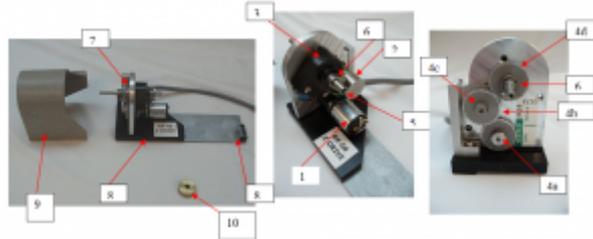# Trouble Shooting ASI Z-axis drives

Configuration

ASI Z-axis drives are precision closed –loop D.C. servo motor systems that employ the following components:

1. A D.C. servomotor with a gear head.
2. An electromechanical clutch that allows the drive to be engaged & disengaged.
3. A precision rotary encoder that provides positioning feedback information.
4. Precision gears that interconnect the above components:
• 4a the motor gear
• 4b the inner clutch gear
• 4c the outer clutch gear
• 4d the drive shaft gear
5. A focus shaft that clamps on to the fine focus shaft of the microscope.
6. Two Drive shaft clamps, one on the gear side & one on the microscope side.
7. A drive plate assembly that can be positioned in three axis's for alignment.
8. A base plate & clamp assembly for attaching the system to the microscope.
9. A cover

In addition to the above some drives may also have:

9. An anti-backlash gear – on select Zeiss Axio series microscopes
10. Brass clutch plates, and focus shaft adapters
11. The linear encoder option

Theory of Operation

The ASI control electronics connect to the drive assembly via the drive cable and provide the drive signal, operating voltages for the encoder & clutch, and receive the feedback signal from the encoder. There is a clutch engage & disengaged switch on the controller; when in the engaged position the two gears of the clutch engage together & allow the motor to turn the drive shaft. The drive signal, or command voltage is sent from the controller to the motor to initiate a move, and the controller monitors the feedback signal from the encoder to insure that the move has been completed. In order for the motor drive to transfer the precise motion from the ASI drive to the microscope fine focus shaft the drive shaft clamps (6), and all gear assembles must be securely tightened to insure that no slippage takes place.

Identifying & correcting slippage

If the components on the ASI drive are not securely tightened slippage make occur which may lead to the following errors:

• Focus Drift
• The drive hunting for position and not settling quickly
• The drive chattering as it hunts to obtain the correct position

To check for slippage first test to see if the drive shaft clamp (6) that is used to clamp the ASI drive shaft (5) onto the microscope's fine focus shaft is securely tightened. This can be done by disengaging the drive via the switch on the controller and then grabbing the two focus knobs on each side of the microscope & turning one while holding the other. If the drive clamp is tight you should not be able to turn one knob while holding the other; if you can then the clamp is not tight and slippage is occurring between the ASI drive shaft (5) and the microscope's fine focus shaft.

If slippage occurs you will need to remove the drive cover & tighten drive shaft clamp (6) as outlined in the Z-drive installation instructions that shipped with the system.

If the clamp on the drive shaft is securely tightened, and no slippage is occurring between the two knobs, then the gears on the motor drive should be checked to insure that the drive shaft of the motor (a), clutch (b), and the drive gear © are not slipping. To do this hold onto the fine focus knob of the microscope while the drive is engaged & turn the command encoder to cause the drive to move; refer to the photos below to insure that the shafts turn with the gears. If the gear stands still while the shaft turns slippage is occurring & the setscrew on the gear will need to be tightened.
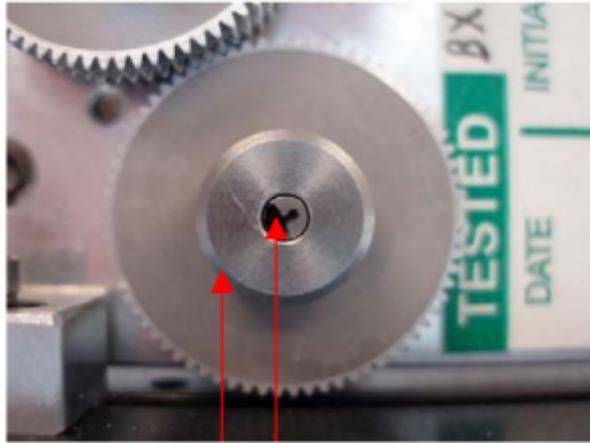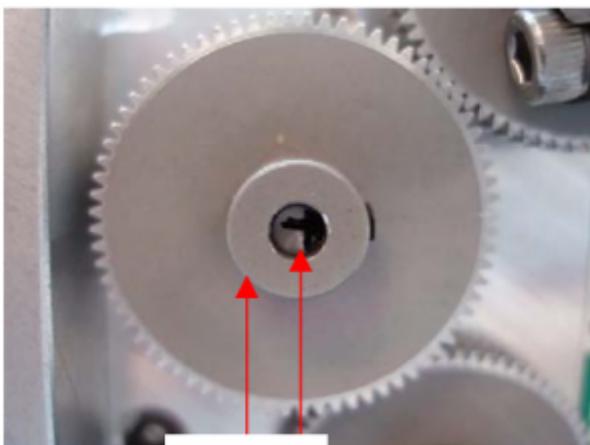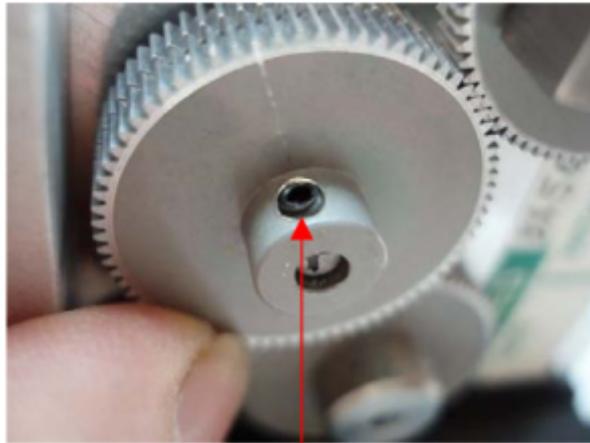
a1   a2
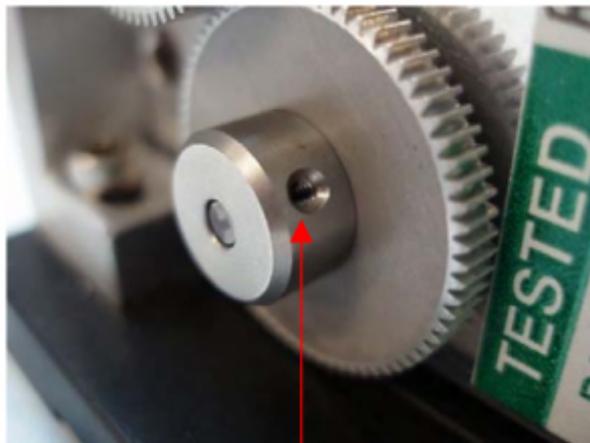
a3

Check to make certain that the motor shaft (a2) turns with gear (a1), if slippage is occurring use a 0.05 inch Allen wrench to tighten set screw (a3)
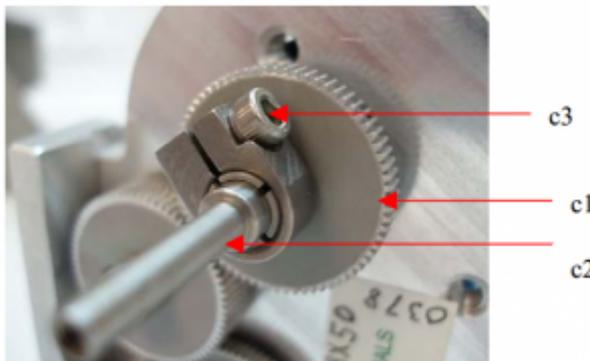

b1   b2

b3

Check to make certain that the clutch shaft (b2) turns with gear (b1), if slippage is occurring use a 0.05 inch Allen wrench to tighten set screw (b3)

zdrive, tech note

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