Section 4 MAINTENANCE

Unplug the 120V power cord before any maintenance operation!

Remove all machining debris and foreign objects before lubricating ANYTHING! If need be, any oil is better than no oil – but use the recommended lubricants when you can.

RECOMMENDED LUBRICANTS

Ball oilers (X and Y leadscrews): ISO 68 oil, such as Mobil Vactra No. 2, or equivalent
X, Y and Z axis ways (dovetails): ISO 68 oil, Mobil Vactra No. 2, or equivalent
Visible gears such as quill rack and pinion, Z-axis bevel gears: light general purpose grease, NLGI No. 2, or equivalent
X and Y leadscrews: ISO 68 oil, Vactra No. 2, or equivalent
Z leadscrew: ISO 68 oil or NLGI No. 2 grease

GENERAL OILING

Assuming a clean environment – no abrasive particles or machining debris – lack of proper lubrication is the main cause of premature wear. Rotating parts are easy to lubricate, sliding parts are not. Gibs are tightened for the best compromise between rigidity and slideability, which means practically zero gap between the ways. Take time to understand exactly which are the bearing surfaces on the various dovetail surfaces; this is not obvious – some of the interfaces look like bearing surfaces, but are simply narrow gaps.

Every few hours of operation: 1. Apply the recommended way-oil with a dedicated short-bristle brush such as the type used for applying flux; 2. Use a similar brush to apply oil or grease to the leadscrews; 3. Apply oil to the ball oilers, see below.

Ball oilers
Use a pump-type oil can with tip large enough to more than span the oiler's spring-loaded steel ball. Oil pressure will displace the ball, allowing oil to flow, provided the oil can tip is firmly pressed onto the brass seating. Before oiling check that the ball is not stuck – press it lightly with a probe.

Quill rack and pinion
Lower and lock the quill. Using a stiff flux brush, clean the visible portions of the rack and pinion. Raise and lower the quill to expose the remainder of the working surfaces, locking and cleaning at each setting.

Sindle bearings
See Servicing Quill and Spindle, two pages on.

GIB ADJUSTMENT

Gibs on the X, Y and Z axes control the fit of the mating dovetailed surfaces. They are gently-tapered lengths of ground cast iron located by opposing screws at each end. Adjusting them is a trial and error process that takes time and patience. Aim for the best compromise of rigidity and reasonably free table movement. Too tight means accelerated wear on the ways and leadscrews. Too free means workpiece instability, inaccuracies and chatter.

Both screw heads must be tight against the gib ends. If you loosen one, tighten the other. Remove the way covers for access to the back of the Y gib and bottom of the Z gib.

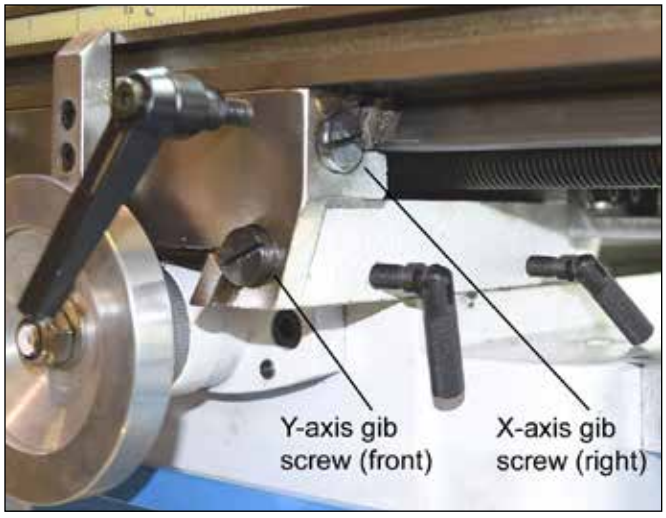

Figure 4-1 **Gib adjustment, X and Y axes**
The back adjustment screw for the Y axis gib is under the solid rubber way cover behind the table. The left adjustment screw for the X axis is in a similar location on the left side of the saddle casting.

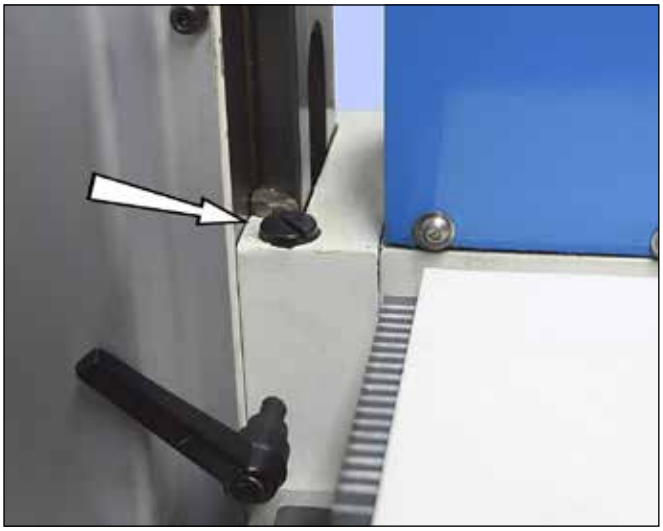

Figure 4-2 **Z-axis gib adjustment, upper screw**
The lower screw is under the pleated way cover.

LEADSCREW BACKLASH CORRECTION

When alternating between clockwise and counter clockwise rotation of the X or Y leadscrews, the handwheel moves freely a few degrees but the table stays put. This is backlash, a feature of all leadscrews other than the precision type found on CNC machines. The acceptable amount of lost motion depends on the user, but 0.005" is generally a good compromise. Smaller numbers are possible, but overdoing it can lead to premature wear of leadscrew and nut.

Excessive backlash can be corrected by compressing the leadscrew split nut. For the X-axis this is done by tightening the socket head screw in Figure 4-3. A long-handled 4 mm hex wrench is required, ideally one with an extra-thick shank to minimize flexing. The corresponding adjustment for the Y-axis is difficult because the split nut and leadscrew are concealed by castings, Figure 4-4. Access to the adjusting screw is possible only if the entire machine is unbolted from the bench or stand, then: 1. ***Lifted*** by sling and engine hoist (see Installation, Section 1), or; 2. ***Tilted*** backward by pivoting on the back edge of the base casting.

Both options are two-man procedures

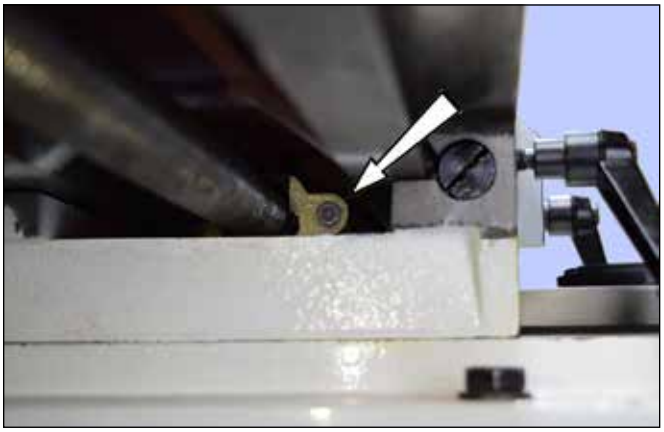

Figure 4-3 **X-axis backlash adjustment**

Figure 4-4 **Y-axis backlash adjustment**

DOWNFEED RETURN SPRING

The quill should automatically retract when the coarse downfeed levers are released following a drilling operation. If it does not, check for binding in the quill lock. The return spring, Figure 4-5, is held by a spring cup which is locked to the spindle by a special C-clip beneath the drawbar cap, Figure 3-2. Spring force is not adjustable.

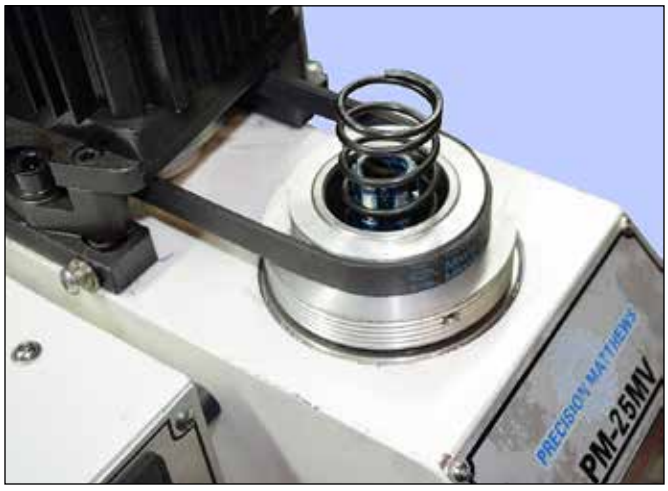

Figure 4-5 **Quill return spring**

SPINDLE BEARINGS

The spindle runs on grease-lubricated tapered roller bearings. These should be serviced every 500 hours of running time. Thoroughly clean each bearing assembly then repack with a grease such as Kluber Isoflex (auto shop wheel bearing grease can be used in low-load, low rpm operations).

Do not over-pack the roller bearings!

Bearing manufacturers recommend that the free volume between inner and outer should be no more than 30% filled with grease. (If smothered with grease, bearings are subject to overheating.)

! *Especially during the first 10 hours of running time check that the spindle runs smoothly, without excessive heat build up (the spindle will run warm when used at high speeds over long periods, but should not be uncomfortably hot). Overheating can be due to excessive grease, see above, or an overtight spanner nut at the upper end of the spindle. Call Precision Matthews for guidance.*

SERVICING QUILL & SPINDLE

In the normal use the quill assembly needs only oiling on its sliding surface. The spindle runs on pre-lubricated roller bearings and needs little attention, see Spindle Bearings, above. If the bearings need to be serviced or replaced, remove the quill/spindle assembly as follows:

1. Remove any installed R8 device from the spindle.
2. Lock the spindle with the C-wrench, then unscrew the drawbar cap (17 mm flats) from the spindle.
3. Remove the drawbar.
4. ***IMPORTANT:*** Use wood blocks or other means to prevent ***unexpected downward movement*** of the quill assembly.
5. Press down on the return spring cup while removing the C-Clip, Figure 4-6.
6. Remove the return spring, Figure 4-5.
7. Using a 2.5 mm hex key remove the two button head screws securing the DRO scale and stand-off block to the quill assembly.
8. Remove the wood blocks (4), then remove the quill assembly from the headstock.

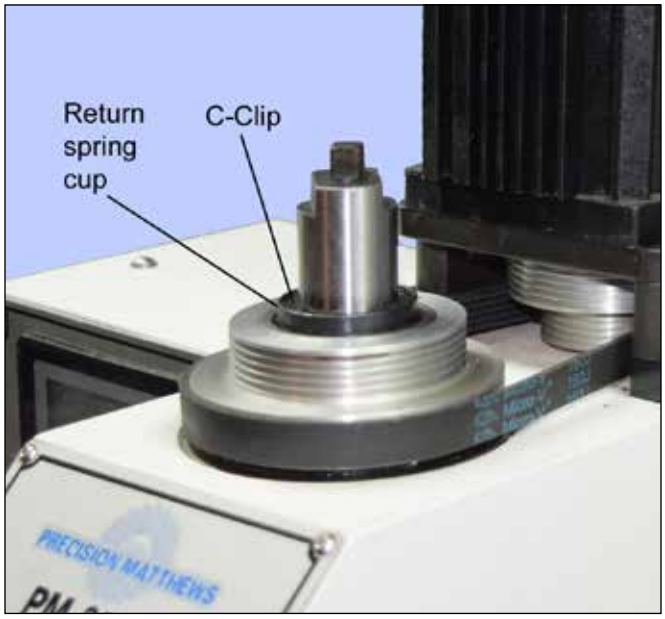

Figure 4-6 **Remove drawbar cap for access to the C-Clip**

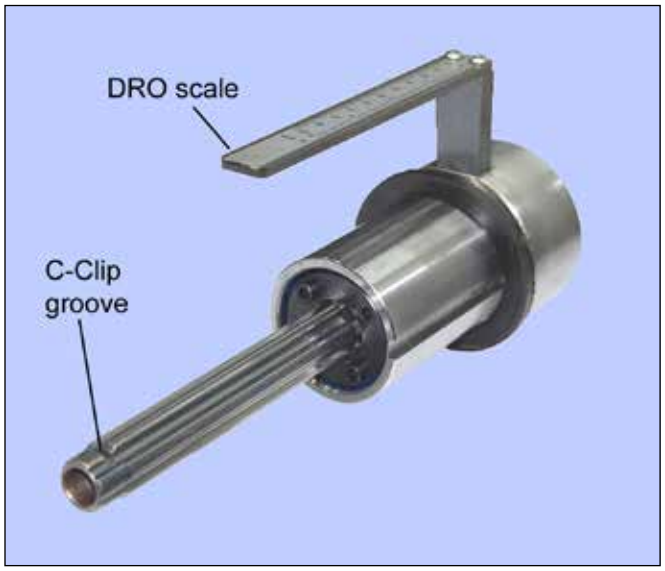

Figure 4-7 **Complete DRO scale and quill assembly**
For illustration only: for servicing operations the scale should be detached from the quill and should remain in the DRO case.