.

Note: Do not turn the vacuum tube while pulling it out.

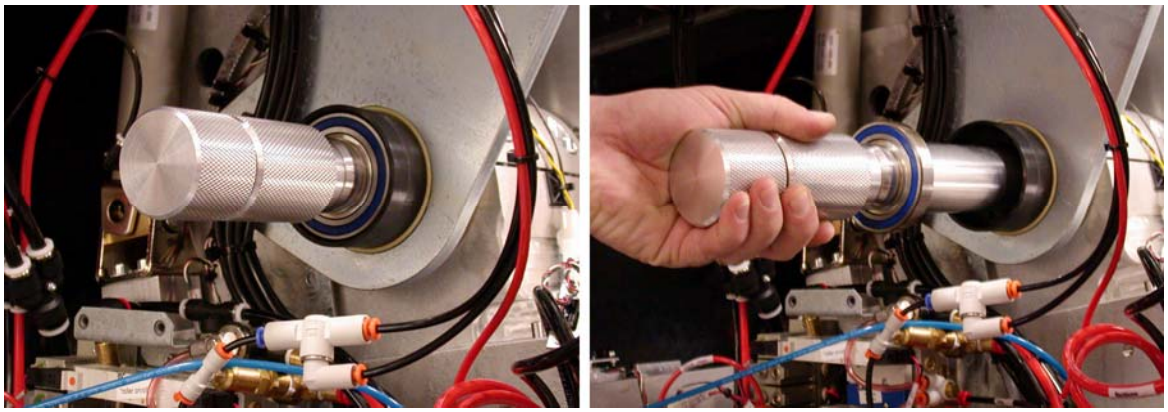


Figure 4: Removing the drum vacuum tube

8. Remove the balancer actuator—4 screws and the balancer actuator mounting plate—4 screws.
9. Remove the drum belt cover—3 screws.
10. Remove the cooling fan assembly—3 screws. Disconnect the electrical connector for the fan assembly to get the fan assembly out of the way.
11. Disconnect the two round connectors on the drum motor.
12. Loosen the drum motor jacking screw and the four motor bracket mounting screws to release the belt tension. Slide the drum belt off the drum pulley.

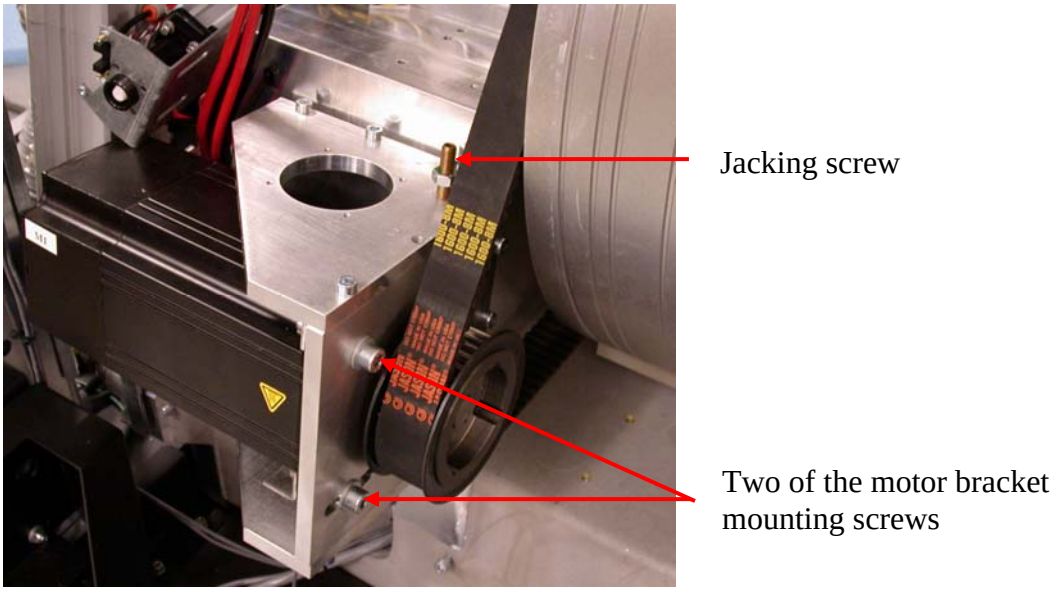


Figure 5: Drum motor assembly

13. With the bracket mounting screws loose, tilt the motor to get access to the four M8 screws that hold the motor bracket to the engine casting. Use a 6 mm hex drive with an extension or a T-handle hex key to access the screws.

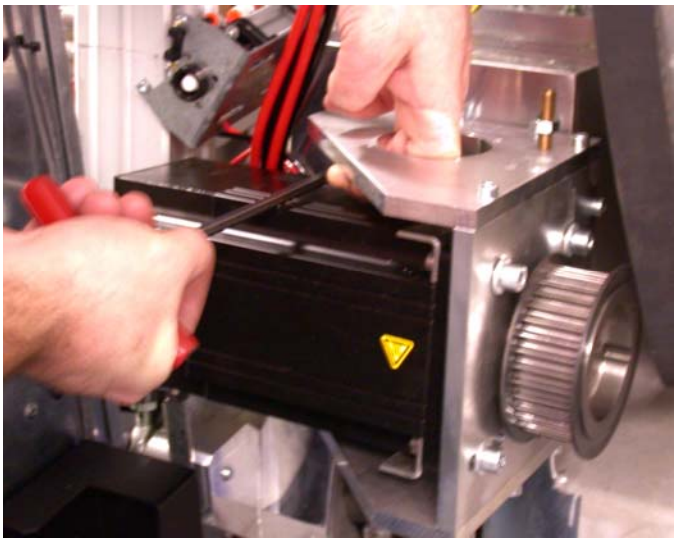
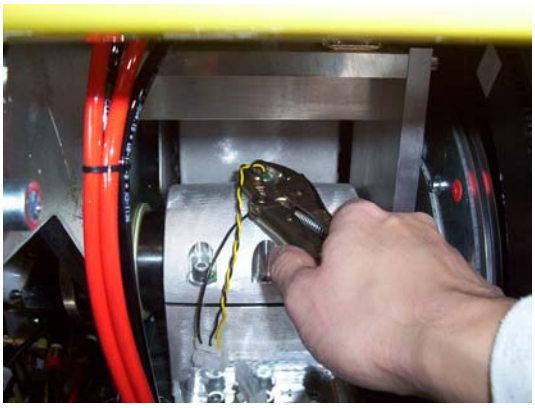


Figure 6: Removing the motor bracket to engine screws

14. Remove the thermocouple on the pillow block. In its place, install the backbone stabilizing endplate tool with an M8 x 20 screw.



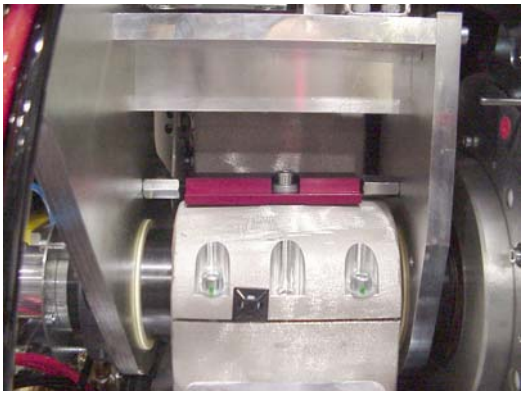


Figure 7: Installing the backbone stabilizing endplate tool

15. On the drum balancer, slide the two balance weights together. Remove the six M6 screws that secure the balancer to the drum. Rotate the drum to get access to the screws.

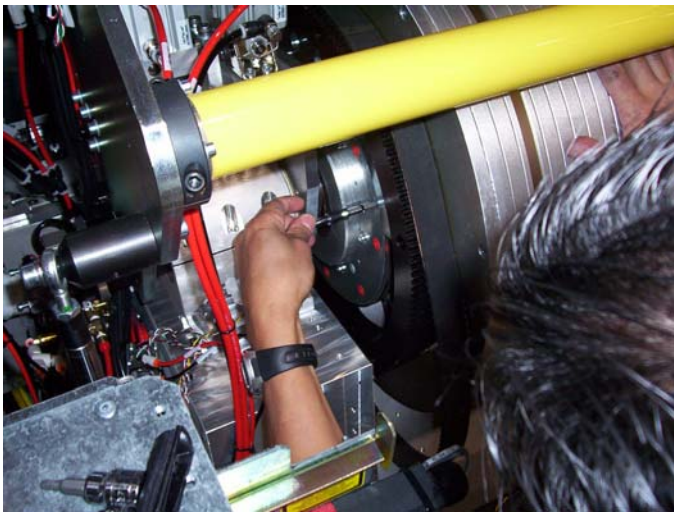


Figure 8: Removing balancer securing screws

On the home side of the device (encoder side):

16. Disconnect the unload table cylinder pivot (see step 5).

17. Remove the balancer actuator and the flyoff sensor mounting plate—4 screws each.

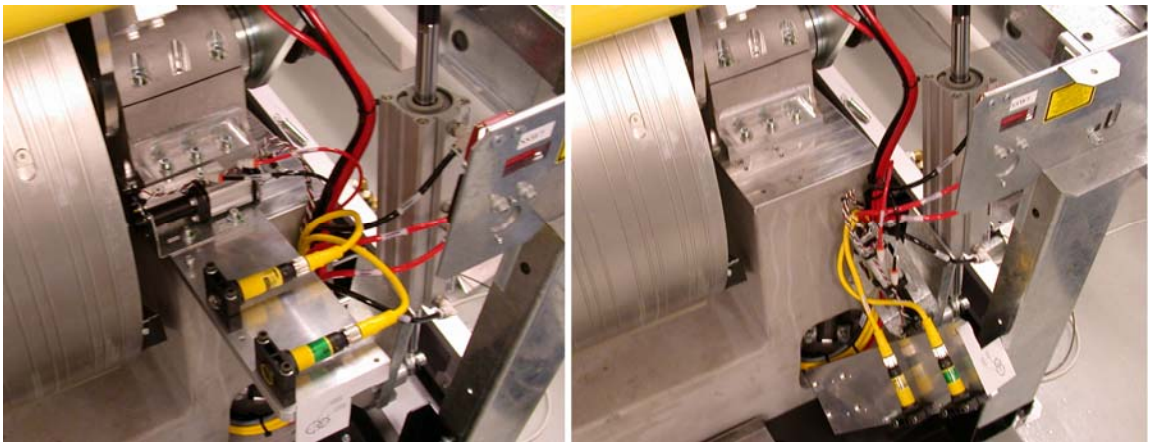


Figure 9: Balance actuator and mounting plate disconnected (right)

18. To prevent the drum from rotating when removing the encoder shaft, place a drum supporting tool under the drum. Push the tool in under the home side of the drum and screw the jacking screw down until the tool is tight against the drum.

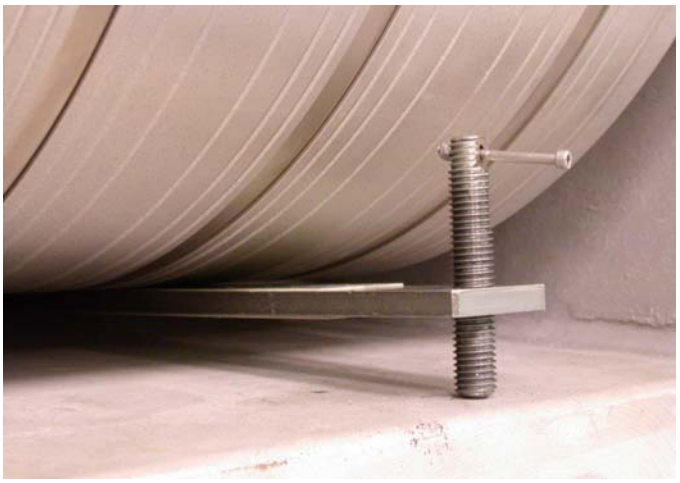


Figure 10: Drum supporting tool

19. Remove the encoder dampening collar—2 screws. Remove the encoder by loosening the two set screws (use the1.5 mm non-ball tip hex key) and remove the two mounting screws holding the encoder onto the drum pin.

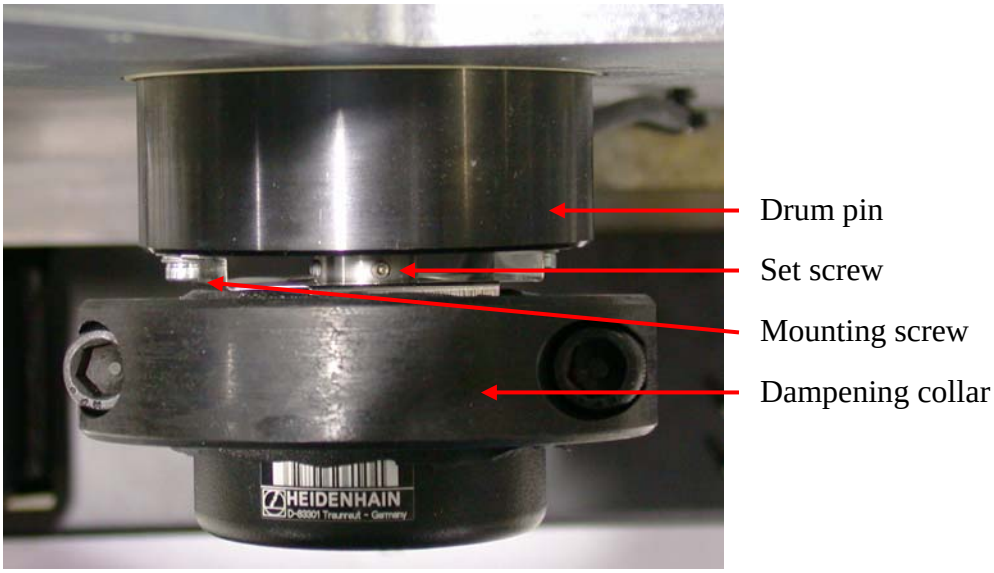


Figure 11: Encoder

Note: The set screws are easily damaged. If one or both are damaged, replace them with the new setscrews from the parts kit.

20. Attach the encoder shaft installation/removal tool's coupling end to the encoder shaft—the tool consists of a 12 mm coupling and a shoulder bolt. Unscrew the shaft from the drum and pull the shaft out.

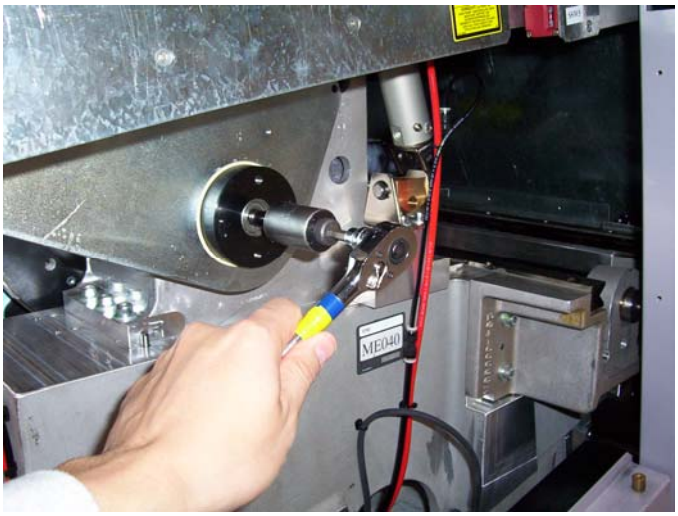


Figure 12: Removing the encoder shaft

21. Remove the drum supporting tool.

22. On the drum balancer, slide the two balance weights together. Remove the six M6 screws that secure the balancer to the drum. Rotate the drum to get access to the screws.

23. To minimize the risk of the leading edge clamps (LECs) hitting the thermal head if the drum should move off its axis, rotate the drum so that the drum lock bracket is positioned as shown in the photo below. This drum position also allows maximum clearance for removing the home side balancer.

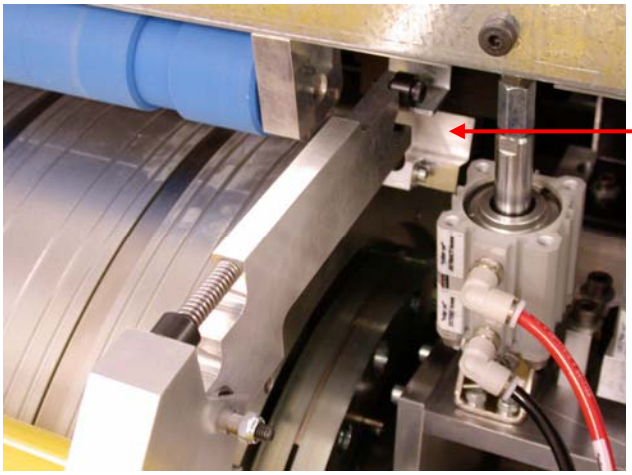


Figure 13: Drum position

On both sides of the device:

24. Support the drum with the drum supporting tools. See Figure 10.

25. Put pieces of foam between the drum and the engine casting to prevent the drum from moving towards the head.

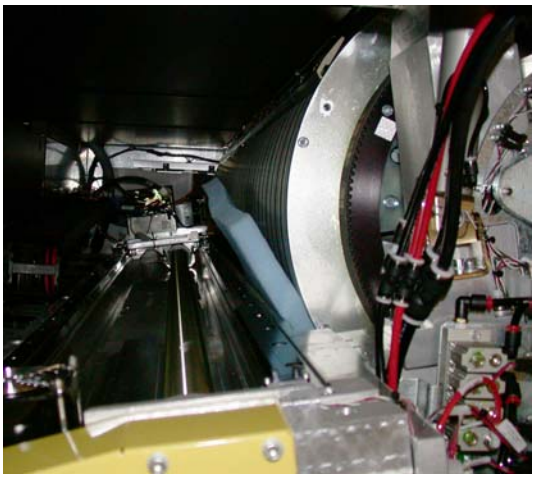


Figure 14: Inserting protection foam

Replacing the home side balancer

Note: For 5183 drums, see Addendum for 5183 Drums.

The drum is moved axially to the away side to replace the home side balancer. To do this:

1. On the away side balancer, position the two balance weights so that the sensor dowel pins will be clear of the engine casting and pillow block when the drum is moved. It may help to temporarily fasten the balancer to the drum with one M6 screw.

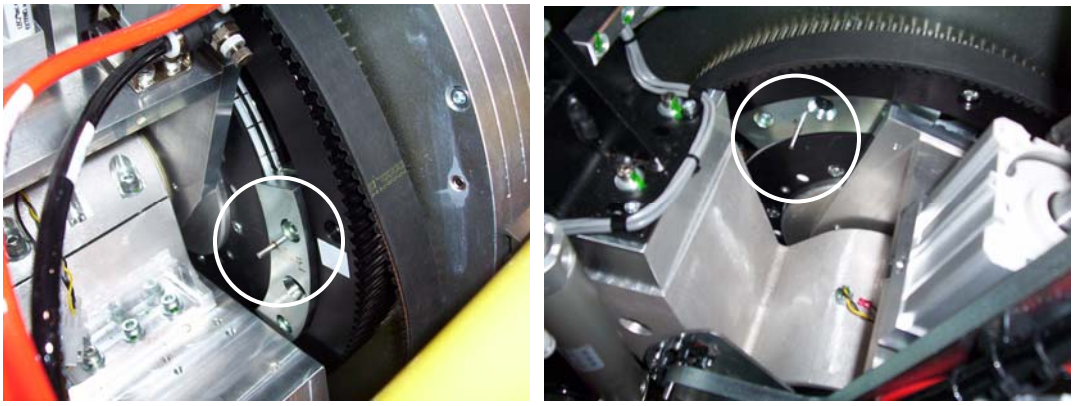


Figure 15: Away side sensor dowel pin positions

2. Position the two balancer masses on the home side so that they are touching each other and facing toward the back of the machine.

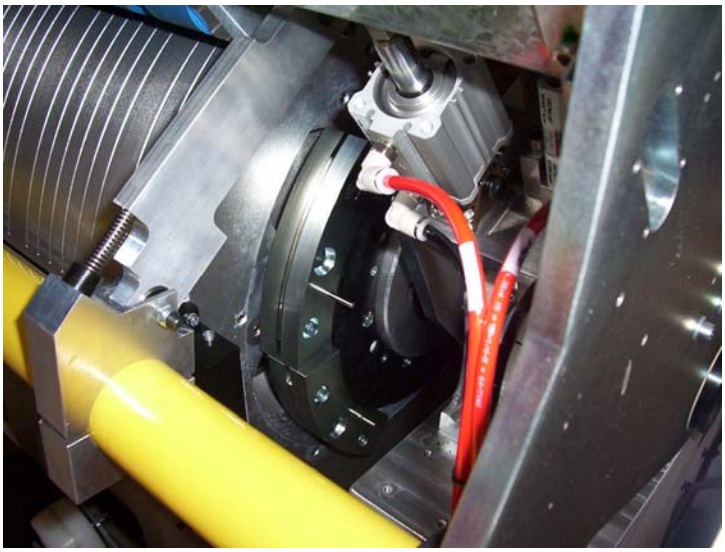


Figure 16: Home side sensor dowel pin positions

3. Loosen the two M8 screws on the home and away side pillow blocks—the pillow blocks provide the clamping force that holds the drum pins in place. Use one of the M8 screws on each of the pillow blocks to jack open the clamping area.

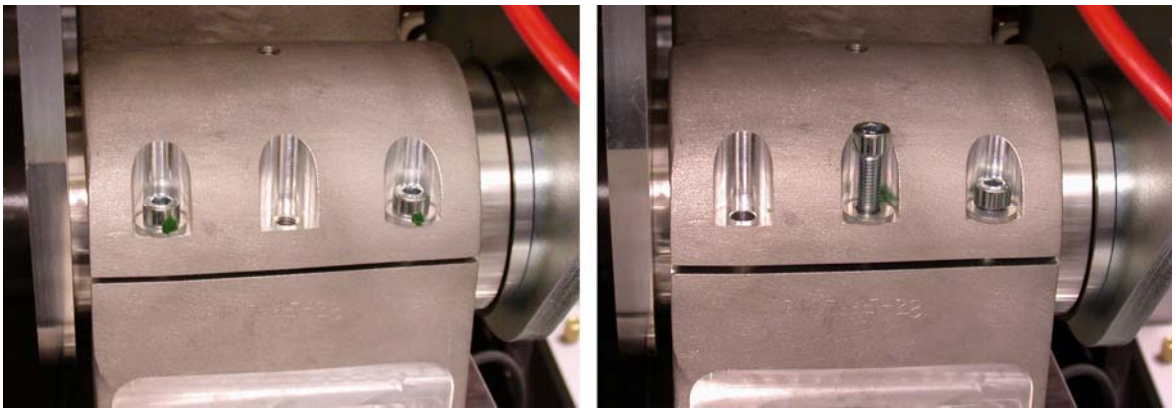


Figure 17: Opening the pillow block clamps

4. Adjust the loading on the home side drum support tool so that the drum pin can be turned—temporarily attach the drum pin puller tool to the drum pin to assist rotating the pin if you cannot turn it by hand (see Figure 19).

5. Install the drum pin cap and pusher tool on the home side. Ensure that the tab and the washer on the tool are positioned such that it has a good hold on the pillow block.

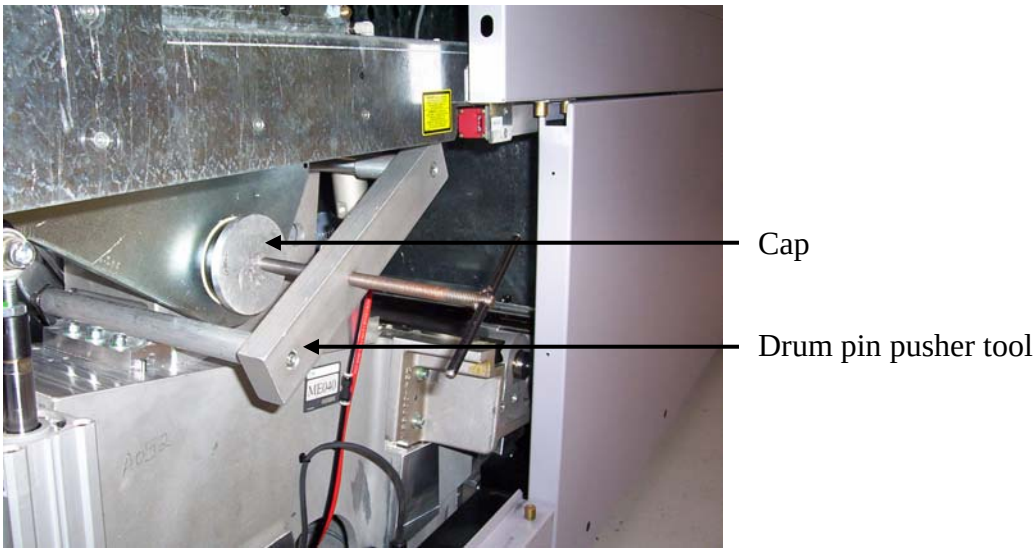


Figure 18: Installing the drum pin pusher tool

6. Using the pusher tool, slowly push the drum toward the away side until the belt pulley is almost contacting the casting. If the drum does not move easily, check the loading on the drum support tools.

7. Remove the drum pin pusher tool and install the drum pin puller tool. The tool is fastened to the home side drum pin with two M6 x 40 screws. Position the tool so that the jacking screws contact the pillow block.



Figure 19: Installing the drum pin puller tool

8. Using the puller tool, pull the drum pin out of the drum bearings until the end of the pin is flush with the inside plate of the main arm. This will provide sufficient gap for the balancer to be removed.

Note: Because one end of the drum is only supported by the drum support tool, be careful not to bump the drum causing it to move towards the imaging head.

9. Slide the home side balancer off the drum end bell and remove it.



Figure 20: Removing the home side balancer

Note: For machines MT006, MT007, and MT008, check that 6 of the 12.7mm clearance bores are machined correctly according to drawings 252-04229B-A and 57-9334B-A for 5183 machines, and 252-00105B-A and 252-04239B-A for 6383 machines. See revision note 1 in Figure 21. The angular positions of the 12.7mm clearance bores are typical on all end bells. The 6 bores which line up with the PEM nuts on the balancers will be correct. The remaining 6 bores should line up with the button head screws on the balancers. The button head screws retain the springs which provide the force on the balancer pressure plate. When the balancer assembly wears, the button head screws will contact the end bell and may cause the balancer weights to move too freely. To correct the problem, the balancer will have to be spaced away from the end bell. Use adhesive tape or glue to hold six M6 heavy washers between the end bell and the new balancer before putting in the M6 fasteners.

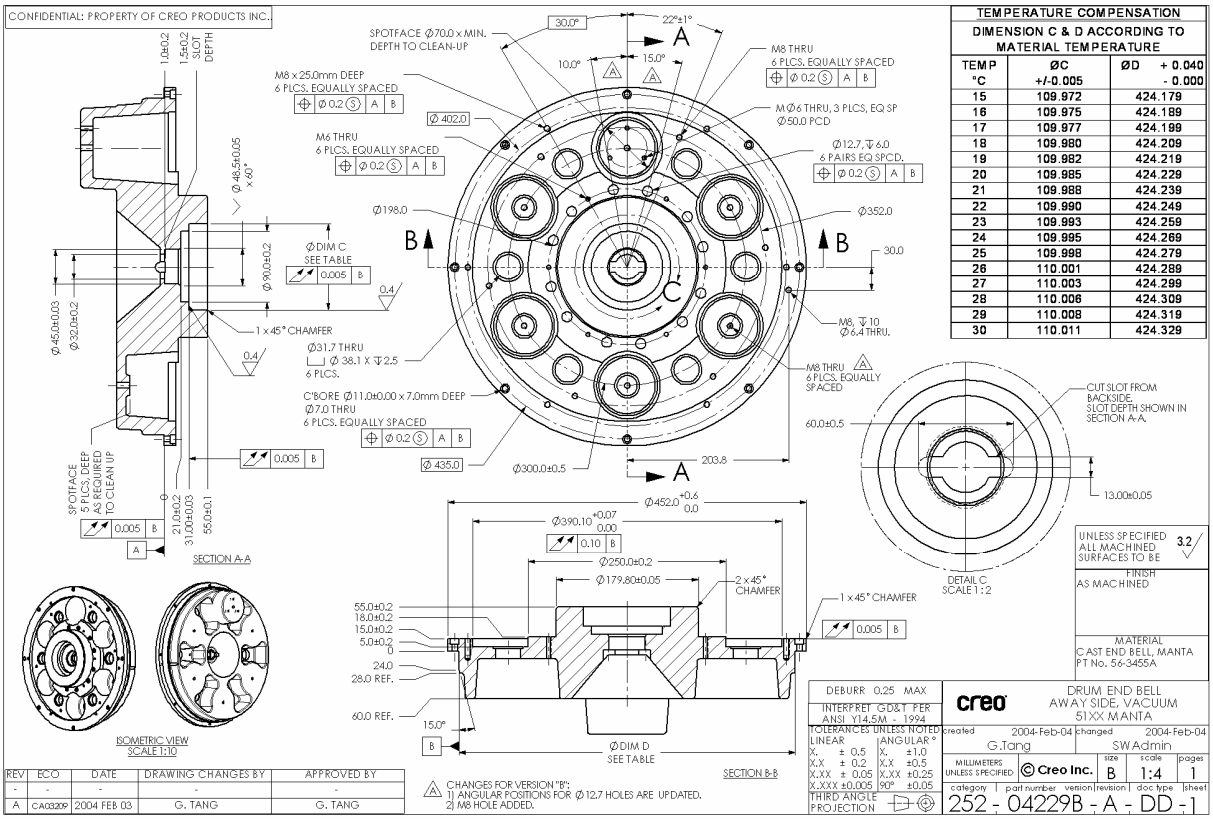


Figure 21: Away side drum end bell

10. On the new balancer, slide the two balance weights together and install the new balancer on the drum end bell.

11. Position the balance weights so that the sensor dowel pins will clear the engine casting and pillow block when the drum is moved to the home side. Temporarily fasten the balancer to the end bell with one M6 screw.

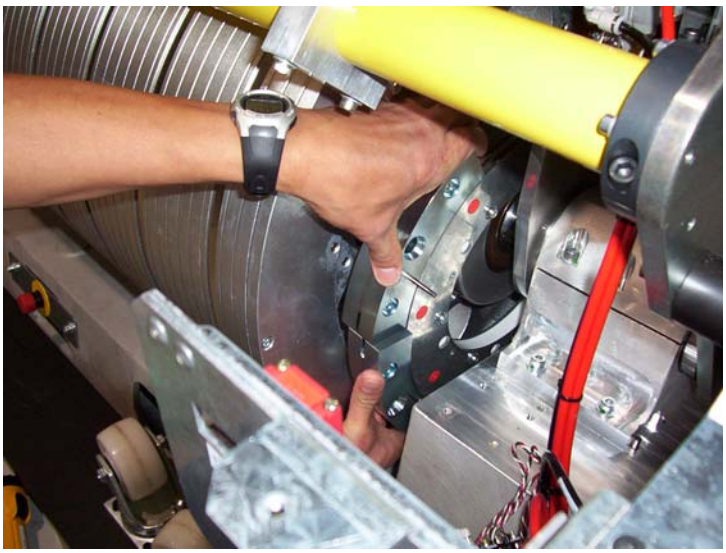


Figure 22: Installing the new balancer

12. Install the drum pin cap and pusher tool and push the drum pin back into the drum bearing. You may need to adjust the home side drum support tool to align the drum pin and bearing.

Replacing the away side balancer

Note: For 5183 drums, see Addendum for 5183 Drums.

1. Remove the drum pin cap and pusher tool from the home side and install them on the away side. Ensure that the tab and the washer on the tool are positioned such that it has a good hold on the pillow block when installed.

2. Using the pusher tool, slowly move the drum towards the home side until the home side end bell is almost contacting the inside plate of the main arm. If the drum does not move easily, check the load on the drum support tools.

3. Remove the drum pin pusher tool and install the drum pin puller tool. The tool is fastened to the away side drum pin with two M5 x 65 screws. Position the tool so that the jacking screws contact the pillow block.

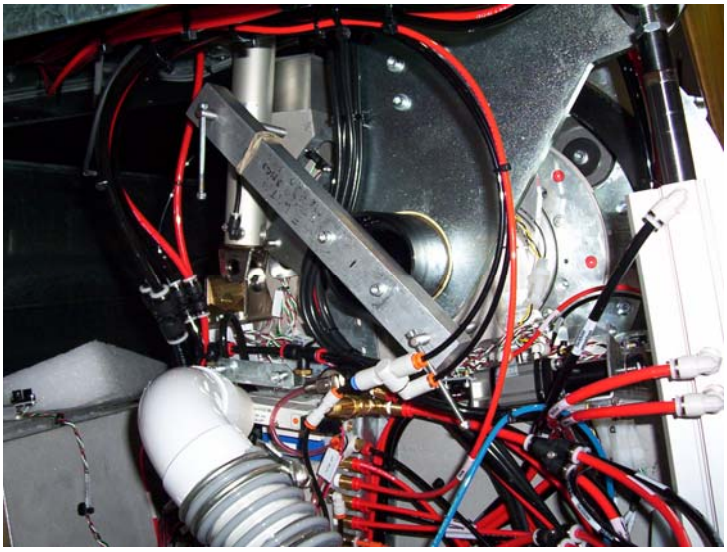


Figure 23: Drum pin puller tool on away side

4. Using the puller tool, pull the drum pin out of the drum bearings until the end of the pin is flush with the inside plate of the main arm. This will provide sufficient gap for the balancer to be removed.

Note: There are three bearing preload springs on the drum pin. Be careful not to lose the springs.

Note: Because one end of the drum is only supported by the drum support tool, be careful not to bump the drum causing it to move towards the imaging head.

5. Position the away side balance weights so that they are facing towards the back of the machine. For maximum clearance when removing the away side balancer, stagger the

balance weights so that the bottom weight is closest to the drum (see Figure 24). This will particularly help on the 5183 drums.

6. Slide the away side balancer off the drum end bell and remove it.



Figure 24: Removing the away side balancer

7. On the new balancer, slide the two balance weights together with the same stagger as the one removed. Install the new balancer on the drum end bell.

8. Install the drum pin cap and pusher tool and push the drum pin back into the drum bearing. Ensure that the three compression springs are on the drum pin before it enters the drum bearing—the spring overlaps must be staggered. You may need to adjust the away side drum support tool to align the drum pin and bearing.
Remove the drum pin pusher tool.

9. On the home side, install the drum positioning tool. Rotate the tool so that the stopper lines up with the machined surface on the pillow block.

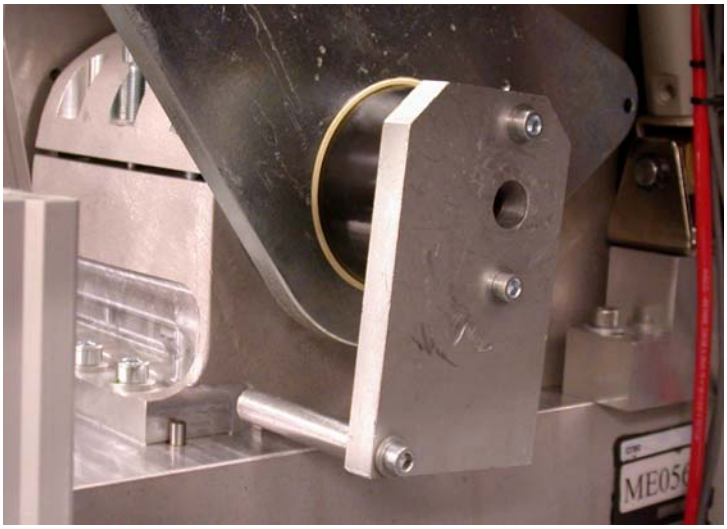


Figure 25: Drum positioning tool

10. Install the drum pin pusher tool and move the drum to the away side until the positioning tool's stopper is against the pillow block.

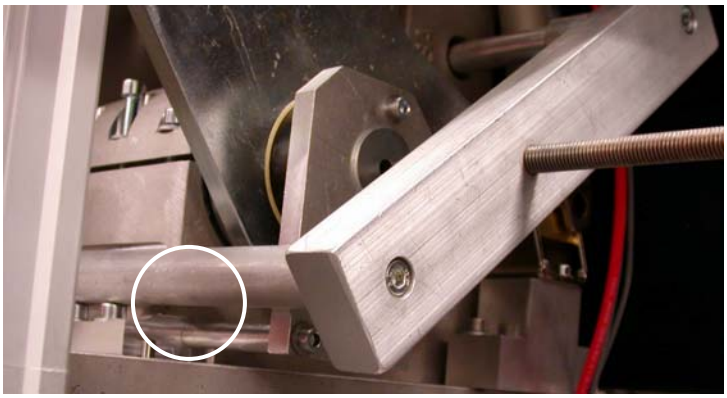


Figure 26: Setting the drum position

11. On the home side pillow block, return the one M8 screw to its original position and tighten the screws to 25 Nm.

12. Remove the drum pin pusher tool and the drum positioning tool.

13. On the away side, use the 4.3 mm gap adjustment tool to adjust the gap at the bearing preload springs. If the gap is too small, use the pusher tool to adjust the gap—if the gap is too big, use the puller tool to adjust the gap.

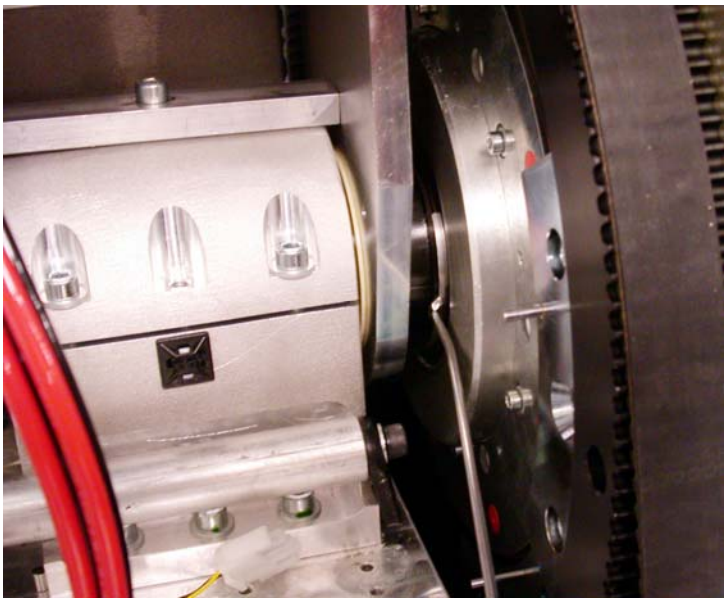


Figure 27: Adjusting the bearing preload springs gap

14. On the away side pillow block, return the one M8 screw to its original position and tighten the screws to 25 Nm.

15. Remove the drum support tools and the foam supports.

Reassembly

On the away side of the device:

1. Apply Loctite 545 to the M6 balancer mounting screws and fasten the balancer to the drum end bell.
2. Remove the stabilizing endplate tool and install the thermocouple back to its original position.
3. Apply O-ring grease to the vacuum tube O-ring and insert the vacuum tube into the drum pin. The tabs on the vacuum tube must be aligned with the slots in the drum end bell.

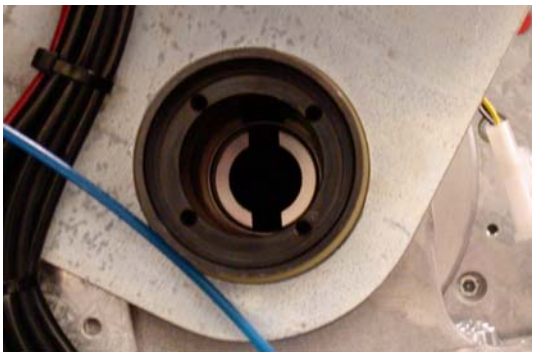


Figure 28: Vacuum tube slots

4. Install the drum vacuum coupling and collar. The collar must be approximately 1 mm from the engine casting.
5. Apply Loctite 242 to the bolts and install the drum motor assembly. The motor bracket must butt up against the pins on the engine casting. Before tightening the bolts, slide the drum belt over the drum belt pulley.

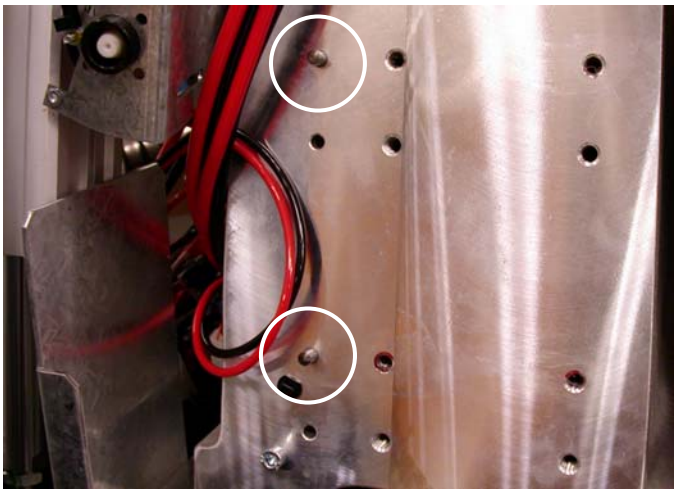


Figure 29: Drum motor bracket alignment pins

6. Using a BrecoFlex, adjust the belt tension to:
   60 to 64 Hz for a 6383 size drum
   47 to 51 Hz for a 5183 size drum
7. Connect the two drum motor connectors.
8. Install the cooling fan assembly and connect its electrical connector.
9. Install the drum belt cover.
10. Install the balancer actuator. Set the gap between the sensor dowel pins and the sensor mounting plate to 2 mm (see Figure 31).
11. Connect the unload table cylinder pivot and insert the rear rue pin to lock it in place.

On the home side of the device:

12. Apply Loctite 545 to the M6 balancer mounting screws and fasten the balancer to the drum end bell.
13. Apply Loctite 242 to the encoder shaft threads and screw the shaft into the drum pin. With the encoder shaft installation/removal tool still attached, torque the shaft to 12 Nm. Remove the installation/removal tool.
14. Place the drum zero position block on the carriage track and rotate the drum until the LECs are resting on the block

Note: The block must be in the upright orientation for all drum sizes. Make sure that the bottom of the block is sitting flat on the carriage track.

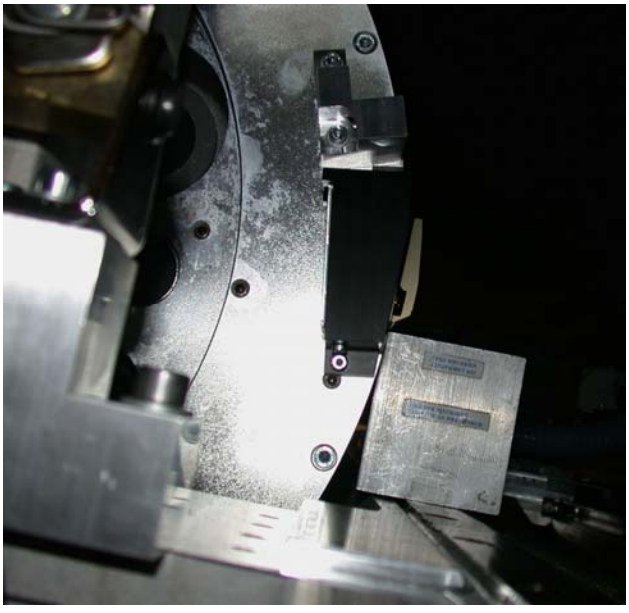


Figure 30: Drum zero position block

15. Prevent the drum from rotating with one of the drum support tools (see Figure 10).
16. Connect the encoder to the encoder alignment tool and turn the tool on.

17. To find the encoder index position, rotate the encoder shaft until both green lights on the alignment tool light up—the buzzer will also sound.
18. Carefully mount the encoder on the encoder shaft while keeping the encoder in the index position (green LEDs and buzzer should stay on). The slots in the encoder brackets should be centered over the holes in the drum pin and the encoder cable should point down.
19. Using the 1.5 mm non-ball tip hex key, tighten the two set screws to secure the encoder to the encoder shaft.
20. Apply Loctite 242 to the encoder mounting screws and secure the encoder brackets to the drum pin. Do not tighten the screws yet.
21. Rotate the encoder until both green LEDs are lit on the alignment tool and tighten the two screws.
22. Remove the drum support tool and the drum zero position block.
23. Apply Loctite 242 to the dampening collar screws and install the collar over the encoder.
24. Connect the unload table cylinder pivot and insert the rear rue pin to lock it in place.
25. Install the flyoff sensor mounting plate.
26. Install the balancer actuator. Set the gap between the sensor dowel pins and the sensor mounting plate to 2 mm.

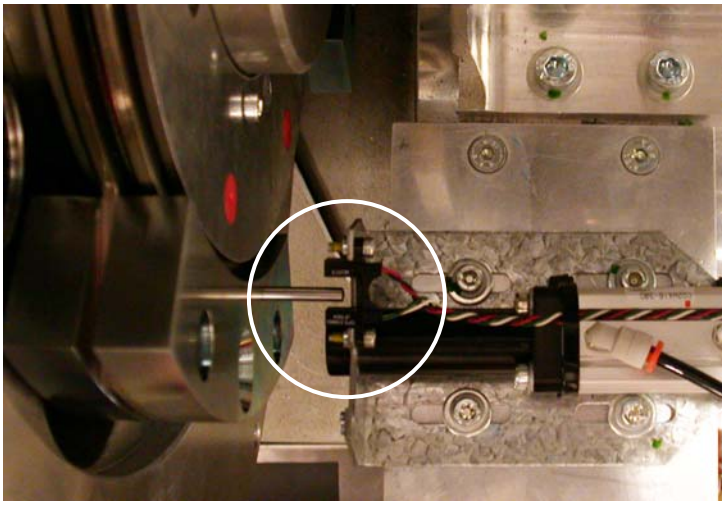


Figure 31: Balance actuator gap

27. Check the axial movement of trailing edge clamp (TEC) backbone—it should be 0 to 0.5 mm.

Power on and final adjustments

1. Install the two side panels and the rear panel. Do not close the rear hood yet.
2. Turn on the device power and air supply.

To align the flyoff sensor circuit:

3. Remove the laser target from the bracket on the home side and mount it in front of the flyoff mirror on the away side so that it is facing the flyoff transmitter and receiver.

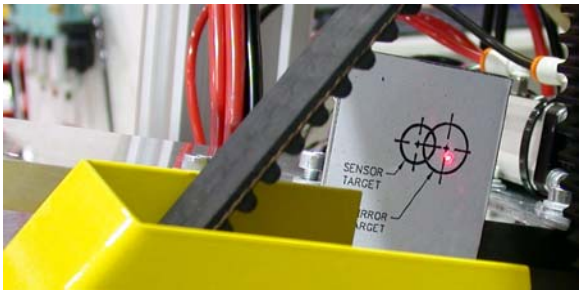


Figure 32: Flyoff transmitter adjustment

4. Loosen the clamp bracket screws on the flyoff transmitter (the one closest to the device) and adjust the transmitter so that the laser is in the middle of the large circle (mirror target). Tighten the clamp bracket screws and ensure that the laser is still on target.
5. Remove the target from the away side and mount it on the flyoff sensor bracket in front of the receiver so that it is facing the flyoff mirror.

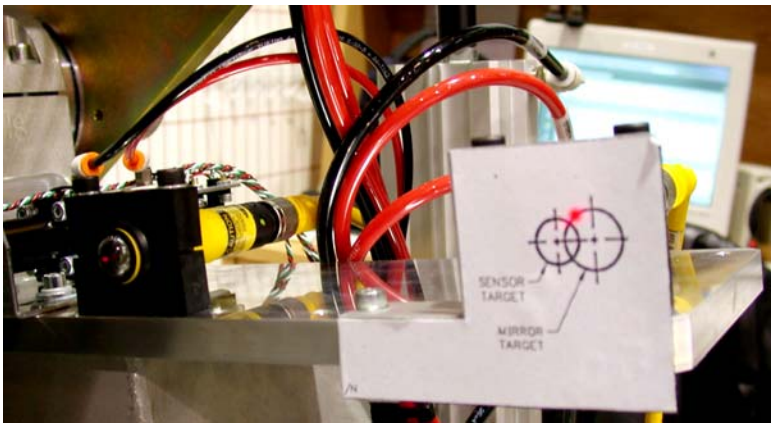


Figure 33: Flyoff mirror adjustment

6. Remove the flyoff mirror cover and adjust the flyoff mirror so that the laser is reflected onto the target and is in the middle of the small circle (sensor target). Adjustments are made with the two knurled wheels on the rear of the mirror. Lock the adjustment wheels and ensure that the laser is still on target.

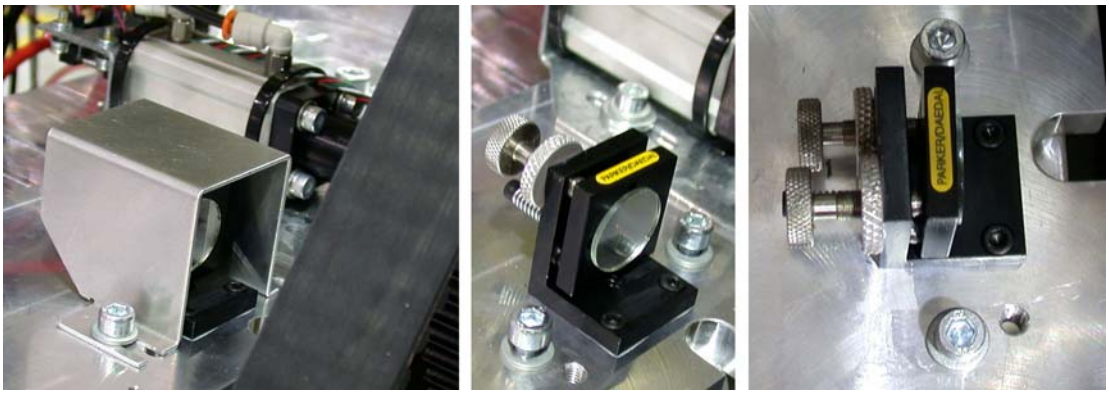


Figure 34: Flyoff sensor mirror

7. Install the flyoff mirror cover.
8. Remove the laser target from the bracket.
9. Loosen the clamp bracket screws on the flyoff receiver and adjust it until both LEDs on the receiver are on—this indicates that the flyoff sensor circuit is working (the receiver sensor must always be parallel with the edge of the mounting bracket). Tighten the clamp bracket screws and ensure that both LEDs are still on.

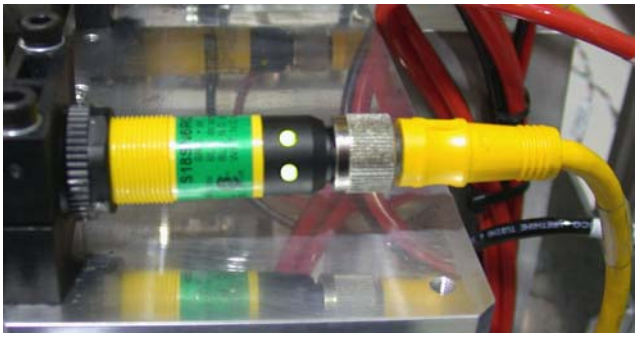


Figure 35: Flyoff sensor receiver

10. Attach the laser target to the end of the flyoff sensor bracket for storage.

To check the drum position:

11. Type
    `>>backbone horizontalload` to move the backbone to the load position (down)
    `>>drum move 97` to position the drum to 97°
    `>>flyoff clear` to prevent errors from tripping the flyoff sensor
    `>>lec on`
12. Check that the torsion bar is not vibrating.
13. Type `>>drum` to measure the drum position. The reading should be between 97.0° to 97.1°. If the drum position is not within the specified range, adjust the two bolts on the home side torsion bar bracket until the drum position is correct.

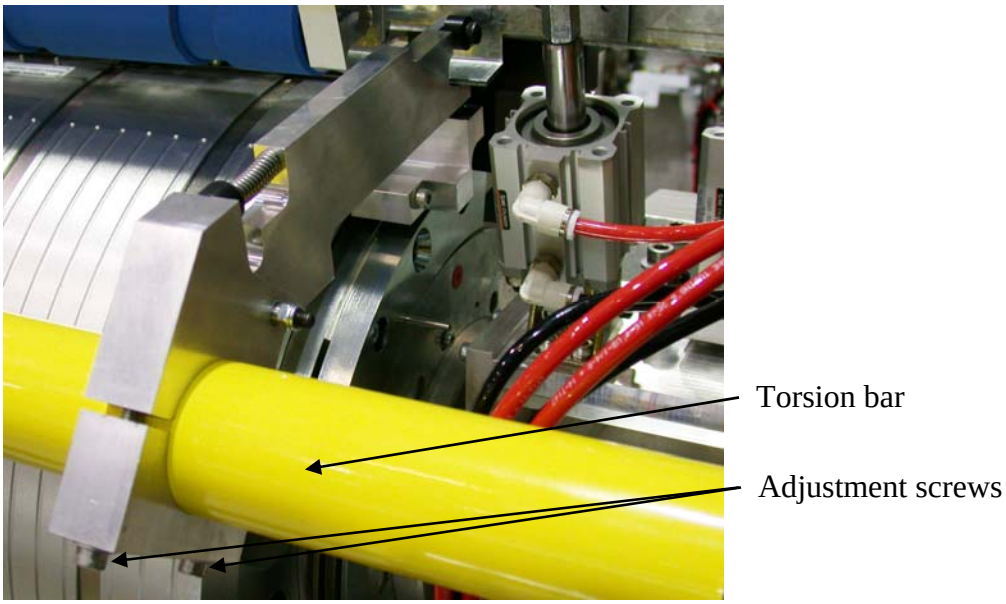


Figure 36: Drum position adjustment

14. Close the rear hood.

Addendum for 5183 Drums

If the device you are upgrading has a 5183 drum and the bottom screws (see Figure 37) are M6 socket cap screws, they will prevent the drum from moving far enough to remove the balance assembly on the opposite side of the drum. The socket cap screws must be replaced with M6 x 18 hex head screws (300-00246) to allow for more drum movement.

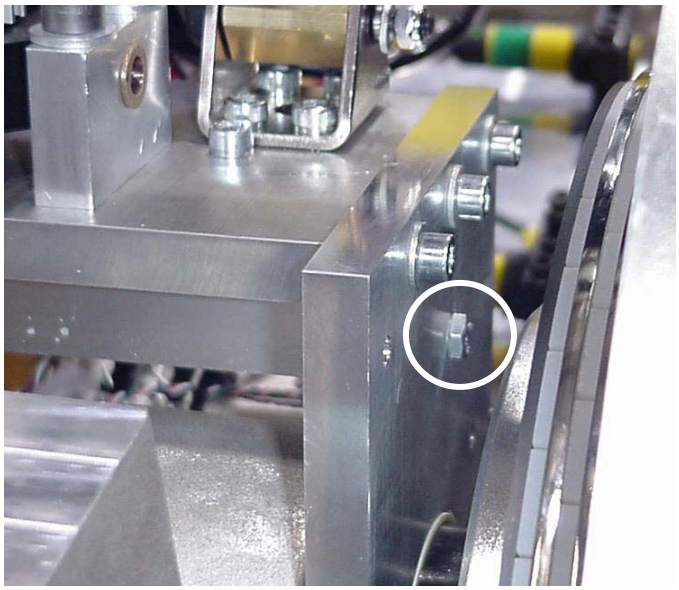


Figure 37: Hex head replacement for 5183 drums

1. Move the drum to the away side and replace the home side screw.
2. Move the drum to the home side and replace the away side screw.