

## Using the Monarch

### **Introduction**

The Product Realization lab has one 10" Model "EE" Monarch Precision Toolmakers Lathe. It is a vintage 1950's precision lathe - but don't let the age fool you. The Monarch lathe is very accurate and smooth. The Monarch is not like the other lathes in the shop. Like the CNC Milling Machines, you must demonstrate proficient knowledge of the Monarch before you will be permitted to use it. This document will give you enough info to get started.

### **Monarch Overview**

The Monarch has several advantages over the Victor and LeBlond lathes in the shop. The most important is that the Monarch is more accurate - it will hold tolerances of 0.001" or better. Of course, this depends in part upon your own measuring and machining abilities. The Monarch is also smoother, less used, and provides a much greater range of spindle speeds. Please be careful with this machine. Many of the people who use it fall in love with it, but one major crash could eliminate half the advantages mentioned.

### **Dials, Controls and Switches, or "How do I turn this thing on?"**

This section will take you from turning the Monarch on through the details of operation.

- **Turning the machine on.** The Monarch has a big lever on the front, down near the floor. Flip it to the right and depress the green "control on" button and you're ready to go.
- **Feed.** There are a lot of buttons, switches, knobs and do-hickies on the monarch. There are two modes of operation. Belt driven (direct) feed and Back gear. Back gear allows you to turn at much slower spindle speeds (less than 400 RPM) with higher torque. The spindle is direct driven - there is no gear arrangement for speed changes like the Victor lathes. By turning the speed dial, you are actually changing the motor speed, which provides the infinite speed stepping. (In contrast, the motors on the Victor lathes run at one speed - the spindle speed is changed by changing the gear sets.) The Monarch will operate up to 4000 rpm.

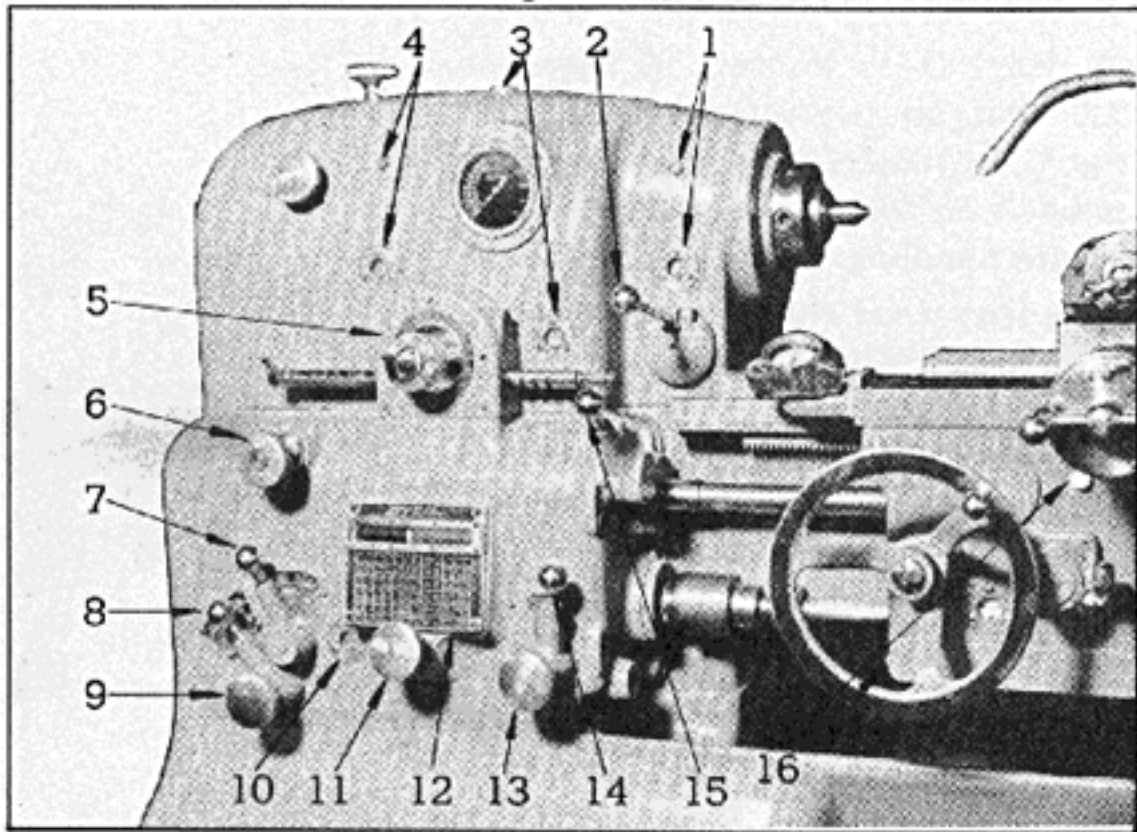


Figure 1

**Below is a bare bones listing of the Monarch features pictured above :**

But first a feature not numbered : the knob in the upper left of the picture locks the spindle for tightening collets. Make sure this is unlocked before attempting to turn on the spindle.

**1, 3, 4** and **10** show the oil gauges as well as where oil is added. Please check to be sure there is sufficient oil in the Monarch before operation. If you need to add oil, find a TA.

The motor is stopped and started in both forwards and reverse by moving the hand lever, **2**. On our Monarch, this lever is actually located on the far right of the apron - approximately where you find the hand lever on the Victor lathes.

Dial **5** allows you to choose between operation in feed mode or threading left or right-handed. To rotate this dial, pull it out and turn. You may have to rotate the spindle by hand.

Controls **6, 11, 13** and **15** are all used to set up threading operations. By turning dial **6**, you can choose either A or B position. Dial **13** allows a choice of C, D or E. Turning dial **11** changes the display on **12**. By lining up all the choices, you can set the number of threads per inch shown in the chart above these knobs.

Tumbler lever, **15**, allows you to move dial **11** and select a desired feed column. When lever **15** is up, the dial is locked. When down, dial **11** may be moved. Lever **15** is released by pulling out and down.

Both levers **7** and **14** switch between feed and threading functions.

Lever **8** changes between back gear and direct drive mode. ALWAYS stop the spindle before changing modes.

Dial **9** changes the speed of the spindle.

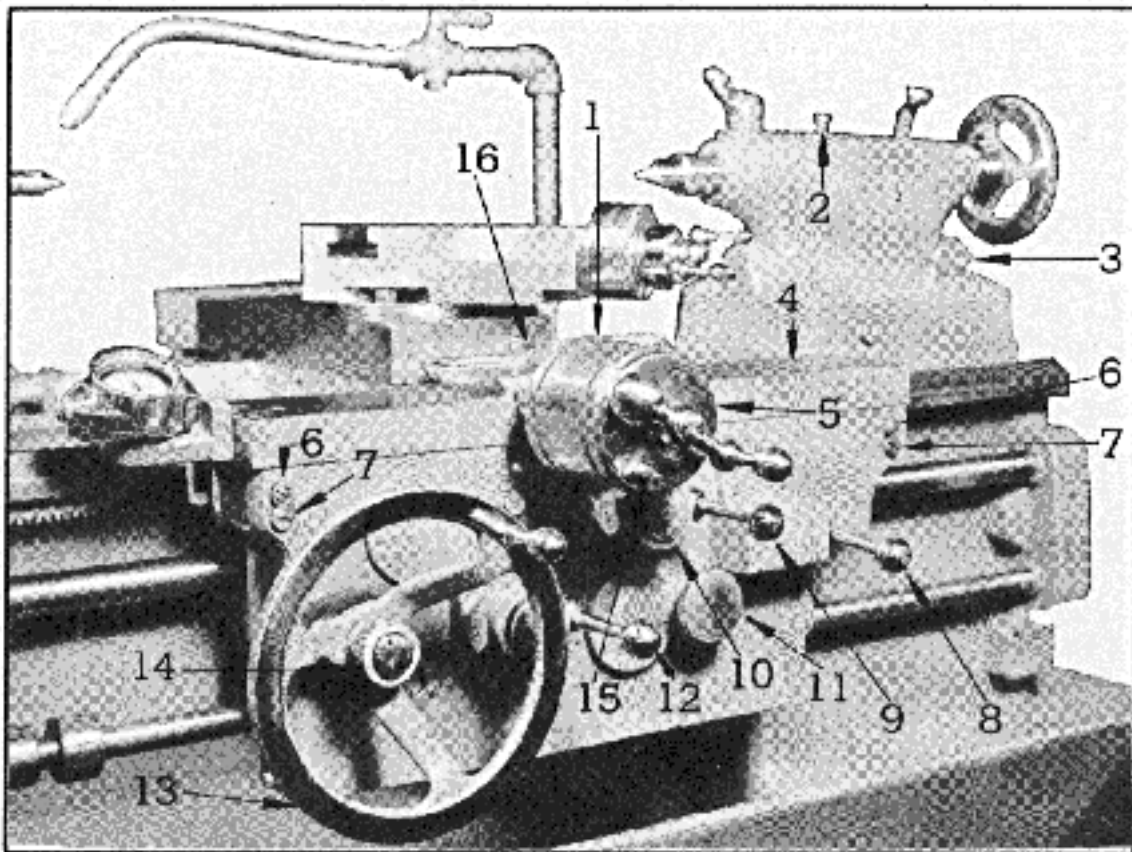


Figure 2

You should be familiar with many of the features pictured above. Following is a brief summary.

**1** is the crossfeed dial and indicator.

For chasing threads, **4** is the thread chasing dial, **5** is a chasing stop that simplifies the process of cycling the compound rest in and out. It is limited to two and a half turns. **8** is the half nut.

Lever **9** engages automatic cross-feed, and lever **12** engages automatic longitudinal feed.

Pulling out or pushing in knob **11** reverses the direction of the feed.

Our Monarch has a few more features that are not pictured in these illustrations. On the far right top of the machine there is a knob with three selections : Right Hand, Left Hand and Neutral. This dial affects the direction the spindle turns. If it is in Neutral the spindle is not engaged and will not turn at all. If it is in Left Hand, the spindle is set up for left handed threading and the spindle spins counter-clockwise. If the knob is set to Right Hand, the spindle spins clockwise. If the knob is set to Left Hand, the speed is changed with the dial mentioned above (number **9** in Figure 1). If the knob is set on Right Hand, the speed is adjusted by a black knob next to the lighted green reset button labeled "reverse."

### **Tips and Hints**

Here are some hints and tips for troubleshooting. Read them before you start working - they might save you some time spent scratching your head.

- If the spindle is spinning over 400 rpm, you should be in direct drive, not back gear. Remember, however, that you should not use a 3-jaw chuck at speeds over 1000 rpm.
- To change from direct drive to back gear do the following. Move lever 8 (Figure 1) from direct to back gear. Make sure the speed of the spindle is turned down, or you will blow the relay. If you do blow a relay, you must wait until it cools down before the spindle will turn on again.
- If you are chasing even threads (for example, 20 threads per inch is even), you may engage the half nut at any line. For odd threads, engage at numbered lines.
- If the spindle automatically shuts off because the motor is overloaded, you must wait a few minutes for the relay to cool down. Press the reset button (green) down near the floor and you should hear a click signaling the relay has closed. The spindle should now go on again.
- It is a good idea to turn the spindle speed down BEFORE turning it on. Often if is set at high speed and tends to kick off the fuse right away. Start it at a low spindle speed and once it is on, turn it up to whatever speed you need.
- If the spindle will not go on, but it looks like everything should be working, check the knob on the far right of the bed and be sure that it is in either Left Hand or Right Hand, not Neutral.
- Before turning on the lathe, be sure that the long drawbar that extends from the spindle to the back of the machine is not in the lathe unless a collet is in use.

- All Monarch equipment and accessories are stored in the gray cabinet to the left of the Monarch.

## **Tools and Monarch equipment**

- **Taper attachment.** The Monarch has a taper attachment that facilitates the cutting of long tapers. Tapers can be cut from  $0^\circ$  to  $8^\circ$ . To cut tapers follow these steps :

- 1) remove the two slotted screws that hold the cover on the taper attachment. This will allow you to see what is going on as you make adjustments to the angle.

- 2) Find the taper attachment in the gray cabinet and slide it on the back way. This little device locks to the way and forces the carriage to move along the taper attachment instead of the ways.

- 3) Set the angle you want on the taper attachment. The Monarch is set up to do tapers up to  $8^\circ$ .

### **Revision history**

ver 0	April 97	Bryan Cooperrider	original text
ver 1	October 01	Katherine Kuchenbecker	revisions