

U-02d: Replace Feedback Device (Heidenhain Linear Scale)

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Lockout/tagout is required when working on a machine.

EQUIPMENT

- Oscilloscope
- Electrician hand tools
- Heidenhain PWM7 Tester
- Feeler gage

RESOURCES

- Heidenhain Linear Scale Manufacturer's Manual
- Oscilloscope Operator's Manual
- Heidenhain Tester's Manual

Replace Feedback Device (Heidenhain Linear Scale)

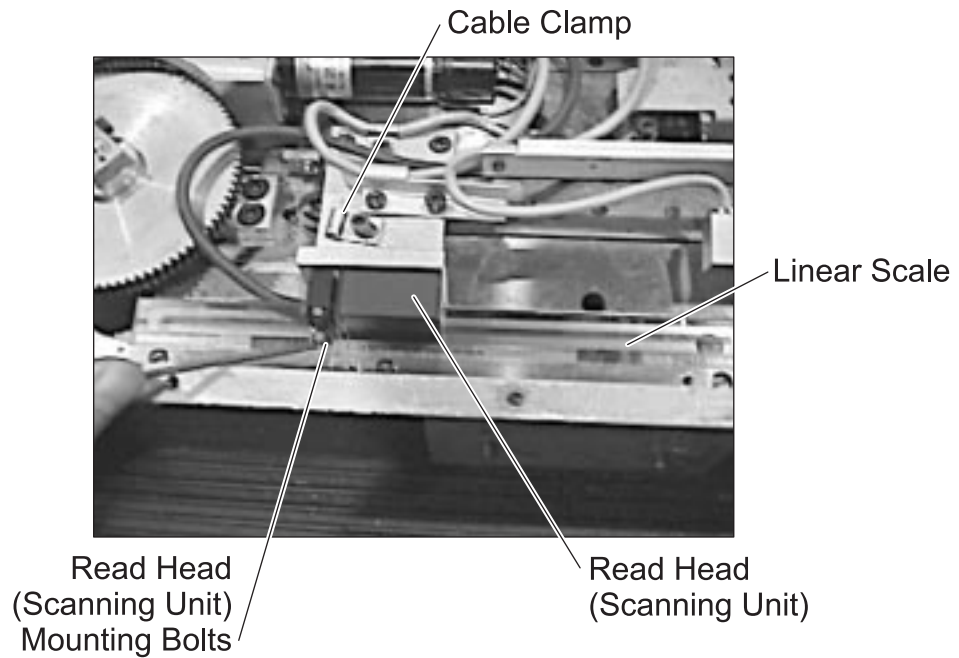
Note: This task was analyzed on a Diatronics Gage.

Note: Throughout the steps the scanning unit on a linear scale is referred to as a read head.

Caution: Handle the scale with extreme care to avoid damaging the fragile components. Do not force mounting bolts.

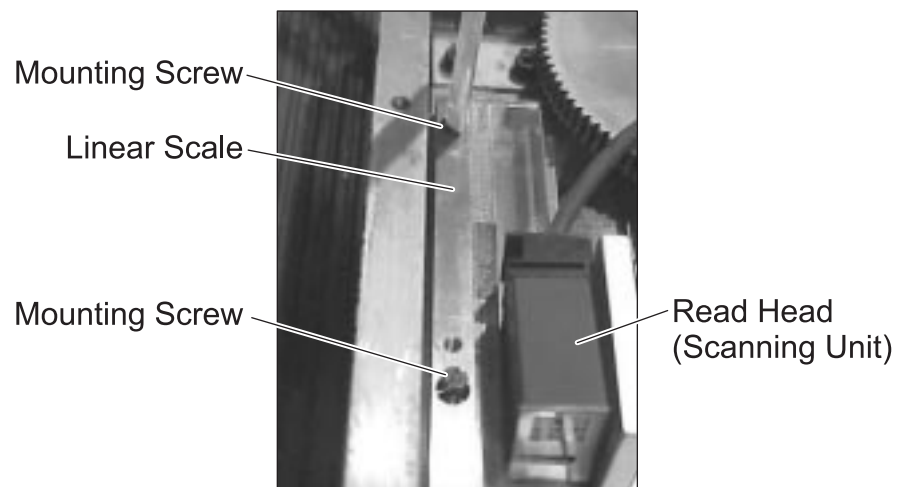
- 1. Use the procedure in the machine manufacturer's manual or ask an experienced Electrician to change the machine parameters to disable the scale and run the machine from the encoder.**
- 2. Perform a lockout/tagout.**
- 3. Remove the scale from the machine.**
 - Most linear scale installations vary; pay attention to detail and document as necessary while removing the scale.

4. **Disconnect the read head cable.**
 - Loosen all cable clamps to free the read head cable.
5. **Remove the read head mounting screws.**
 - Retain all shims or spacers.



Scanning Unit Removal

6. **Remove the mounting screws from the linear scale.**



Linear Scale Removal

7. Remove the read head and scale.

8. Obtain the replacement unit.

Note: Most linear scales come with a read head attached. Be aware that some may not and be prepared to order the read head separately.



Manufacturer's Number on Linear Scale

Read Head (Scanning Unit) Manufacturer's Number



9. Clean the mounting surfaces.

- Wipe all mounting surfaces free of debris with a lint-free cloth.

Linear Scale Mounting Surface

Lint-free Cloth



Read Head (Scanning Unit) Mounting Plate

10. Verify the new scale.

- Follow the procedures to Troubleshoot Linear Scale (Heidenhain).

11. Loosely install the scale.

- Leave the mounting screws loose to allow adjustment of the scale to the mounting axis.

12. Set the scale parallel to the mounting axis.

- Use a feeler gage to adjust the scale in relation to the read head mounting plate, according to the manufacturer's specifications.



Bottom Linear Scale
Mounting Screw

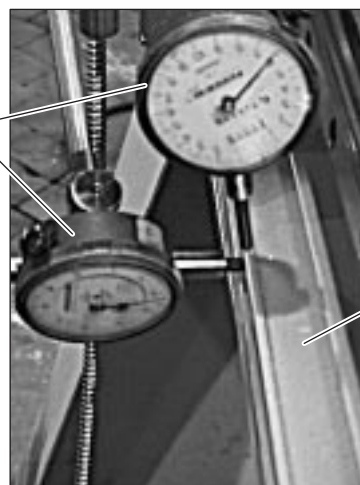


Read Head
(Scanning Unit)
Mounting Plate

Plastic
Feeler Gage

- Position an enclosed scale so that the housing is flat and parallel as shown by dial indicators on two planes.

Dial Indicators
Mounted
in Two Planes

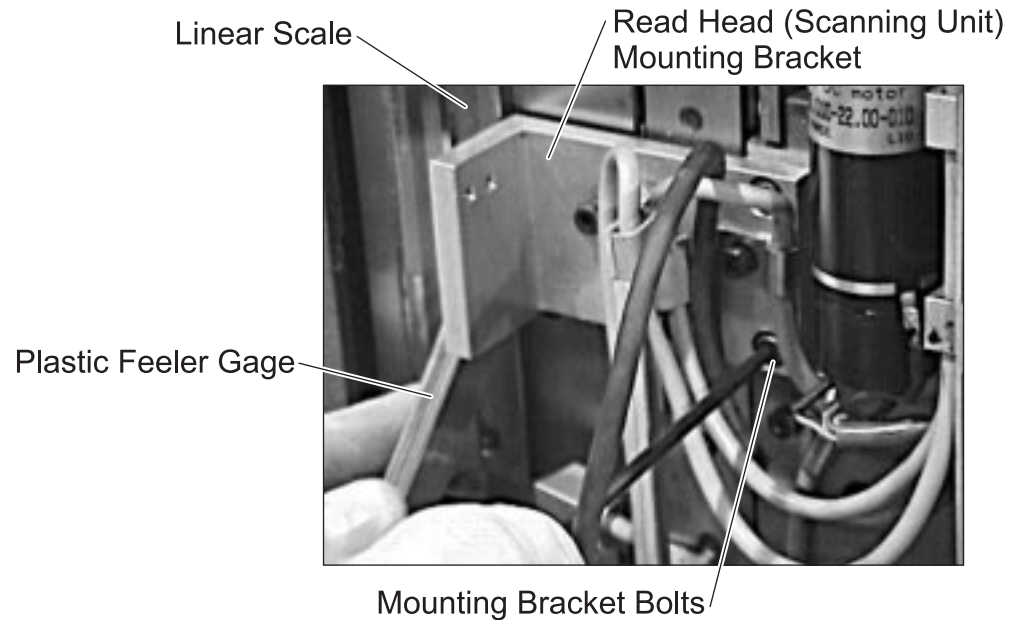


Linear Scale
Housing

Verifying a Flat and Parallel Housing

13. Verify that the read head mounting plate is properly located.

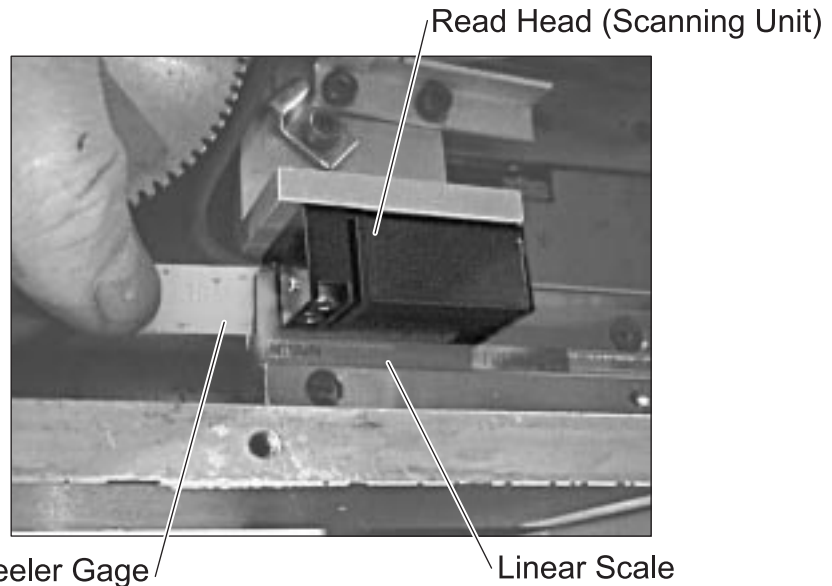
- Use a feeler gage to check the read head mounting plate in relation to the scale according to the specifications in the Heidenhain Manufacturer's manual.

**14. Mount the read head for adjustment.**

- Leave the shipping brackets on the read head, if possible. Shipping brackets help to hold the read head in position while attaching it to the mounting plate.
- Install the read head mounting bolts, but allow a small amount of play for adjustment.
- Reinstall shims or spacers, if applicable, between the read head.

15. Set the read head depth.

- Determine the required read head-to-scale gap as shown in the Heidenhain manufacturer's manual.
- Use a plastic feeler gage to set the read head gap in relation to the scale.



- Shipping brackets set the gap between read heads and the housing. Remove the shipping bracket after tightening all mounting bolts.
- 16. Reconnect the read head cable.**
- Route the cable as originally installed.
 - Reinstall the cable clamps.
- 17. Adjust the read head to the scale.**
- Connect the oscilloscope, PWM7 tester, and linear scale.
 - Adjust the read head until the manufacturer's specified voltage is read (1.8-3.6v). Both signals must be of the same amplitude and at 90 degrees out of sync to each other.
 - The signals must be continuous for the complete travel of the axis.
 - Verify the reference pulse.
- 18. Remove lockout/tagout.**

19. Restore original parameters to enable the scale.
20. Verify the machine operation.

Caution: Be aware that the axis could “run away” during restart. Be prepared to press the E-Stop.

21. Reset home position.

