

BD-03a: Align Components (Laser)

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Motor may need to be locked and tagged if connected electrically.
- Be aware of rotating shafts.

EQUIPMENT

- laser alignment kit (Pruftechnik AG-Rotalign)
- shim pack
- wrenches
- Maintenance Mechanic hand tools
- pry bar
- Porta power
- magnetic mounting device

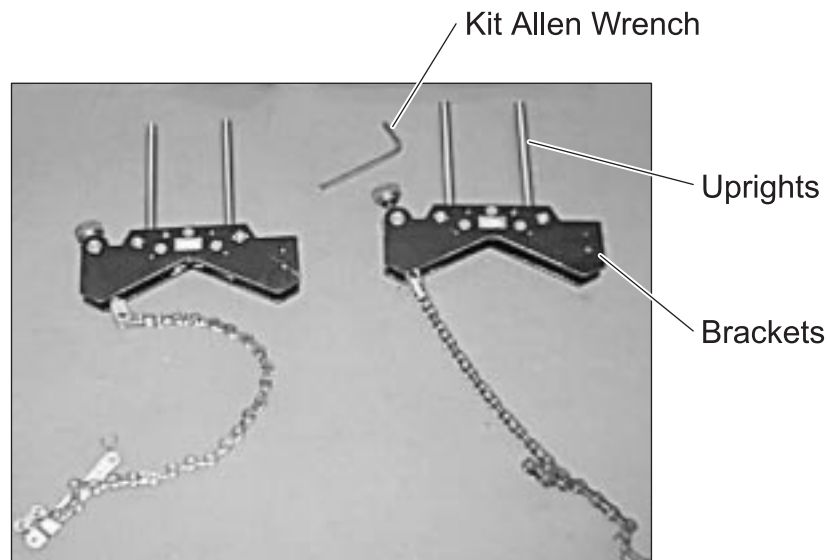
RESOURCES

- manufacturer's instructions and alignment handbook
- Maintenance Technician (for history data)



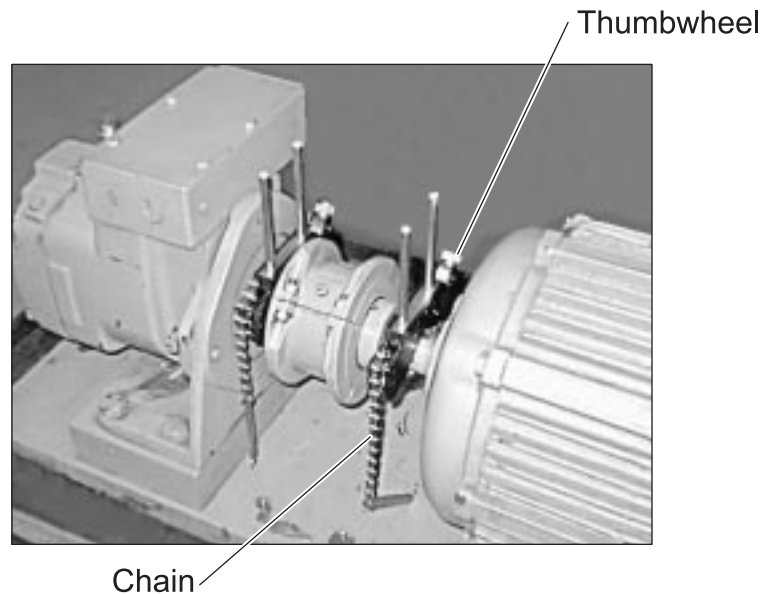
Align Components (Laser)

1. **Select uprights for laser brackets from the laser kit.**
 - Select the uprights dependent upon clearing the coupling height.
2. **Install the uprights in the laser brackets.**
 - Use the kit Allen wrench and tighten the uprights evenly into the brackets.



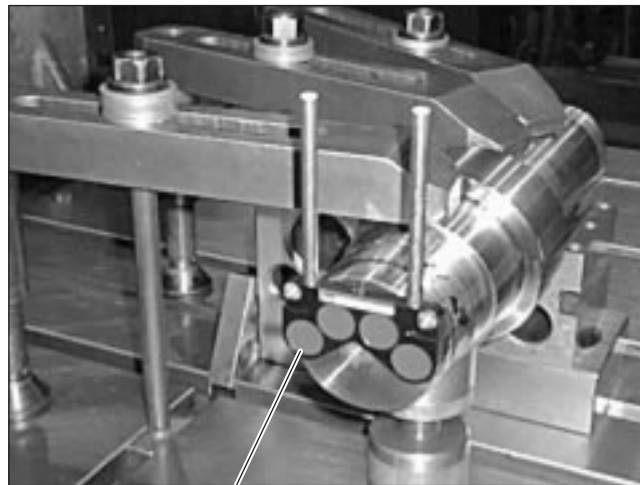
Kit Components

3. Install the laser brackets to the shaft, on both sides of the coupling.



Installed Brackets

- Position one of the brackets on the side of the coupling.
- Pull the bracket chain or magnetic mounting device around the shaft, and link the chain to the bracket teeth.



- Hand-tighten the knob so the bracket will not move on the shaft.
- Position the other bracket on the pump side of the coupling.
- Pull the bracket chain around the shaft and link the chain to the bracket teeth.

- Tighten the thumb wheel to snug the chain so the bracket will not move on the shaft.

4. Locate and correct motor “soft foot.”

Note: Motor “soft foot” is a condition in which the motor rests on three of the four feet.

- Verify that the motor base bolts are loose.
- Check the condition of the shims, if using old shims.
- Add the same size shims to all four feet, if using new shims.
- Find which foot has the loose shim.

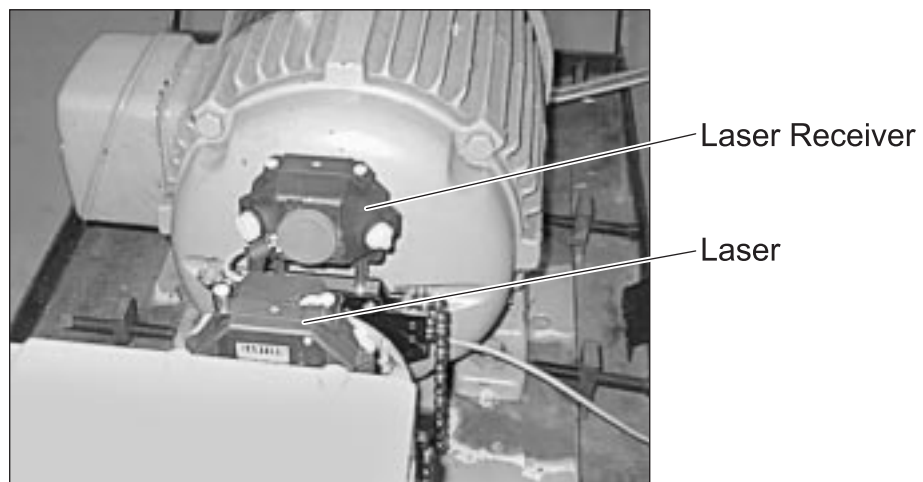
5. Shim the motor “soft foot.”

- Add shims to the soft foot until within .002 - .003 inch tolerance. Shimming prevents damaging the “floating” foot of the motor when you tighten and align the motor.
- Wrench-tighten the motor base bolts in a cross pattern.

6. Install the laser receiver (the unit with the cable) onto the shaft bracket of the component to be shimmed.

- Slide the receiver onto the uprights.
- Tighten the thumbscrews on the receiver so the receiver won't slide on the uprights.

7. Install the laser onto the stationary (pump) component bracket.



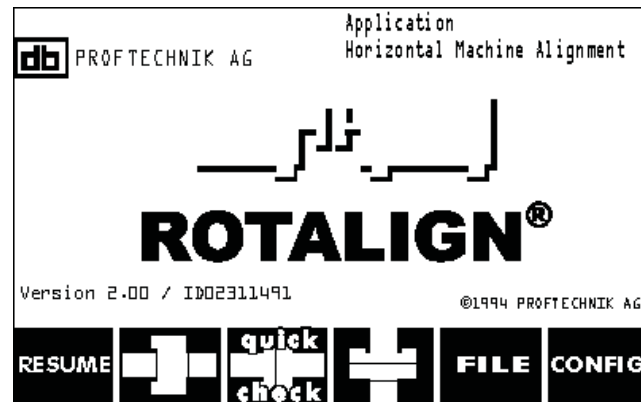
Installed Laser and Receiver

8. Connect and boot the computer.

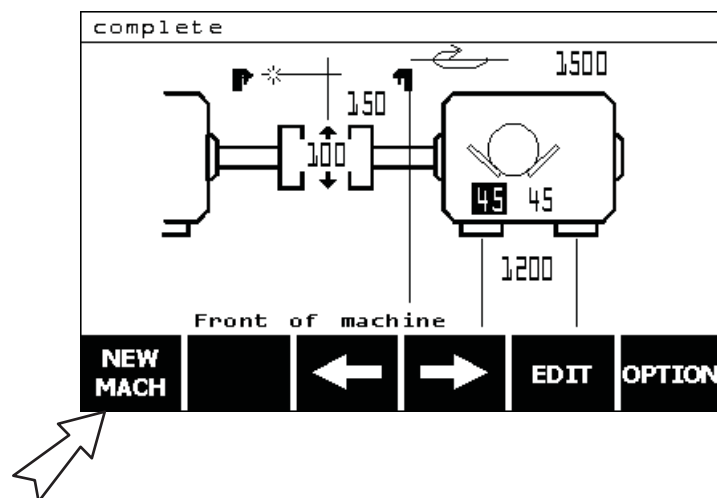
- Connect the data communication cable to the computer.
- Turn the computer power ON.
- If the computer fails to turn ON, check the battery supply.

9. Select <Horizontal Machine Instructions> function.

- Press the second blue function key from the left below the icon. See below.



- Press NEW MACH (first blue key from the left). See below.



- Save DATA? will display. You do not need to save the old data. Press <ESC>. The computer display is shown below.



Aligned
Shaft/Coupling
Icon

Computer

Note: Check the manufacturer's specifications before entering any data. See if there are offsets for heat expansion on the shaft center lines.

10. **Enter the coupling dimensions as requested on the computer interface.**
 - Select <EDIT> to input the coupling diameter dimension.
 - Type the value of your measurement. Enter 10" for the coupling unless the manufacturer has supplied shaft alignment tolerances.
 - Press <ENTER>.
11. **Enter the measurement from the center of the coupling to the upright on the receiver. The display shows the measurement to be taken.**
 - Use the tape measure supplied in the laser alignment kit.
 - Select <EDIT>.
 - Type the measured value. Check to ensure that the measurement system is inches.
 - Press <ENTER> if the typed value is correct.
12. **Enter the measurement from the upright on the receiver to the center of the bolt located on the front of the motor.**

- Use a tape measure to obtain the value.
- Select <EDIT>.
- Type in the measured value.
- Press <ENTER>. See the figure below.



Measure Between Front Motor Foot and Upright

13. Measure between the feet of the motor and enter the measurement.

- Use the tape measure.
- Select <EDIT>.
- Type in the measured value.
- Press <ENTER>.

14. Enter the variable information.

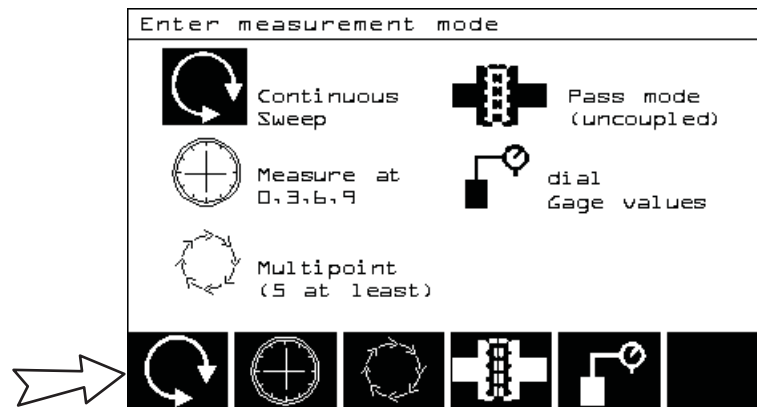
- Press the key shown below.



- Variable information may include type of motor, coupling type, tolerance, measurement mode, etc.
- Press the measurement mode function key. See the figure below.



- Select “Continuous Sweep” from the Measurement mode option. See the figure below.



15. Rough adjust the laser.

- Remove the laser lens cap.
- Move the toggle switch to the up position to turn on the laser.
- Roughly align the laser in the “bulls eye” of the lens cap on the receiver.
- Loosen the upright and shaft chain (or mounting device) thumbscrews to raise or lower the laser or receiver.

16. Fine tune the laser.

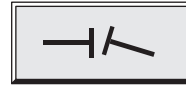
- Remove the receiver lens cap.
- Move the laser point within the cross hairs of the X and Y axes as shown in the computer monitor display to fine tune the laser.
- Rotate the top dial on the laser component to adjust the Y axis. Use the thumbwheels on the laser to adjust the laser to the center of the target.
- Rotate the side dial to adjust the X axis.
- Watch needle movement on the dial to assure you are adjusting the proper axis.

17. Measure shaft alignment.

- Turn the shaft to a starting position. The starting position must be able to sweep 180° in one direction.
- Press <START>, and wait for the display to indicate it is reading data.
- Be careful not to break the beam of the laser with your hand or clothing.

- Rotate the shaft 180° (1/2 a turn), as smoothly as possible. Grab the coupling, not the uprights to rotate.
- Press stop. Wait until the computer gets done reading.

18. Press the Results Function Key (F11) to get the exact required adjustments. See the figure below.



Note: When the vertical axis shows the variable needs to go lower than the stationary axis, adjust the variable. Use common sense when reading the results table and making adjustments. If the variable cannot be lowered, raise the stationary axis and take laser measurements again.

19. Set up the tolerance table.

- Tolerance includes setting the level of tolerance to align to your shaft. The levels of tolerance include “Acceptable,” “User Defined,” and “Excellent.”
- Press the <OPTION> key.
- Press <TOL> key.
- Use the arrow keys to get to “table.”
- Press <OK>.
- Press <EDIT>.
- Type in the rpm data.
- Use “Excellent Tolerance” as shown on the display. This can be changed by using the <TABLE TYPE> key, if necessary. Below that is “60Hz.” This also has a function key to change, if necessary.
- Press <Enter>.
- Press <OK> twice.

20. Align the vertical axis of the variable (motor).

- Select <Move> before loosening the motor mounting bolts.
- Verify that the display is updating or “fluctuating.”
- Remember to loosen the motor mounting bolts and shim where necessary.

- Monitor the Move screen while shimming to gauge the effect. A good result is indicated when the following icon displays.



- Proceed to step 21 if the readings indicate that the horizontal axis is not aligned.

21. Align the horizontal axis of the variable (motor).

- Verify that the <MOVE> screen is displayed.
- Loosen the motor mount bolts and adjust the motor until the horizontal axis is within tolerance to the pump. Good results will be indicated when the “Smiley” face displays.
- Move the motor evenly until it reaches the horizontal plane as signified in the <MOVE> display screen.
- If the motor is equipped with footing adjusters, turn the adjusters in equal increments to evenly move the motor into the horizontal plane.

22. When both the vertical axis and the horizontal axis are within tolerance, tighten the motor mounts corner to corner with proper torque.

- Tighten the first foot 1/4 of the manufacturer’s specified torque, then move to the opposite corner of the motor and tighten 1/4, moving around the motor until all mounts are tightened.
- “Smiley” faces will appear on both axes when they are within tolerances.
- If the alignment was not successful, go to step 23. If successful, go to step 24.

23. Take another reading.

- Press Stop and take another reading.
- Press the measure {M} function key, as shown below.



- Repeat steps 17-21.
- Keep repeating until within tolerance. Two “Smiley” faces will appear.

24. Verify laser measurements.

- Select <STOP>.
- Press the measure {M} function key, as shown below.



- Press <START>.
- Rotate the shaft 180°.
- Press <STOP>.
- Press the results (icon) key, as shown below.



- If the readings indicate that the variable (motor) and stationary (pump) shafts are aligned, go to step 25. Two “Smiley” faces will appear if aligned.

25. Save the file.

- Press <SAVE>.
- Press <SELECT>.
- The data will be required for future reference if this task was not performed on a simulator.
- Note the #, date, and time for future recall.

26. Power down the computer.

- Press OFF.

27. Power down the laser.**28. Disconnect the data cable from the computer. Leave the data cable attached to the receiver.****29. Store all components.**