

BG-04: Troubleshoot/Repair Counterbalance or Counterweight System

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- The machine must be locked and tagged when replacing components and when removing the cylinder or cribbing the head or counterweight.
- The floor area may be slippery due to hydraulic oil and coolant. Move carefully to avoid injury from falls.
- Follow all recommended safe practices when operating a hoist. Check for overhead clearance.
- You will be working in the area inside the column; this area is dimly lit. Use a flashlight to provide adequate lighting.

EQUIPMENT

- flashlight
- replacement chain and rollers
- replacement cylinder
- needle nose pliers
- channel locks
- hoist
- cribbing
- linear measuring device

RESOURCES

- G & L General Instructions and Repair Parts Manual



Part 1: Troubleshoot Counterbalance

1. Ask the Operator for their observations about the problem.

- Listen for problems related to the counterbalance system such as:
 - a. the motor kicking out when the head goes up for a tool change or to home position.
 - b. excessive chain noise.
 - c. noise in the area around the rollers.
 - d. chain slippage.

2. Inspect the counterbalance chain components and perform the corrective actions.

- Use only specified parts when replacing counterbalance system components.
- Refer to the table on the next page for machine symptoms associated with defective counterbalance components.





Symptom	Possible Problem	Recommended Action
Fault message; motor pulling high amps; or Z-axis movement stops during travel	Chain stretch	Check for chain slack: <ol style="list-style-type: none"> 1. Move the head to the home position, then check the chain for slack. If slack is observed, check the work history to see how many times a chain length adjustment has been made at the eye bolt. 2. If two or more adjustments have been documented, replace the chain. See Part 2: Replace Counterbalance Chain and Rollers. 3. If less than two adjustments have been documented, adjust chain tension at the eye bolt. Tighten until no slack is visible.
	Worn or locked up bearings	Replace roller assembly.
	No lubrication flow to Z-axis ways	Troubleshoot the Trabon circuit: <ol style="list-style-type: none"> 1. Check the oil level in the reservoir. Fill as necessary. 2. Check for defective blocks. Repair or replace as necessary. 3. Check for disconnected, damaged, or blocked circuit lines. Repair as necessary.
Grinding noise or erratic feed	Roller bearings	Check for broken, cracked, or worn bearings. Replace as necessary.
	Chain sliding over rollers or roller wear	Replace roller assembly.
Oil leak	Cylinder rod seal leak	Remove and replace cylinder.

Counterbalance System Troubleshooting Table

Part 2: Replace the Counterbalance Chain and Rollers

1. Obtain the required materials.

- Cribbing or a block capable of supporting the machine head and counterweight.
- Refer to the G & L General Instructions and Repair Parts Manual for the replacement part numbers.

2. Position the machine head for access.

Warning: The floor area around the machine may be slippery due to lubricants and or coolants. Move carefully to avoid injury from falls.

- Place the cribbing or block beneath the machine head.
- Lower the Z-axis all the way down until the head rests on the cribbing.
- Lift and block up the counterweight making sure there is enough slack in the chain to remove the attaching pins.
- Power down the machine.

3. Lock and tag the machine.

- Locate the disconnect and perform the lock and tag procedure.

4. Hoist the hydraulic cylinder or counterweight to remove the pressure from the chain.

Warning: You will be using a hoist for lifting the chains. Follow all safe practices when using the hoist. Check for overhead clearance.

- The hydraulic cylinder or counterweight is located inside the column and is connected to the head by means of a chain. The cylinder is connected to the column base by a pin.



- Connect the hoist hook to the eyebolt located on the balance bar. A flashlight may be required for lighting in the column area. See the figure below.



Balance Bar



Looking Down into the Column

- Remove the counterbalance gage. Removing the gage enables cylinder extension. The gage is located at the base of the machine, beside the counterbalance pressure regulator.
- If the cylinder is to be replaced, remove the hydraulic lines and the column base pin.
- Bump the hoist control to gradually extend the hydraulic cylinder.

Note: As the cylinder extends, oil escapes from the gage port fitting. If the cylinder is extended too fast, the force of the oil release could damage the gage port or oil lines. If the cylinder is extended too fast, the chain or eyebolt also can break.

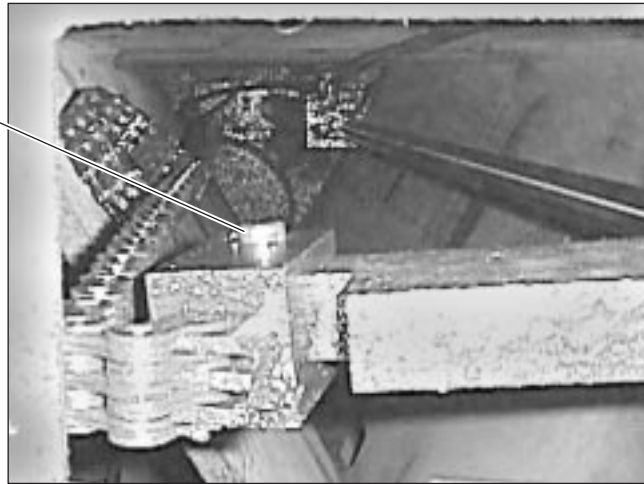
5. Remove the chains.

- Using needle nose pliers, remove the clevis pins from the anchor bolts in the top of the head.

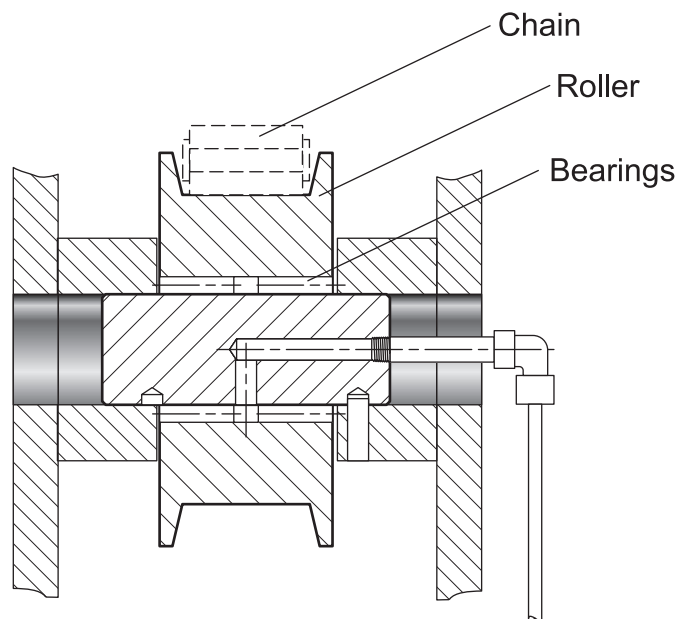
- Pull the chains off the rollers.
- Remove the clevis pins to disconnect the chains from the two ends of the balance bar cylinder or counterweight. Set the chains aside.
- If the cylinder is to be replaced, replace it at this time. See the figure below.



Clevis Pin



6. **Check the condition of the roller assembly and replace defective parts, as necessary. See the figure below.**

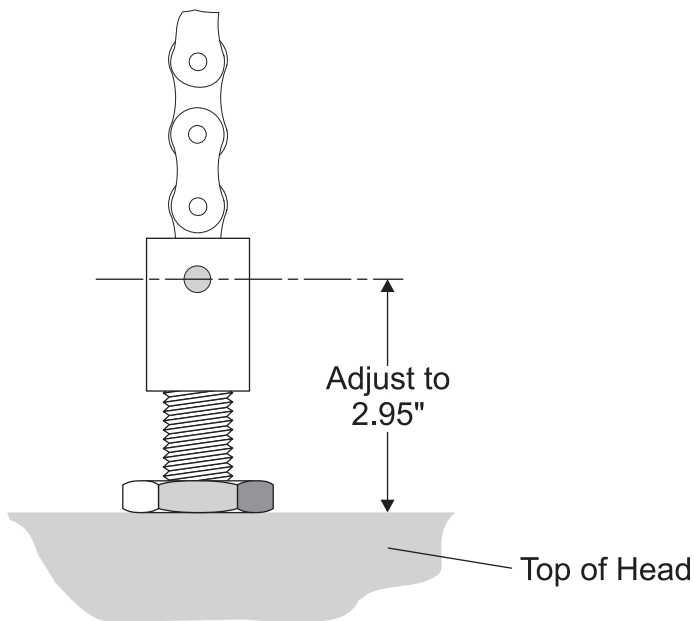


- Check for broken, cracked, or worn bearings.

- Check for wear on rollers. Rollers should rotate freely and without friction. The motion of the chain sliding over the surface can wear grooves in the rollers.

7. Install the chains.

- Break the chain to length. Count the number of lengths in the old chain and compare the number to the assembly drawing. The drawing will indicate the required number of chain lengths.
- Connect the hoist to one of the two chains, and lift the chain to the top of the machine.
- Feed the chain over the roller assembly.
- Insert the clevis pin into the last link on the chain, to connect the chain to the balance bar.
- Using a linear measuring device, set the chain adjuster on both chains (at the head) per the specifications shown on the assembly drawing. See the figure below.



- After setting the dimension, tighten the jam nut wrench-tight to secure the setting. This initial adjuster dimension must be set when new chains are installed.
- Connect the chain to the eyebolt at the top of the head.
- Hoist the other chain and feed the chain over the roller assembly.



- Secure the chain to the balance bar and to the head with cotter pins.
 - Disconnect the hoist from the chain and move the hoist aside.
- 8. Reinstall the counterbalance pressure gage.**
- Hook up the hydraulic lines if the cylinder has been replaced.
- 9. Tension the chain.**
- Remove the lock and tag.
 - Lift the counterweight with the hoist and remove cribbing.
 - Power up the machine.
 - If the counterbalance is hydraulic, jog the machine hydraulics to gradually tension the chain.
- 10. Remove the cribbing.**
- Raise the Z-axis to a point that will allow safe removal of the cribbing.
 - Remove the cribbing from beneath the head area.
- 11. Test the counterbalance system operation.**
- Ask an Electrician to move the Z-axis to the home position.
 - Move the axis slowly the full length of Z travel.
 - Observe the chain for alignment over the rollers.
 - Listen for smooth operation, with no binding, slipping, popping, or cracking noises. Adjust as necessary.
- 11. Clean up the work area.**
- 12. Document the work history.**