

## **L3-CAPWW301 - WOOD WORKING MACHINE.**

### **Types of portable power machines:**

1. Portable hand planer 2. Jigsaw machine 3. Router machine 4. Hand sander machine 5. Hand drill machine 6. Hand circular saw machine.

### **Types of heavy machines:**

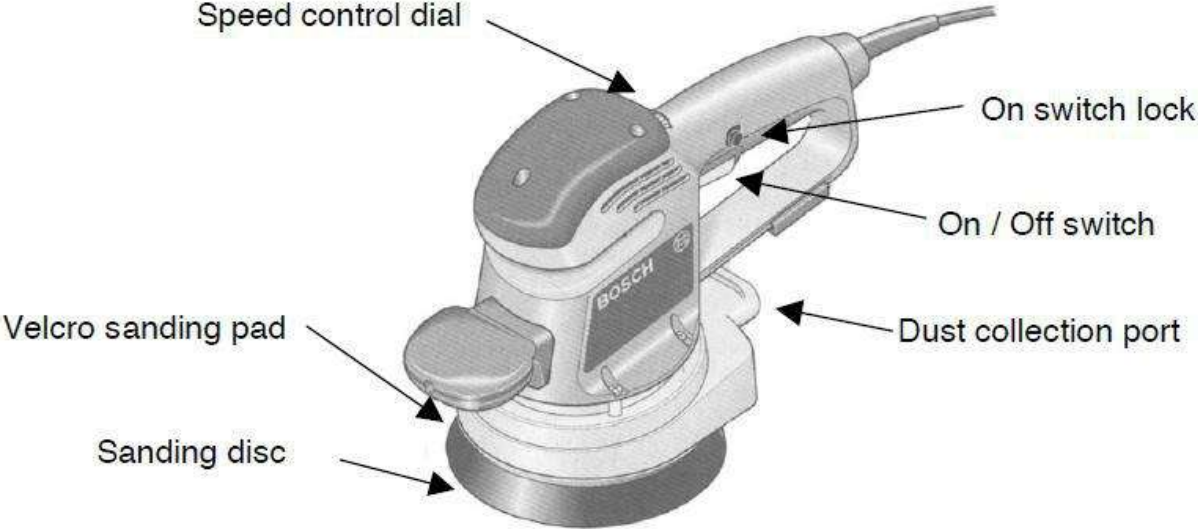
1. The thicknesser machine 2. Spindle moulder machine 3. Frasing machine 4. Band saw machine 5. Jig saw machine 6. Miter saw machine 7. Boring machines 8. Radial arm saw 9. The wood lathe/ turning machine 10. Sander machines 11. Resharpening machine.

# PORTABLE POWER MACHINES

## 1. Random Orbit Sander.

Electric Random Orbit Sanders are used for final finish sanding and may be used on wood or wood composite material and some plastic materials.

Random Orbit Sanders use disposable sandpaper discs that are available for purchase in the shop.

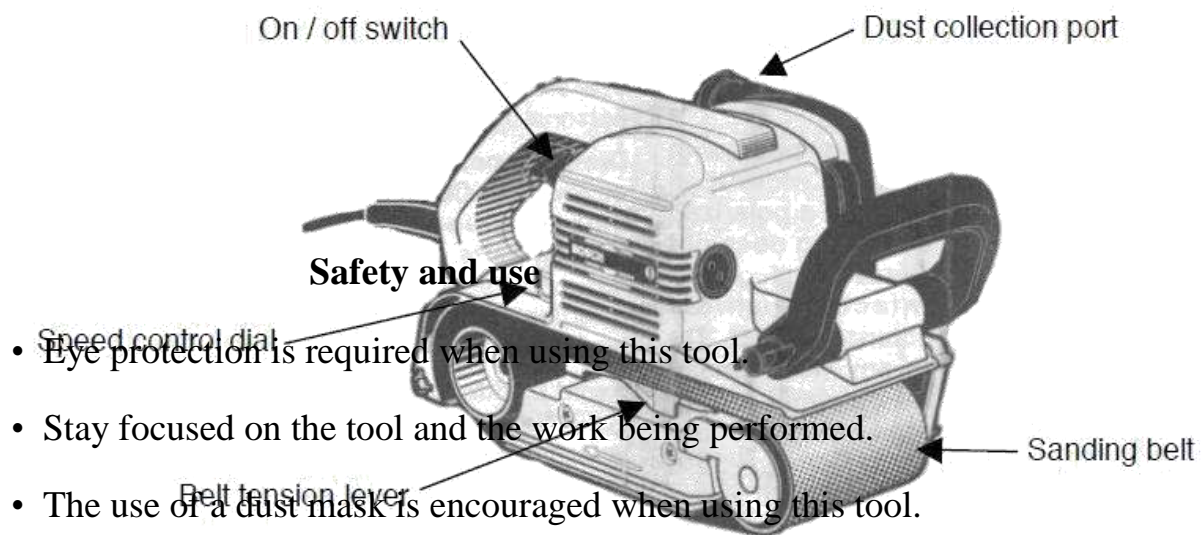


## **Safety and Use**

- Eye protection is required when using Random Orbit Sanders.
- Stay focused on the tool and the work being performed.
- All sanding should be performed on downdraft tables.
- Sandpaper disc must be attached to bottom of sander before using Random Orbit Sander.
- Be sure switch is in “OFF” position before plugging in.
- Only use discs available for purchase from shop supply room. Ask Shop staff for assistance.
- The use of a dust mask is encouraged when using this tool.
- Connect vacuum to dust collection port.
- Start sander on material to be sanded.
- Hold handle firmly.
- Sander should “float” on top of material. Do not bear down on sander or push sander into material.
- When pausing or stopping sanding operation lift sander off material and hold away from any surfaces until disc coasts to a complete stop.
- Do not place spinning or coasting sander directly on downdraft table.

## **Belt Sander**

The Electric Portable Belt Sander is used for flattening and smoothing flat material in preparation of final sanding. With the appropriate belts it will quickly remove large amounts of material or smooth a surface in preparation for final finish sanding with other sanders.

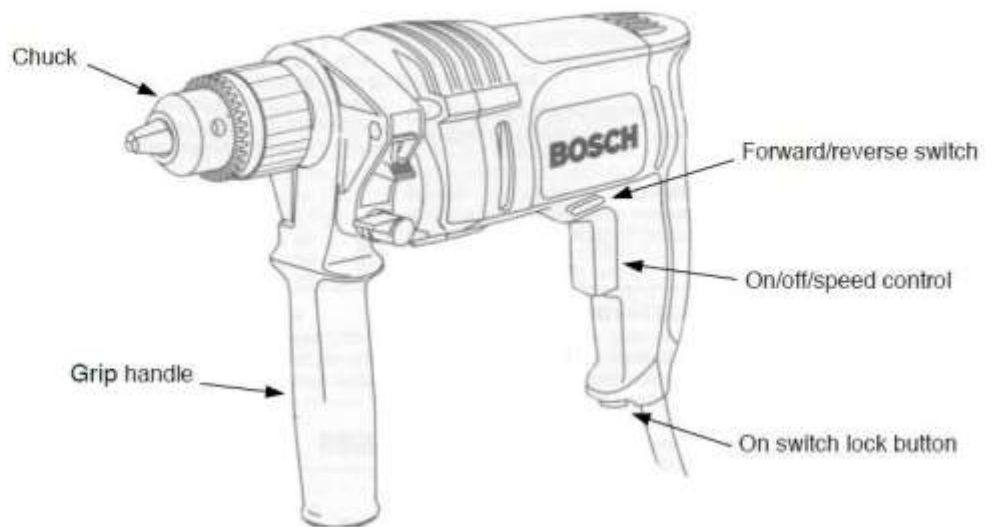


- Eye protection is required when using this tool.
- Stay focused on the tool and the work being performed.
- The use of a dust mask is encouraged when using this tool.
- Loose clothing, hair and or jewelry should be removed, tucked back and or restrained.
- All sanding with belt sanders should be performed on downdraft tables or outside on the concrete pad
- Use appropriate sandpaper belt for sander and for work to be performed ask attendant for assistance if you are not sure which belt to use.
- Attach vacuum to dust collection port.
- Belt Tension Lever must be retracted before using.
- Be sure switch is “OFF” before plugging in.
- Always keep finger or exposed flesh away from sanding belt.

- Hold handles firmly before starting sander.
- Start sander on material to be sanded.
- When pausing or stopping sanding operation allow sander to decelerate by slowly releasing trigger switch, wait for sander to come to a complete stop.
- Do not place running or coasting sander directly on downdraft table.
- Sander should “float” on top of material. Do not bear down on sander or push sander into material.

## Electric Drill

The Electric Drill is a powerful traditional corded drill that offers greater torque than cordless drills. It can be used to drill holes and with a wide range of accessories it can be used to sand, grind or polish.



## Safety and Use

- Eye protection is required when using these tool.
- Stay focused on the tool and the work being performed.
- Loose clothing, hair and or jewelry should be removed, tucked back and or

restrained.

- Use appropriate drill bit or accessory for work to be performed.

ask attendant for assistance if you are not sure which bit or accessory to use.

- Check forward/reverse switch before starting Switch should be in forward position

for drilling or reverse for backing out stuck bits.

- Use chuck key to secure bits in chuck. Tighten all three holes.
- This is a high torque drill, use accessory handle for greater leverage when using bits larger than 1”.
- Always keep finger or exposed flesh away from drill bit or accessory.

### **Cordless Drill**

Cordless drills have a variety of uses; drilling holes, driving screws and fasteners, sanding with abrasive accessories, etc. They are very versatile because of the large number of accessories available and also because they are not bound by the limits of electrical cords.



## Safety and Use

- Eye protection is required when using these tool.
- Stay focused on the tool and the work being performed.
- Loose clothing, hair and or jewelry should be removed, tucked back and or restrained.
- Use appropriate drill bit or accessory for work to be performed. Ask attendant for assistance if you are not sure which bit or accessory to use.
- Set gear switch to high or low. Generally, use low speed to drive screws and high speed to drill holes.
- Check forward/reverse switch before drilling or driving screws.

Switch should be in forward position for drilling or driving screws, reverse for removing screws

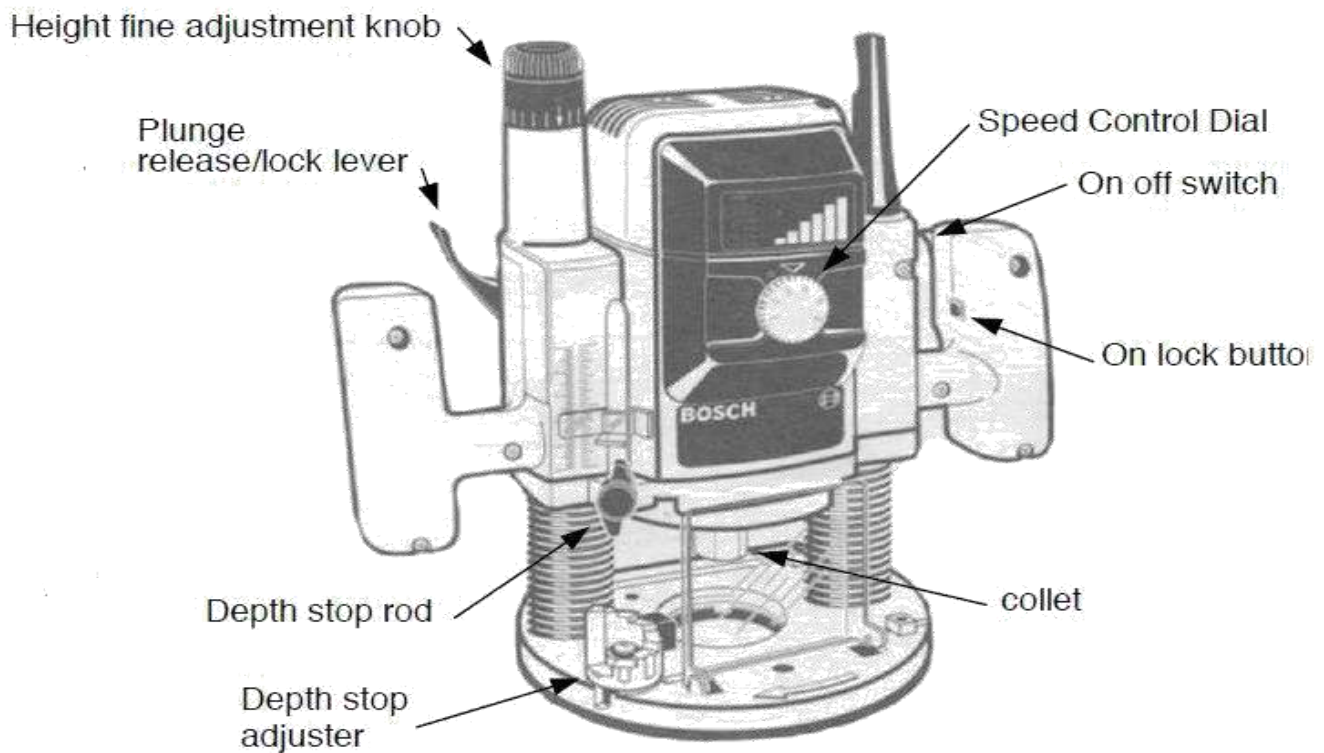
- Adjust clutch to appropriate setting for work being performed. Ask for assistance if you are not sure which setting to use.
- Always keep finger or exposed flesh away from drill bit or accessory.
- Avoid dropping or bumping drill of tables and ledges. Be mindful and keep drill away from the edge of work benches or elevated surfaces.
- Ask for assistance with discharged battery.



- When drilling holes use a piece of scrap under material being drilled to protect workbenches and to minimize tear out on mat

## Routers

Routers are one of the most versatile tools in the woodworking field. Different cutters called bits, may be used to provide a variety of cutting and shaping operations such as; slotting, mortising, grooving, rabbeting, corner-rounding, beading, dovetailing, veining, inlay work, etc



Plunge Router

## **Safety**

- Eye protection is required when using these tools.
- Stay focused on the tool and the work being performed.
- The use of hearing protection is encouraged when using this tool.
- The use of a dust mask is encouraged when using this tool.
- Loose clothing, hair and or jewelry should be removed, tucked back and or

### Restrained

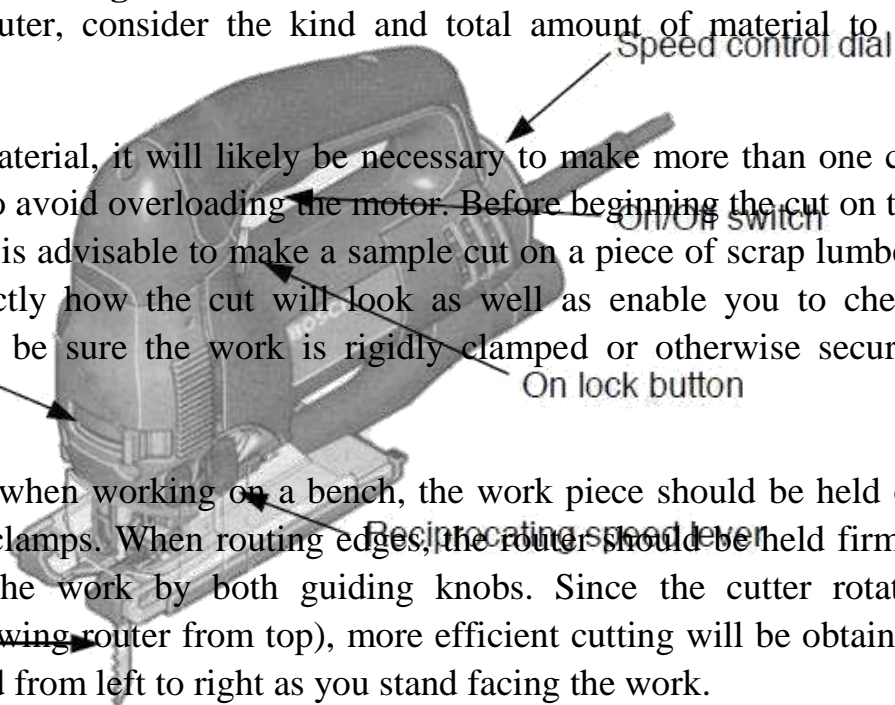
- Select proper bit for work to be done.
- Always be sure the collet nut is securely tightened to prevent the router bit from slipping during use.
- Use appropriate dust collection device and adapter if practical.
- Make certain that the work piece is rigidly held in desired position and free of obstructions and always hold the router firmly and against the work, using both hands.
- Remove material in increments (successive passes) if cut will exceed 1/8" in width or depth of cut. Keep cutting pressure constant. Do not force tool into cut.
- Never adjust depth of cut while motor is running.
- Be sure cord is free and will not "hang up" during routing operations.
- Keep hands clear of cutter when motor is running to prevent personal injury.
- Be sure switch is "OFF" before plugging in.
- Maintain firm grip on router when starting motor to resist starting torque. Allow motor to come to full speed before contacting work piece.

- Be sure motor has completely stopped before setting machine down.

### Typical procedure for using router

Before using the router, consider the kind and total amount of material to be removed.

Depending on the material, it will likely be necessary to make more than one cut for best results and to avoid overloading the motor. Before beginning the cut on the actual work piece, it is advisable to make a sample cut on a piece of scrap lumber. This will show exactly how the cut will look as well as enable you to check dimensions. Always be sure the work is rigidly clamped or otherwise secured before making a cut.



Generally speaking, when working on a bench, the work piece should be held on the bench by wood clamps. When routing edges, the router should be held firmly down and against the work by both guiding knobs. Since the cutter rotates clockwise (when viewing router from top), more efficient cutting will be obtained if the router is moved from left to right as you stand facing the work.

When working on the inside of a template, move router in a clockwise direction. When working on the outside of a template, move the router in a counter clockwise direction. The speed and depth of cut will depend largely on the type of material being worked upon.

Keep the cutting pressure constant, but do not force the router through the material so the motor speed slows excessively. When making cuts on all four edges of the work piece, it is advisable to make the first cut on the end of the piece across the grain. Thus, if chipping occurs at the end of a cut, it will be removed when making the next cut parallel with the grain.

The shop has two different types of routers. Plunge Routers allow the user to make cuts on the interior area of a material. With a spring loaded mechanism the user is able to “plunge” the router bit into the material when it is placed in the interior portions of the material.

Fixed Base Routers on the other hand must be started from the outside edges of the material. They can be used for profiling the edges of material and can also be used to cut from grooves from one edge of the material to the other. Fixed base attachment. Base clamp Lever On/Off switch Speed Control Dial Router with Fixed Base Plunge Router Plunge release.

## **Jigsaw**

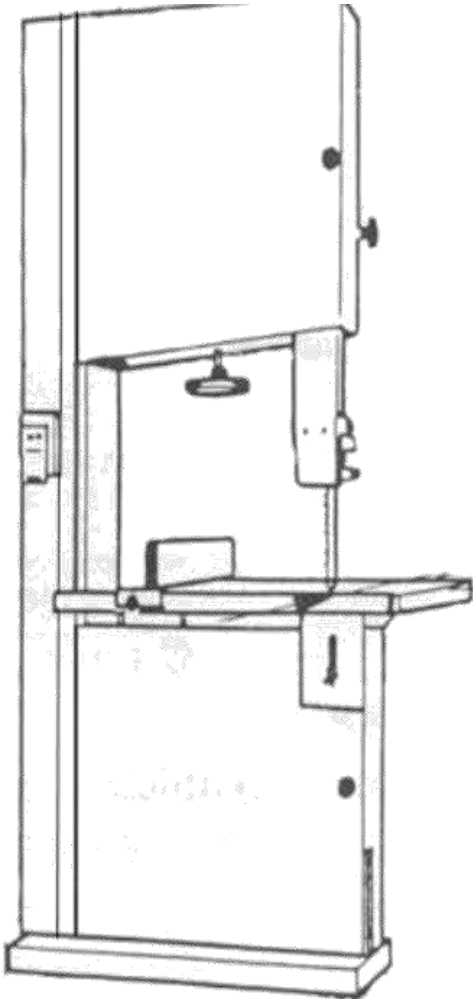
This tool is generally used for pattern cutting into materials with the maximum thickness of 2" wood and 1 1/4" plastic and fiberglass, refer to manual for metal thickness.

### **Safety**

- Eye protection is required at all times when using this tool.
  - Stay focused on the tool and the work being performed.
  - Restrain loose clothing, tie back long hair, remove or restrain loose jewelry.
  - Keep fingers away from line of cut
  - Always securely clamp or hold material in position.
1. Use appropriate blade for material to be cut. Ask for help from shop staff.
  2. Do not attempt to change blade or blade settings.
  3. Find a clear area to work with this tool and secure the material.
  4. When cutting on material on bench-tops be aware of where bench surface is underneath. Avoid cutting bench-top.

5. Area underneath line of cut should be free of any obstructions.
6. Line up front edge of blade with line of cut.
7. Back Jigsaw away from material slightly .
8. Never start Jigsaw with front edge of blade pressed up against material.
9. Keep jigsaw base flat on material when in use.
10. Never use a bent blade

**LU 2. Operate heavy duty woodworking machines.**



## BAND SAW MACHINE.

### Wood Cutting Band Saws

Band Saws can be used to cut straight cut and freehand curves in all kinds of wood and some types of plastics. Before using these pieces of equipment please read and make sure you understand the following safety rules. With the various size Band Saws in the shop and the variety of blade sizes large planks of lumber can be cut as well as delicate scale model materials.

#### Safety

- Eye protection is required when using these machines.
- Stay focused on the tool and the work being performed.
- ALWAYS MAINTAIN A 3” MARGIN OF SAFETY (Keep hands and body parts away from line of cut).
- Make all adjustments with the power off.
- Do not expose more than 1/2” of blade between material and bottom of upper guide.
- Allow saw to reach full speed before beginning cut.
- Hold stock flat on table top.
- Do not cut stock that does not have a flat surface. (i.e. do not attempt to cut spherical objects).
- Feed stock only as fast as teeth will remove material.
- Avoid backing out of cuts when possible.
- Plan relief cuts in advance – think first.
- Do not make turns too
- Tight – listen for blade twisting.

- If “clicking” noise is heard, SHUT OFF POWER – BLADE MAY BE DAMAGED.
- Stop machine and blade before removing scrap pieces.
- On 15” Band saw allow blade to coast to a stop before cleaning.
- Band Saw blades continue to move after power has been shut off. Use brake when available to stop blade or stay with machine until blade stops.
- Operate the machine from front side (side with doors). Avoid standing to side of machine.
- Ask for help when cutting long or wide or difficult to handle pieces.
- Saw is for use in cutting wood and some other soft materials

Keep hands and body parts away from line of cut.

### **Procedure for using Band Saws**

- 1) Inspect material. It should be flat and free of debris (dirt, nails, screws, etc.)
- 2) Check blade pitch. Use proper blade for various cuts (ask shop attendant).
- 3) Adjust upper guide to within 1/2” above surface of material.
- 4) For straight cuts set up fence (see attendant for assistance).
- 5) Turn on saw. Machine should run smoothly with a consistent buzz. Report strange noises to shop attendant.
- 6) Feed material while standing directly in front of blade. Avoid standing to side of blade.
- 7) Keep hands and body parts away from line of cut. Sometimes the blade may "jump" through the material. This occurs when the blade cuts through a portion of the material that may have a lesser density, thus offering less resistance to cutting. The blade will actually speed up and cut at a greater velocity. If you are near the end of a cut and your fingers are in the line of cut injury could occur.

8) Begin feeding material into blade. Use enough pressure to feed material through blade at a slow consistent speed. If material smokes or burns report it to shop attendant.

If you need to pull material out of blade do so with caution, proceed slowly and if blade pulls away from guides do not try to pull piece out

9) Any further. If blade gets stuck in saw kerf and pulls out of guides turn off machine and seek help from shop attendant.

10) For angled cuts check with shop attendant for help.



# Typical Band Saw detail

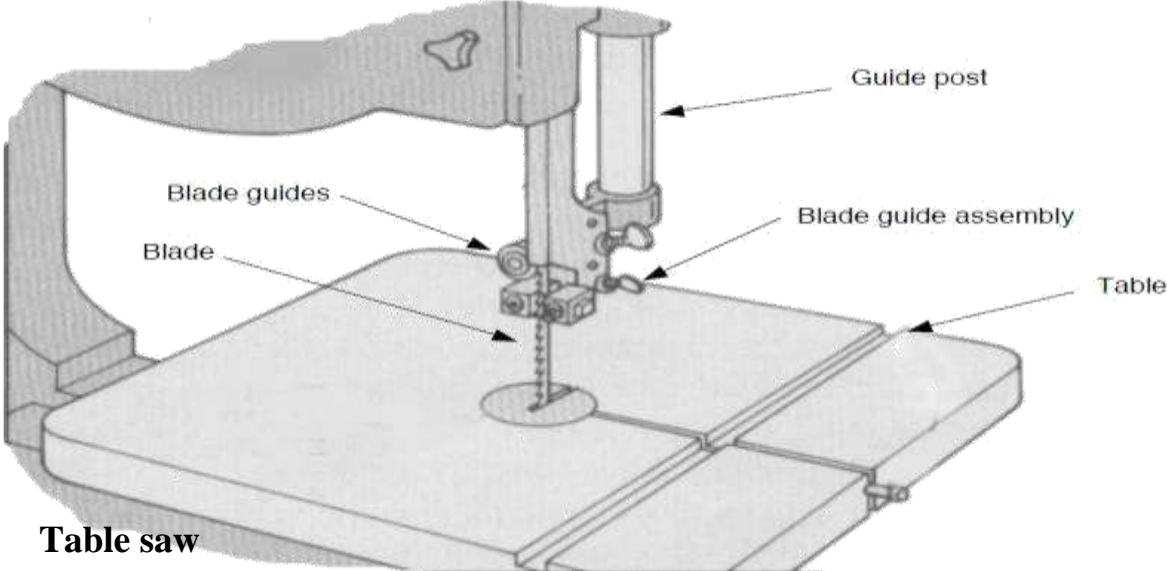
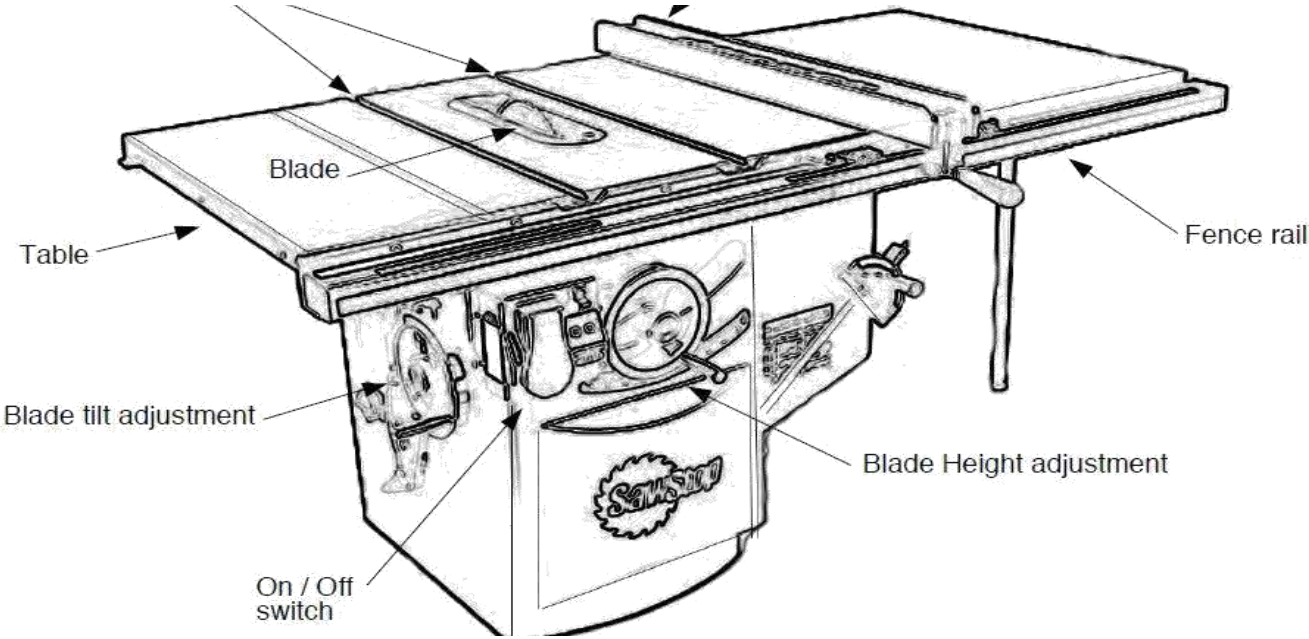


Table saw



The Table saw is a frequently used piece of equipment. It can be used to cut solid wood, composite wood products such as plywood and particleboard and some types of plastics. The table saw shown above is configured primarily for ripping wood (cutting parallel to the grain of the wood). Two table saws in the shop are configured in this manner. One is set up with a blade used for making cuts as shown and the other is setup with a dado blade used for cutting grooves in material.

### **Safety**

Protective eyewear should always be worn when operating this machine.

- Hearing Protection is recommended while using these machines.
- Stay focused on the tool and the work being performed.
- Seek shop attendant approval before using these machines.
- Material to be cut on table saws should be flat and straight on at least two adjacent surfaces. Free of dirt, loose knots and splits.
- Be sure to check for any metal objects embedded in the wood (nails, screws, staples, etc.)

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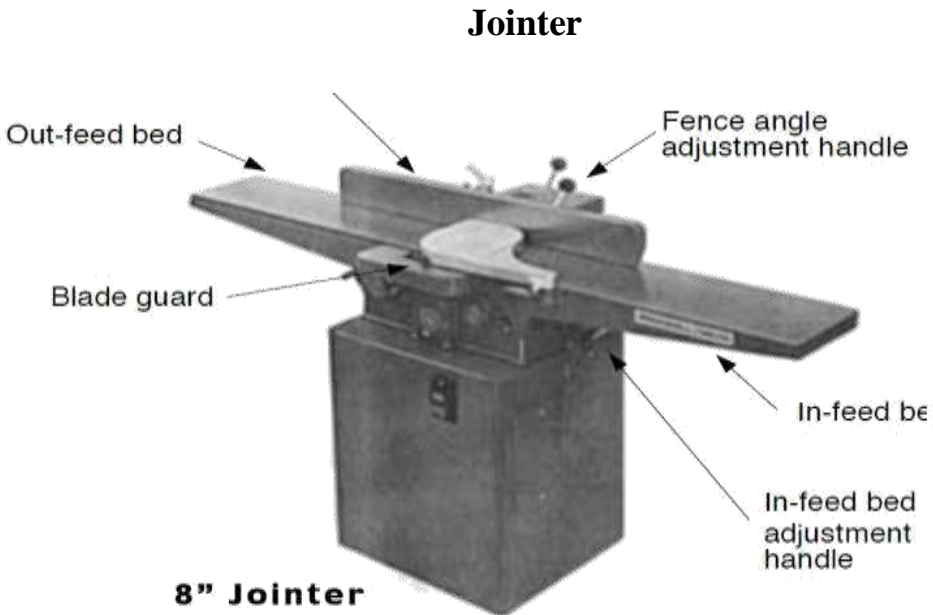
- Hearing Protection is recommended while using these machines.
- Stay focused on the tool and the work being performed.
- Seek shop attendant approval before using these machines.

- Material to be cut on table saws should be flat and straight on at least two adjacent surfaces. Free of dirt, loose knots and splits.
- Be sure to check for any metal objects embedded in the wood (nails, screws, staples, etc.)
- Use a push stick whenever cutting pieces less than 6" wide.
- Do not rip material greater than 2" thick on this machine.
- If guards need to be removed please ask shop attendant for help.
- **DO NOT LET GO OF MATERIAL UNTIL IT IS COMPLETELY PAST THE BLADE.**
- Avoid standing directly in-line with blade. If possible stand off to the side of blade.

### **Procedure for ripping material on table saw**

- 1) Inspect material. It should be flat and straight, free of loose knots, dirt, or metal objects.
- 2) Use appropriate blade for material being cut. Seek attendant's help if needed.
- 3) Adjust blade tilt if needed, use appropriate throat plate for beveled cuts. Seek attendant's assistance if needed.
- 4) To adjust fence to desired width, lift large handled knob upwards and slide fence bar towards or away from saw blade.
- 5) Guards should be kept in place. But can be removed if they interfere with passage of material through blade (By shop attendant only).
- 6) Lock down fence by pushing large handled knob downwards.
- 7) Have push stick ready for use if there is less than six inches between fences and saw blade.

- 8) Remove dust shield if it interferes with passage of push stick (Usually about 3" width).
- 9) Remove Splitter if it interferes with passage of push stick
- 10) Turn on saw
- 11) Place material flat on table saw surface and tight against fence.
- 12) With steady even pressure and moderate speed push material into blade.
- 13) As material moves through blade continue holding material tight against fence And flat against table.
- 14) Minimize saw marks and burning by not pausing during the sawing process.
- 15) When end of board approaches reach for push stick if needed (Material less than 6" wide).
- 16) When reaching for push stick, do not let go of material at any time. Switch hands as necessary to reach for push stick.
- 17) Do not let go of material until it is completely past saw blade.



The Jointer is a primary piece of woodworking equipment. It is used to make wood material flat and square in preparation for other machining procedures.

Safe and proper use and good technique are essential for accurate and consistent performance.

### **Safety**

- Protective eyewear should always be worn when operating these machines.
- Stay focused on the tool and the work being performed.
- Never attempt to process end grain (end of board) on this machine.

- Never reach down to free material that gets stuck on the out-feed bed while machine is on and operating.
- Ask for shop attendant's assistance for help changing depth of cut settings.
- It is easier to flatten shorter lengths of material. Cut longer boards to rough length before flattening.

### **Procedure for flattening a board:**

Seldom does a board come from a lumberyard or sawmill truly flat or square. More often than not boards will have a warp, twist or bow or a combination of all of these things.

A jointer can remove these undesirable qualities and leave the material in a more workable condition.

- 1) Inspect material. It should be clean and free of debris; dirt, nails, screws and loose knots.
- 2) Check settings on machine. Depth of cut should be 1/16" or less for hardwoods or 1/8" or less for softwoods.
- 3) Turn the machine on.

If material is bowed or cupped place it on the in-feed table with the cup or bowed side down.

***Fingers should be above surface of material at all times.***

4) Begin feeding material through cutter knives. Apply downward pressure to the leading end of the board and a combination of downward and forward pressure on back end of board. . If material gets caught on out-feed bed DO NOT reach down to free material. Hold material in place and turn off machine. Back material out after machine has stopped completely.

5) As material passes over cutter knives gradually shift more downward pressure to back end of board. Material should pass over knives with relatively little vibration

(Procedure cont'd) and with a moderate noise level. Noisy cuts or cuts that generate a lot of vibration indicate dull knives. Report this to shop attendant.

6) Repeat steps 5 and 6 until material is flat on one side.

### **Procedure for jointing the edge of a board**

Once the face of a board has been flattened an edge that is straight and 90° to the face can be obtained.

1) Inspect material. It should be clean and free of debris; dirt, nails, screws and loose knots.

2) Check settings on machine. Depth of cut should be 1/16" or less for hardwoods or 1/8" or less for softwoods.

3) Make sure dust collector is on.

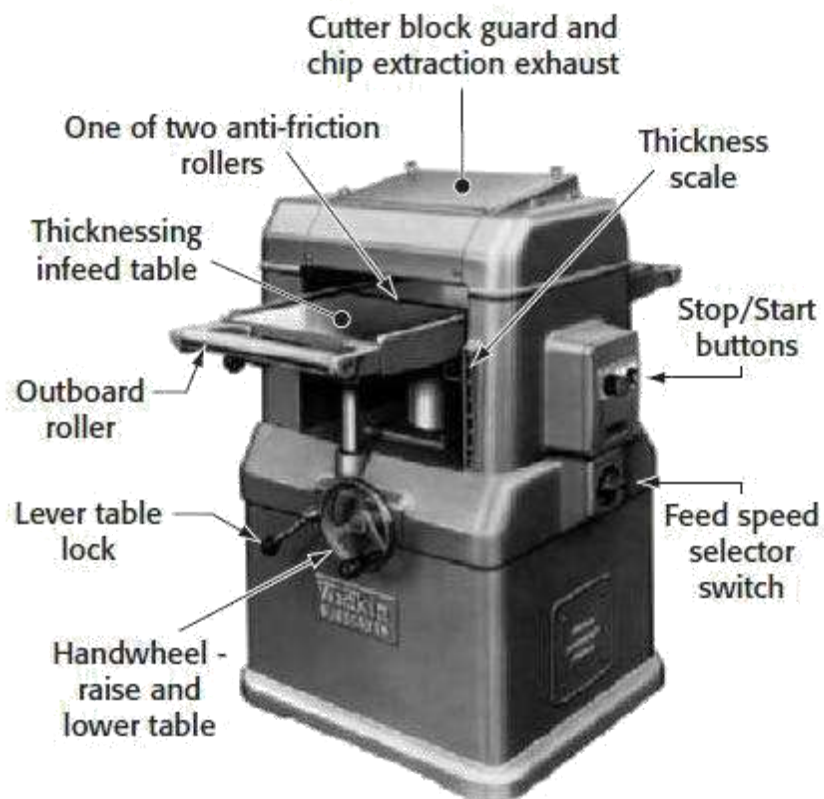
4) Turn the machine on.

Place the flat face of the board against the fence. Apply pressure at the leading end of the board and press it flat against the fence. At the back end of the board use your other hand to begin pushing the board.

Fingers should be above surface of material at all times.

- 5) Use push block if needed. . If material gets caught on out-feed bed DO NOT reach down to free material. Hold material in place and turn off machine. Back material out after machine has stopped completely.
- 6) As the material passes over the cutter head use one hand to keep the board against the fence and tight to the bed. Allow the board to slide past as the other hand pushes the material. Ask for help if you don't understand this procedure.
- 7) Repeat steps 6 and 7 until the edge is square to the face and straight along the length. Use a square to check for square.

### Planer





The Planer is ideally suited for planing small to medium size wide boards of solid wood. It can be used to plane rough sawn wood or wood that has been previously flattened.

PLANERS DO NOT FLATTEN BOARDS. If there is a bow, cup or twist in a board the planer will not remedy these characteristics. A planer will merely smooth the face of a board and plane it to a consistent thickness. The planers in the woodshop are vital pieces of equipment and crucial to the completion of many projects. Be gentle with these machines and read the operating procedures carefully.

### **Safety**

- Do not stand directly behind machine when operating.
- Do not look into front opening of planer while it is on and operating.
- Protective eyewear should always be worn when operating this machine.
- Stay focused on the tool and the work being performed.
- The use of hearing protection is recommended when using this machine.
- Do not attempt to remove too much material per pass
- Always measure thickness of board at several points along the length
- For the first pass set the machine according to the thickest part of the board.
- Material to be surfaced should be at least 12" long.
- If needed see attendant for assistance with this machine.

Clutch lever

In-feed bed

On / Off switch

Table height adjustment

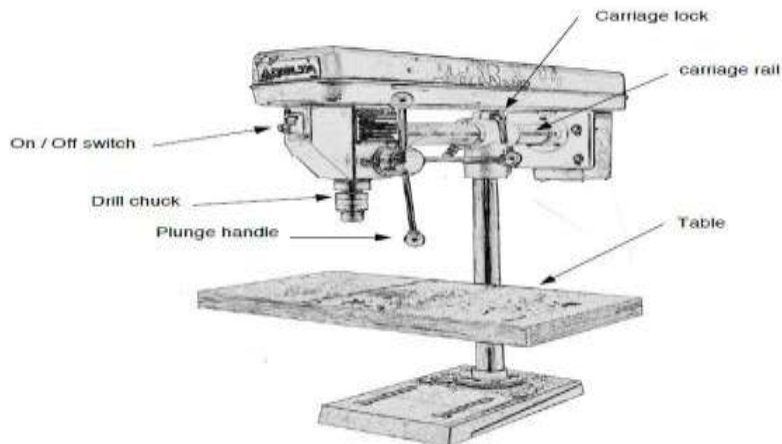
Front opening

## Procedure for planing a board

- 1) Check board for maximum thickness.
- 2) Adjust planer for thickest part of board. Be sure planer is off. Insert board into front of planer and raise or lower table bed until material barely clears the in-feed roller. (The in-feed roller is a serrated metal rod about 3" in from the front of planer).

Machine should be off for this step :

- 3) Use hand crank on left side of machine to raise / lower bed.
- 4) Turn on machine (Green button).
- 5) Make sure dust collector comes on.
- 6) Feed board into machine with grain of wood parallel to direction of feed.
- 7) If material gets stuck in planer, pull or push clutch to right (When facing front of machine) and give board a push into machine.
- 8) Raise bed for next pass.



## **Radial Drill Press**

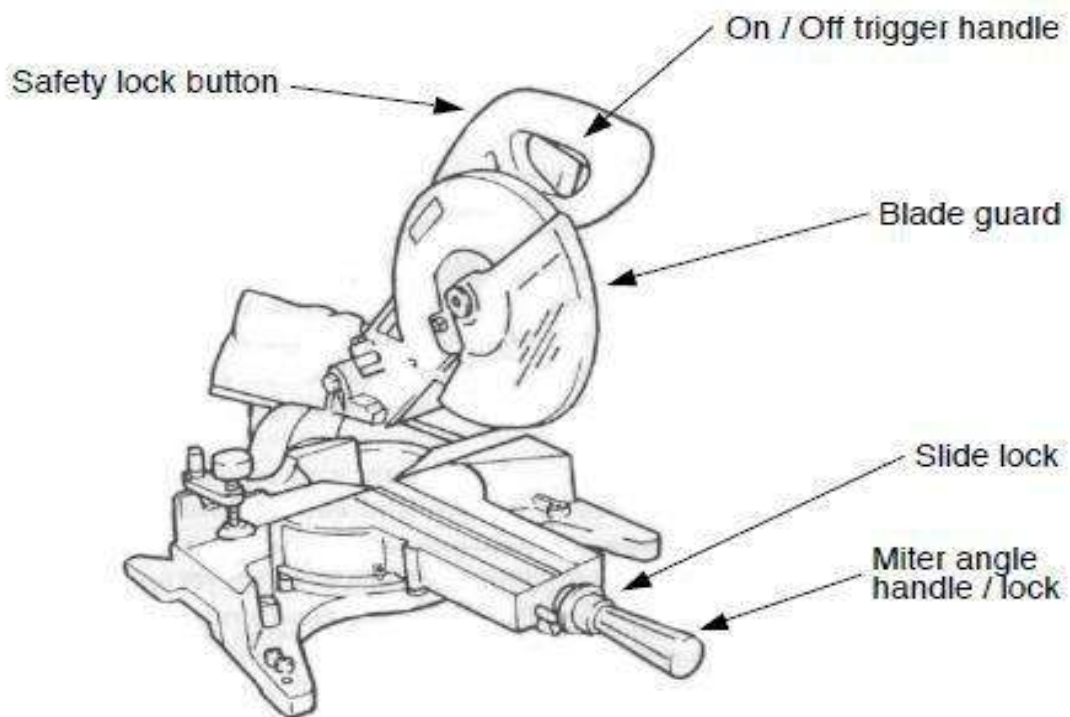
The Radial Drill Press has a movable carriage that allows the user to drill holes in the center of large pieces . It also has a tilting carriage feature that gives it the ability to drill holes at an infinite number of angles.

### **Safety**

- Protective eyewear should always be worn when operating this machine.
- Stay focused on the machine and the work being performed.
- General Rule: The larger the bit the slower the speed. Ask shop attendant for help changing speed.
- Always remove chuck key before starting drill press.
- Make adjustments with power off.
- Securely lock bits into chuck by tightening all three holes.
- Be sure to use scrap beneath material to be drilled.
- Avoid drilling into drill press table.
- Loosen lock knob before using crank handle to raise drill press table.
- Drill only wood, plastics, mild steel, aluminum, brass with the drill press.
- Always clamp down metal or plastic material.
- Hold material to be drilled securely. For small pieces use a drill press vise or clamp.
- Do not drill full depth of hole in one plunge. Take several small plunges.
- Shut off power, remove bit and clean drill press and surrounding area when done.

## Sliding Compound Miter Saw

The Sliding Compound Miter Saw can make 90-degree cross cuts and compound angles in wood and wood composite. It cuts quickly with a fair degree of accuracy.



## **Safety**

- Protective eyewear should always be worn when operating this machine.
- Stay focused on the machine and the work being performed.
- Cut only wood and wood based material with this saw.
- Material should be flat and straight. Do not attempt to cut bowed or twisted boards with this machine. This could cause a kickback.
- Hands and finger should be kept a minimum of 8" from blade.
- Do not cut pieces less than 12" with this saw.
- Do not operate saw with hands crossed. I.E., Left hand should always stay to left of saw and used for holding material and right hand should always be used to operate saw switch.

## **Procedure for crosscutting**

- 1) Adjust bevel angle and miter angle to desired settings (seek attendant assistance).
- 2) Adjust adjustable fence to clear blade guard travel (seek attendant assistance).
- 3) Hold material firmly and flatly against fence and table.
- 4) Pull saw carriage out past material.
- 5) Simultaneously push safety lock button and squeeze trigger handle to start saw.
- 6) Allow blade to reach full speed before lowering saw into material.
- 7) Lower saw blade into material with a slow steady rate of feed.
- 8) Push saw carriage through material and back towards fence.

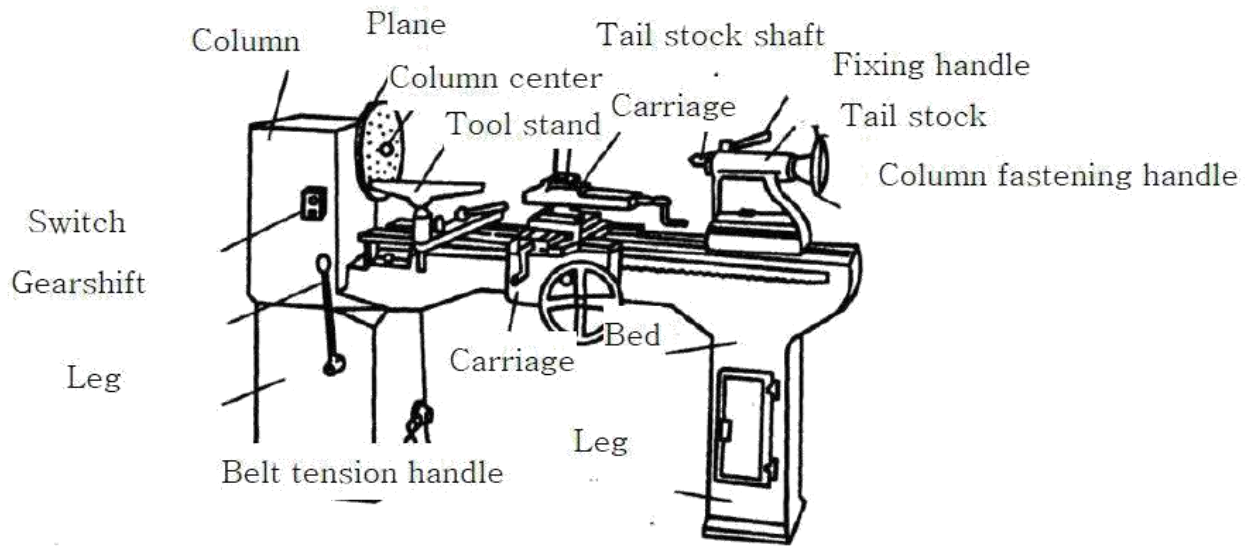
9) If material starts to bind against blade, lift saw from material and take several shallow passes until cut is complete.

10) Allow blade to come to a complete stop before raising blade.

11) After cut is complete do not reach for material until blade is fully covered by blade guard.

## **Wood Lathe**

The Lathe is used for making things round in cross-section. Material is mounted in the chuck and tools are used to “cut” the shape as the material spins. Shaped spindles, bowls and other semi-circular objects can be turned on the lathe.



Picture 1 Structure of wood lathe

The Lathe is used for making things round in cross-section. Material is mounted in the chuck and tools are used to “cut” the shape as the material spins. Shaped spindles, bowls and other semi-circular objects can be turned on the lathe.