



## Engine Lathe

This study guide will cover the major working parts, functions, and machining techniques that can be found/used on most standard **Engine Lathes**.

This study guide has been designed to directly represent the questions that will be found on the open book written assessment and as an aid for the hands-on usability assessment. Both assessments will also include questions related to standard machine shop safety and APS internal user safety guidelines.

Answering the questions found at the end of the study guide will enable the user to successfully pass the hands-on usability and open book written assessments. Study guide practice test and answers can be found at the end of the guide.

**Note:** For this study guide a Sharp, Model 1440 Engine Lathe with will be described. Parts and functions of most standard shop lathes are very common.

The **Engine Lathe** is one of the most useful and necessary machines in a shop. The major function of the engine lathe is to change the size, shape or finish of a revolving work piece with various cutting tools.

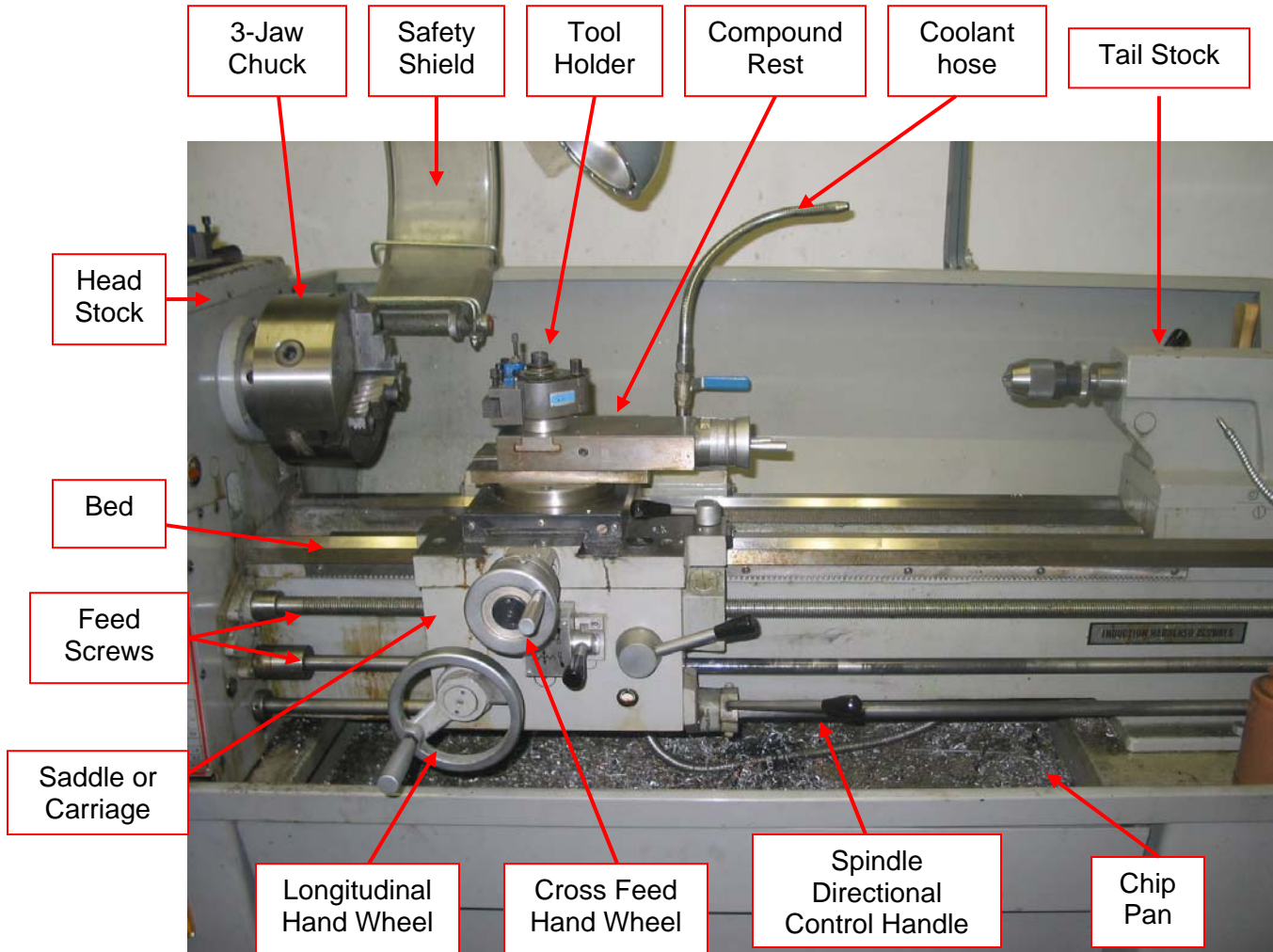
The lathes in most shop consist of a headstock, tailstock, carriage and bed.

- The headstock encloses the spindle and motor, along with any gears and pulleys used to change the spindle speed and feed rate.
- The tailstock is used for drilling, reaming, tapping, threading and centering parts. Drill chucks generally have a tang that allows the chuck to be seated in the tailstock.
- The carriage contains levers, clutches, and gears that control its movement either by hand or by power feed. Below the carriage is a long flat bar. This bar is an emergency brake and can be used to stop the rotation of the spindle.
- Both tailstock and carriage rest on the bed, which is attached to the headstock.

### Engine Lathe Size

The size or machining capacity of all engine lathes is determined by:

- The swing (chuck capacity)
- Length of the bed between head and tail stock centers.



Sharp, Model 1440 Engine Lathe

The Sharp, Model 1440 Engine Lathe (pictured above) is found in all APS User machines shops and is similar to most standard shop lathes. This model lathe must be stopped before shifting the RPM (spindle speed) range gears. For general machining such as turning, facing, boring, and drilling this machine can perform very high levels of accuracy.

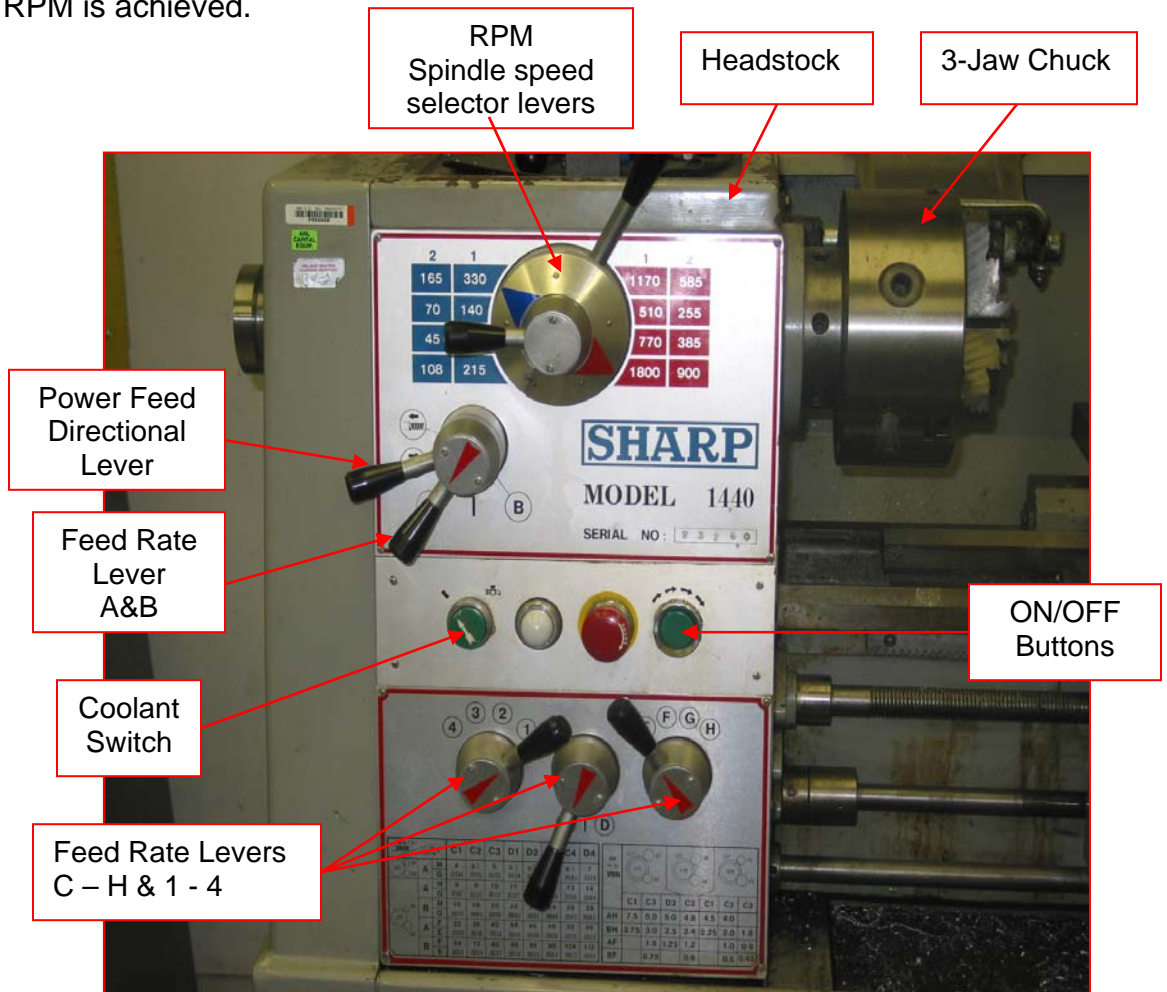
The Sharp Lathe also has a built-in coolant system that can be used to control heat build up during a machining process, promote tool life, or when machining harder materials. The machine is well suited for using collets, a 3-jaw chuck (pictured above), or a 4-jaw chuck to hold the work piece.

## THE CONTROLS

Many of the controls on the Sharp lathe work the same as on the most lathes, such as the hand-wheels, power feed, and half-nut lever. Other controls like the spindle speed and power feed direction may operate differently from other lathes.

### SPINDLE CONTROL HANDLES

The lathe main power is turned on and off with the On/Off Buttons. To the left of the ON/OFF buttons is the coolant switch. Directly above the coolant switch are two levers. One lever is used control the direction of the chuck (forward and reverse) forward is used for conventional lathe work while putting the spindle in reverse is used only for special turning tools and putting threads on a part. The other lever is used in conjunction with the lower lever to control the feed rate. By selecting a feed rate from the feed rate chart (see picture) the four levers can be set to accommodate the desired feed. The four levers are identified with letters (A through H) and numbers (1 through 4) that correspond to the feed rate chart. Near the top of the headstock are two more levers that control the RPM (speed) of the chuck. By lining up the colored arrow to a color and number the desired RPM is achieved.



## POWER FEED DIRECTION

The power feed switch on the carriage will change from longitudinal to cross-feed traversing and this switch on the headstock operates the direction of traverse.

## SPINDLE SPEED LEVER

These two levers move specific gears in the headstock to change the speed of the spindle. There is a list on the machine that gives the final speeds for high and low range depending on the combination of the two levers.

## EMERGENCY STOP

This switch (looks like a long flat pedal) will shut off the machine power immediately. It should only be used for emergencies and not to stop the machine during routine turning. It is generally found in the lower front of the lathe

## Practice Test

The following questions have been designed to directly represent the questions that will be found on the written assessment and as an aid for the hands-on usability assessment.

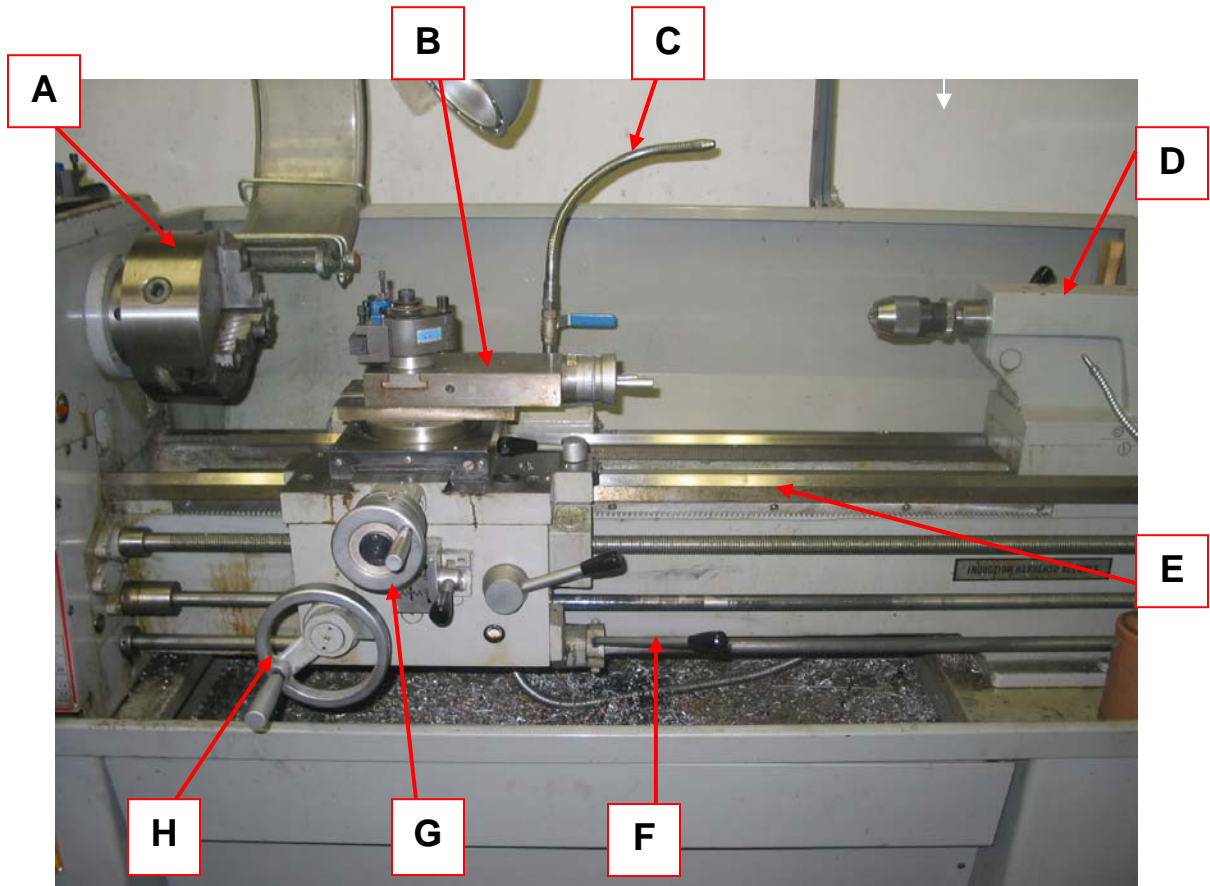
1. Use only brushes, vacuums or special tools for machine clean up.  
True False
2. Never attempt to measure a part on a lathe while the spindle is turning.  
True False
3. It is not necessary to keep the floor around your machine clear of chips.  
True False
4. Round stock can be held in a \_\_\_\_\_ chuck when turning a part on a lathe.  
A. 3-jaw universal  
B. 4-jaw independent  
C. Collet  
D. all of the above
5. The tang of a drill is shaped flat and thin so that it will:  
A. Fit in a groove  
B. Lighten the weight of the tang  
C. Help in sharpening a drill  
D. Equalize the balance of the tool

6. When turning a part on a lathe the tool bit should be on or slightly below center.  
True False
7. Brass and aluminum may be machined faster than steel.  
True False
8. Never wear jewelry or loose clothing while operating machine  
True False
9. Lathe chips can be removed with your hands if you are very careful.  
True False
10. Be thoroughly familiar with the placement of the machine's "stop" switch or lever.  
True False
11. A facing operation on a lathe is when the operator makes a squaring cut on the end of the part.  
True False
12. It is permissible to leave the chuck key in the tail stock mounted drill chuck while drilling a hole.  
True False
13. A turning operation on a lathe is when the operator takes a cut to reduce the diameter of the part.  
True False
14. The tailstock on most all Lathes is used for \_\_\_\_\_ .
  - A. Drilling
  - B. reaming
  - C. tapping
  - D. threading
  - E. centering parts
  - F. All of the above
  - G. None of the above
15. The Engine Lathe is one of the most useful and necessary machines in a shop.  
True False

16. The size or machining capacity of all engine lathes is determined by the \_\_\_\_\_ and \_\_\_\_\_ between head and tail stock centers.
17. Never walk away from a lathe and leave the 3 or 4-jaw chuck key in the chuck.  
True False
18. When turning a long section, the part should be supported to prevent bowing during the cut.  
True False
19. It is OK to use a taper-shank drill in a 3-jaw drill bit chuck.  
True False
20. Never change gears on a machine while it is running unless it is equipped with a variable speed drive motor.  
True False
21. Always prop the machine shop door open upon entering shop.  
True False
22. Always stop the machine before making measurements or cleaning out chips.  
True False

**Identify the major parts on the lathe below**

- 23. \_\_\_\_\_ Compound Rest
- 24. \_\_\_\_\_ 3-Jaw Chuck
- 25. \_\_\_\_\_ Cross-feed Hand Wheel
- 26. \_\_\_\_\_ Bed
- 27. \_\_\_\_\_ Longitudinal Hand Wheel
- 28. \_\_\_\_\_ Coolant Hose
- 29. \_\_\_\_\_ Spindle Directional Control Handle
- 30. \_\_\_\_\_ Tail Stock



**Study Guide**  
**Answer Sheet**

- |           |                      |
|-----------|----------------------|
| 1. True   | 16. Swing & Bed size |
| 2. True   | 17. True             |
| 3. False  | 18. True             |
| 4. D      | 19. False            |
| 5. A      | 20. True             |
| 6. True   | 21. True             |
| 7. True   | 22. True             |
| 8. True   | 23. B                |
| 9. False  | 24. A                |
| 10. True  | 25. G                |
| 11. True  | 26. E                |
| 12. False | 27. H                |
| 13. True  | 28. C                |
| 14. F     | 29. F                |
| 15. True  | 30. D                |