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Presented by the manufacturer members of the
power tool institute, inc.

The purpose of the Power Tool Institute is to educate the public as to the usefulness and importance of power tools; to encourage high standards of safety and quality control in the manufacture of power tools; and to prepare and distribute information about safe use of power tools.

POWER TOOL
"SAFETY IS SPECIFIC"

Guidelines for the safe operation of widely used portable, and stationary power tools

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Contents

Introduction

Power tools are ‘good friends’ which require operator respect in specific ways. They must be used carefully and kept in safe operating condition, whether they are in the hands of a professional tradesman, a beginning do-it-yourselfer or a vocational student. *The demands of safety apply to all.* The material presented here is a compilation of carefully selected safe use precautions as they relate to specific electric power tools — ACTUALLY SPECIFIC CAUTIONS, WARNINGS AND DANGERS. The purpose is to underscore for you some of the aspects of safe use related to specific tools which have high potential of causing injury if ignored. There are other safety precautions that relate to the specific tools covered that are not included here, and many general power tool safety recommendations of which users should be aware, such as:

- Reading and understanding the contents and following the advisements of owner/operators manuals on each specific power tool and related accessories. This is considered essential to the safe operation of any power tool.
- Reading and understanding information on labels affixed to tools before operating the tool.
- Connecting power cords only after the switch is off, and you have followed all instructions contained in the tool owner/operators manual concerning assembly, alignments, guarding, operation procedures and safety instruction.
- Comparing the data on the tool nameplate with the voltage and amperage are compatible.
- Disconnecting tools from the power source after each use, and before making adjustments, or changing accessories.
- Not using accessories other than those specifically recommended by the manufacturer, as described in the specific tool’s owner/operators manual.
- Wearing safety goggles or safety glasses with side shields, complying with current national standard and a face shield when needed, for all power tool operations. It is always highly dangerous not to have proper eye, face and ear protection.
- Not using power tools in damp, wet conditions.
- Guarding against overconfidence or repetitious operations lulling you into carelessness. It only takes a second for a serious accident to occur.
- Checking often to assure that the guards return to their normal position quickly. If a guard seems slow to return or “hangs up” then repair or adjust it immediately.
- Replacing or repairing damaged or missing parts before continuing to use a tool.

Please see “General Safety Recommendations.”

And, remember this:
If a tool fails to turn on or off in a normal way or it turns on or off by itself, unplug the tool immediately. These are abnormal conditions and may indicate a faulty switch or an electrical short. The potential for electric shock or other injury exists. Do not use the tool until it has been repaired. With the exception of models marked “Double Insulated,” tools are equipped with three-wire, grounded cords. Maintaining a proper ground is a must for these tools. Never remove the ground.

NOTICE

The contents of this brochure are not meant to be, nor should they be considered, an absolute or complete presentation of the safety measures and procedures that relate to the usage of the power tools covered. Obviously every possible application cannot be foreseen. This brochure’s purpose is to highlight only some important safety and safety related information compiled from the experience of Institute members and other reliable safety oriented sources. Individual manufacturers’ tool owner/operator manuals, shipped with tools and accessories, are recommended as a final source for proper procedures for specific tool usage.

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reciprocating saws

The versatility of the reciprocating saw, in cutting metal, pipe, wood and other materials has made it a widely used tool. By design, it is a simple tool to handle. Its few demands for safe use, however, are very important.

Blades can break. Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear loose clothing, jewelry or any dangling objects that may catch in moving parts or accessories. Tie back long hair.

Use sharp blades. Dull blades can produce excessive heat, make sawing difficult, result in forcing the tool, and possibly cause an accident.

Without exception, use the blade specifically recommended for the job being done. Check your owner/operators manual carefully concerning this.

Position yourself to maintain full control of the tool, and avoid cutting above shoulder height.

To minimize blade flexing and provide a smooth cut, use the shortest blade that will to the job.

To minimize blade flexing and provide a smooth cut use the shortest blade that will do the job.

The workpiece must be clamped securely, and the shoe of the saw held firmly against the work to prevent operator injury and blade breakage.

When plunge cutting, use a blade designed for that purpose. Maintain firm contact between the saw’s shoe and the material being cut.

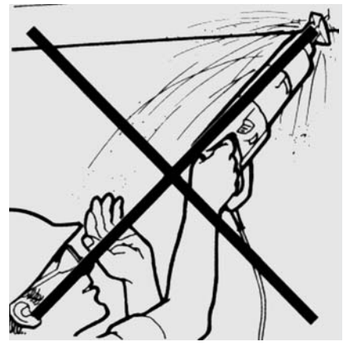
When making a “blind” cut (you can’t see behind what is being cut), be sure that hidden electrical wiring, or water pipes are not in the path of the cut. If wires are present, they must be disconnected at their power source by a qualified person or avoided, to prevent the possibility of lethal shock or fire. Water pipes must be drained and capped.

Always hold the tool by the insulated grouping surfaces.

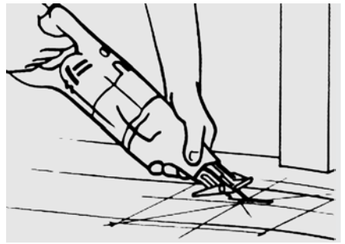
When making anything other than a through cut, allow the tool to come to a complete stop before removing the blade from the workpiece. This prevents breakage of the blade, and possible loss of tool control.

Remember that the blade and blade clamp may be hot immediately after cutting. Avoid contact until they have cooled.

You expose yourself to unnecessary hazards if these or any manufacturers’ instructions are not followed. Keep hands away from blade and shoe.



When possible, avoid cutting above shoulder height. Wear a dust mask when necessary in addition to safety glasses with side shields. Hold tool firmly with both hands.



When plunge cutting maintain firm contact between shoe and workpiece.

circular saws (portable)

Among professional tradesmen, on the farm, around the house and in the vocational shop, the circular saw is probably the most commonly used power saw, and perhaps the most commonly abused. Familiarity should not breed carelessness. The following are specific safety 'musts' when using any portable circular saw. Not doing so must be considered dangerous. Failure to follow these safety rules may result in serious injury.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Do not use a circular saw that is too heavy for you to easily control

Be sure the switch turns on properly. Do not use a tool if the switch does not turn it off when returned to the "off" position after release.

Use sharp blades. Dull blades cause binding, stalling and possible kickback. They also waste power and reduce motor and switch life.

Use the correct blade for the application. Check this carefully: Does it have the proper size and shape arbor hole? Is the speed marked on the blade at least as high as the no load RPM on the saw's nameplate?

Check blades carefully before each use for proper alignment and possible defects. Be sure the blade washers (flanges) are correctly assembled on the shaft and that the blade is properly supported.

Is the blade guard working? Check for proper operation before each cut. Check often to assure that guards return to their normal position quickly. If a guard seems slow to return or "hangs up" repair or adjust it immediately. Never defeat the guard to expose the blade. For example, tying back or removing the guard.

Before starting a circular saw be sure the power cord and extension cord are out of the blade path and are sufficiently long to freely complete the cut. A sudden jerk or pulling on the cord can cause loss of control of the saw and a serious accident.

For maximum control, hold the saw firmly with both hands after securing the workpiece. Clamp workpieces. Check frequently to be sure clamps remain secure.

Never hold a workpiece in your hand or across your leg when sawing.

Avoid cutting small pieces of material which can't be properly secured, and material on which the base of the saw (shoe) cannot properly rest.

When making a "blind" cut (you can't see behind what is being cut), be sure that hidden electrical wiring, water pipes or any mechanical hazards are not in the blade path. If wires are present, they must be disconnected at the power source by a qualified person or avoided. Contact with live wires could cause lethal shock or fire. Water pipes should be drained and capped. Always hold the tool by the insulated grasping surfaces.

Set blade depth to no more than 1/8 in. to 1/4 in. greater than the thickness of the material being cut.

When you start your saw allow the blade to reach full speed before the workpiece is contacted.

Be alert to the possibility of the blade binding and kickback occurring, (see "preventing Portable Circular Saw Kickback").

If a fence or guard board is used, be certain the blade is kept parallel with it.

NEVER overreach!

Crowded, cluttered conditions that can cause tripping, or loss of balance are particularly dangerous.

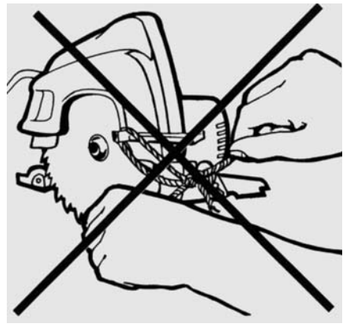
When making a partial cut, or if power is interrupted, release the trigger immediately and don't remove the saw until the blade has come to a complete stop.

Never reach under the saw or workpiece.

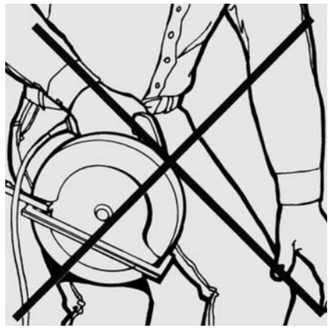
Portable circular saws are not designed for cutting logs, or roots, trimming trees or shrubs. These are very hazardous practices.

Switch the tool off after a cut is completed, and keep the saw away from your body until the blade stops.

Unplug, clean and store the tool in a safe, dry place after use.



Never *tie back or defeat the retractable guard to expose the blade. It can result in severe injury.*



A plugged in circular saw should ***never*** *be rested on your arm, leg or foot.*

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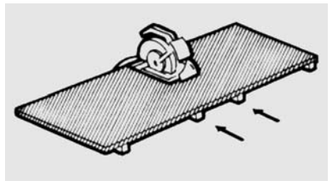


PREVENTING PORTABLE CIRCULAR SAW KICKBACK

Kickback is a sudden reaction to a pinched blade, causing an uncontrolled portable tool to lift up and out of the workpiece toward the operator. Kickback is the result of tool misuse and/or incorrect operating procedures or conditions.

Take these specific precautions to help prevent kickback when using any type of circular saw:

Keep saw blades sharp. A sharp blade will tend to cut its way out of a pinching condition.

Make sure the blade has adequate set in the teeth. Tooth set provides clearance between the sides of the blade and the workpiece, thus minimizing the probability of binding. Some saw blades have hollow ground sides instead of tooth set to provide clearance.

Keep saw blades clean. A buildup of pitch or sap on the surface of the saw blade increases the thickness of the blade and also increases the friction on the blade surface. These conditions cause an increase in the likelihood of a kickback

Be very cautious of stock which is pitchy, knotty or warped. These are most likely to create pinching conditions and possible kickback.

Always hold the saw firmly with both hands.

Release the switch immediately if the blade binds or the saw stalls.

Support large panels so they will not pinch the blade. Use a straight edge as a guide for ripping.

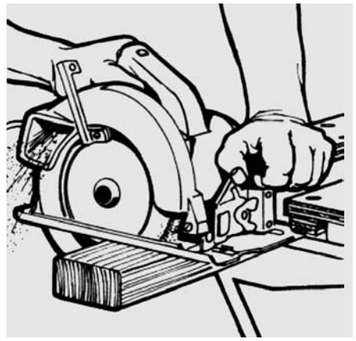
Never remove the saw from a cut while the blade is rotating.

Never use a bent, broken or warped saw blade. The probability of binding and resultant kickback is greatly increased by these conditions.

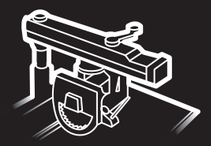
Overheating a saw blade can cause it to warp and result in a kickback. Buildup of sap on the blades, insufficient set, dullness, and unguided cuts, can all cause an over heated blade and kickback.

Never set a blade deeper than is required to cut the workpiece 1/8 in. to 1/4 in. greater than the thickness of the stock is sufficient. This minimizes the amount of saw blade surface exposed and reduces the probability and severity if any kickback does occur.

Minimize blade pinching by placing the saw shoe on the clamped, supported portion of the workpiece and allowing the cut off piece to fall away freely.



The workpiece must be securely clamped. For maximum control, use both hands to properly and safely guide the saw.



radial arm saws

Radial arm saws, because of their versatility, are widely used in the home, professionally, and in the vocation shop. They demand a thorough understanding by the operator of all of the procedures utilized.

To begin with, read and thoroughly understand the warnings and instructions on the saw and in the owner/operators manual.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Never operate a radial arm saw with tools debris or any loose objects on the table. Check often to assure that guards return to their normal position quickly if a guard seems slow to return or “hangs up,” repair or adjust it immediately.

Make sure the blade is installed to rotate in the proper direction.

The saw blade should not extend beyond the saw table in any operation you perform.

Know what a kickback is and all the precautions in preventing it from occurring. (See “Preventing Radial Arm Saw Kickback” Section).

Wrong direction feeding of a workpiece is extremely dangerous. Follow the instructions provided with, and on the saw very carefully.

Thoroughly read your owner/operators manual and instructions that accompany the lower guard.

Do not release your feed pressure on a workpiece, wait until it is clear of the blade.

Never read near, along side, or around the saw blade. This is particularly dangerous.

During a crosscutting operation, never place arm, hands or fingers in the path of the blade.

When a crosscut operation is complete, return the carriage to the full rear position behind the fence.

The anti-kickback devices should be positioned to just clear the workpiece in crosscutting.

Anti-kickback devices may not work when cutting smooth, hard surfaces. Therefore, always cut with the smooth, hard surface down, next to the table. When rip cutting a spreader should be used.

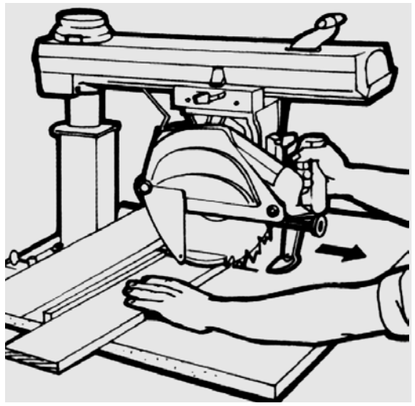
Use of some accessories, such as a dado or molding head, require special safety precautions and equipment. Consult the appropriate owner/operators manual.

Use only those accessories specifically recommended by the manufacturer of your tool.

Do not use grinding or wire brush wheels on your radial arm saw. Radical arm saws are not equipped with the proper guards for use of grinding or wire brush wheels.

Accessories specific to radial arm saw should be used with strict adherence to the radial saw manufacturer’s procedural and safety recommendations contained in the owner/operators manual.

Turn off, unplug when possible and lock the switch of the saw after each use. Store the switch or lock key.



When you crosscut always pull the saw towards you and through the workpiece just far enough to complete the cut. Pulling beyond this can result in picking up the cut-off piece and throwing it as the saw is returned to the back position. The anti-kickback device is positioned to act as a barrier guard.

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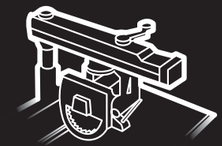


radial arm saws *(continued)*

PREVENTING RADIAL ARM SAW KICKBACK

Kickback of a workpiece (stock) can occur when the workpiece binds between the saw blade and the fence during a ripping operation. This can result in the workpiece being ejected from the saw and thrown back towards the operator. Following are precautions and advisements to prevent the potential for kickback from developing out of wrong procedure and/or operating conditions.

Keep your radial arm saw in correct adjustment and alignment. Use only sharp, freecutting tools and accessories that were designed for your saw. Follow your owner/operators manual carefully.

Both the spreader device (to prevent binding) and the anti-kickback devices should be used for most ripping operations the spreader must be precisely lined up with the blade.

When ripping, the upper guard must be positioned to hold down the workpiece on the table. Make certain that the anti-kickback device fingers are sharp, free-moving and adjusted to stop kickback and assure proper operation. See your owner/operators manual.

For ripping short or narrow stock, a push-stick must be used. It is to be applied between the blade and the fence. Do not attempt to rip a workpiece shorter than the diameter of the saw blade. Do not cut freehand (failing to use the fence to stabilize the workplace.

Other precautions which should be taken to prevent kickback while using a radial arm saw:

Keep blades sharp. A dull table may contribute to a kickback.

Make sure the set tooth blade has adequate set in the teeth. Tooth set provides clearance between the sides of the blade and the workpiece, thus minimizing the probability of binding. Some saw blades are hollow or taper ground to provide clearance.

Keep saw blades clean. A buildup of pitch or sap on the surface of the saw blade increases the thickness of the blade and also increases friction on the blade surface. These conditions cause an increase in the potential of a kickback.

Do not cut wet wood. It produces higher friction against the blade. Also the blade tends to load up with wet sawdust and creates a much greater probability of kickback.

Be very cautious of stock which is pitchy, knotty or warped. These are more likely to create pinching conditions and possible kickback. Avoid bowed stock that cannot be prevented from rocking on the table.

Never use a bent, broken or warped saw blade. Discard immediately.

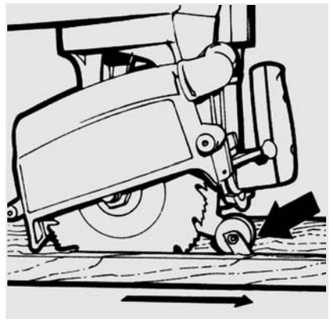
Overheating a saw blade can cause it to warp and create a kickback. Buildup of sap on blades, insufficient set, dullness and unguided cuts can all cause an overheated blade and kickback.

Freehanding a workpiece can cause crooked cuts and potential kickback. Crooked edges on the stock can also cause a crooked cut.

Make sure the blade is exactly parallel to the fence. If the fence closes in toward the rear of the blade it will tend to wedge the wood against the blade and may cause kickback.

Avoid standing or permitting others to stand directly behind the workpiece when making a ripping cut.

Always hold the workpiece firmly against the fence when crosscutting.



Make certain the spreader and anti-kickback device are in proper position for ripping and working order before you start your cut.

NOTE: Always follow instruction manual for proper application of lower guards.

table saws

The table saw is one of the most commonly used stationary power tools in any woodworking shop. Safe usage requires that it be handled with care and specific procedures be followed to prevent accidents. Read and understand the warnings and instructions on the saw and in the owner/operators manual.

Always wear safety goggles or safety glasses with side shield complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

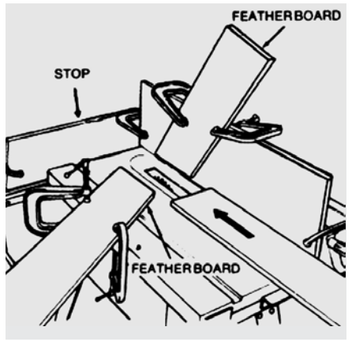
Do not wear gloves, loose clothing, jewelry or any dangling objects that my catch in rotating parts or accessories. Tie back long hair.

Keep the saw table free of tool and debris.

Use an auxiliary work support when sawing long or wide workpieces to assure firm control of the workpiece at all times.

A table saw should be equipped with a rip fence, miter gauge, blade guard, spreader and anti-kickback device. The rip fence must be parallel to the line of the saw blade to prevent binding and possible kickback (See "Preventing Table Saw Kickback").

The blade should project only a minimal distance above the cut — 1/8" to 1/4" is plenty — check your owner/operators manual carefully.



Featherboards should be used for all non-through sawing operations when the blade guard must be removed. Check your owner/operators manual.

Never reach over or behind the blade with the table saw operating.

Use the guard on all operations where the saw blade cuts through the thickness of the workpiece.

When using the table saw for dadoing, grooving or shaping, use a pushblock to keep your hands and fingers well away from the saw blade in case of kickback or other unexpected event.

Check often to assure that guards return to their normal position quickly. If a guard seems slow to return or "hangs up," repair or adjust it immediately.

Do not cut freehand (cutting without the use of a miter gauge or rip fence).

When crosscutting, use the miter gauge to assure a straight cut, not the rip fence. The cut off piece can bind between the fence and blade, causing kickback and possible injury.

When ripping, always use the rip fence to assure a straight cut.

Make sure the blade and fence are parallel to each other. Pressure to feed the workpiece (stock) should be against the direction of blade rotation and between the blade and the fence. Use a pushstick to keep your fingers away from the saw blade. For special operations (whenever the blade does not cut through the thickness of the workpiece) such as dadoing and rabbeting, consult your owner/operators manual.

Use a featherboard to firmly hold the workpiece against the fence and table when ripping narrow stock.

Keep your tool blades sharp. Dull blades can cause binding, possible kickback and injury.

Use the correct blade for the job you are doing. Watch for overly heated or vibrating blades. Correct the condition before continuing.

Make sure the blade is installed to rotate in the proper direction. Do not use grinding wheels, wire brushes, or abrasive wheels on a table saw.

Onlookers should be kept out of the work areas. They distract the operator and make him more accident prone. A

Wearing a full face shield along with safety glasses with side shields is an excellent safety practice.

kickback or a broken carbide tip could send the stock or the tip flying with unpredictable results.

It is recommended that you turn the tool off after each completed procedure.

The saw should always be turned off and unplugged before making adjustments of any kind.

Turn off, unplug when possible, and lock the table saw after each use. Remove and store the switch or lock key.

PREVENTING TABLE SAW KICKBACK

Kickback is the ejection of the workpiece from the saw back towards the operator. Table saw kickback may be caused by:

- the kerf of the workpiece closing up and pinching the rear of the saw blade.
- wedging of the workpiece between the fence and the rear of the saw blade (fence not parallel with saw blade).
- a crooked cut which causes the workpiece to bind against the sides of the blade as it passes through.
- edge of a workpiece against the fence not straight.

When binding, pinching or wedging occur the motion of the saw blade tends to lift the wood and may hurl it back toward the operator.

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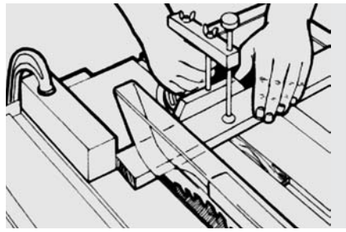
table saws (continued)



When using a block as a length stop (usually in repetitive crosscutting), the end of the block must be well in front of the saw blade and clamped securely to table. See your tool manual.

Specific safety precautions in preventing kickback when using table saws are given below:

Always use the spreader (splitter) when it is functional. This prevents the kerf from closing and pinching the blade. Make sure the spreader is properly lined up behind the blade.

Always use the anti-kickback pawls (fingers). If a kickback should occur they are designed to grab the workpiece and prevent it from being thrown back toward the operator. Keep the teeth of the pawls (fingers) sharp.

Anti-kickback devices may not work when cutting smooth or hard surfaces. Therefore always cut with the smooth, hard surface next to the table.

Always use the rip fence to guide the workpiece in a straight line when ripping.

Never freehand cut a workpiece. Freehanding causes crooked cuts and potential kickback. Crooked edges on the stock can also cause crooked cuts.

Make sure the fence is parallel to the blade. If the fence closes in toward the rear of the blade it will tend to wedge the wood against the blade and may cause kickback.

Never tilt the blade or saw table such that the workpiece is trapped in the angle between the blade and the fence. This is a condition which has high potential of causing kickback. Use the fence to the side of the blade that results in an angle greater than 90 degrees between the blade and the table.

Keep the angle between the blade and fence open so that the workpiece is free to absorb any misalignments. (See owner's manual for cutting techniques).

Avoid standing directly behind the workpiece when making a rip cut.

Always use the miter gauge when crosscutting, and hold the workpiece firmly against it to assure a straight cut.

Other precautions which should be taken to prevent kickback while using a table saw:

A dull blade may cause a kickback. Keep blades sharp.

Make sure set tooth blades have adequate set. Tooth set provides clearance between the plate of the blade and the workpiece, thus minimizing the probability of binding. Some saw blades are hollow or taper ground to provide clearance.

Keep saw blades clean. A buildup of pitch or sap on the surface of the saw blade increases the thickness of the blade and also increases friction on the blade surface. These conditions cause an increase in the potential of a kickback.

Do not cut wet wood. It produces higher friction against the blade. Also the blade tends to load up with wet sawdust, affecting a much greater probability of kickback.

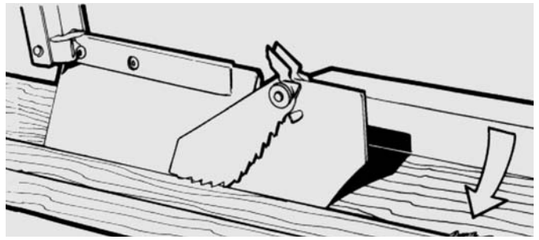
Be very careful of stock which is pitchy, knotty or warped. These are more likely to create pinching conditions and possible kickback.

Never use a bent, broken or warped saw blade. The probability of binding and creating a kickback is greatly increased.

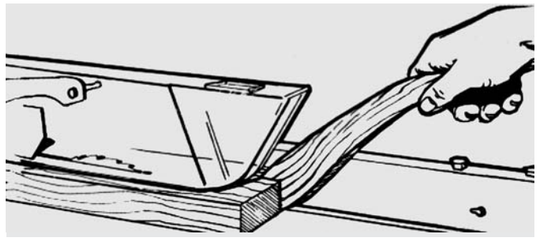
Overheating a saw blade can cause it to warp and create a kickback. Buildup of sap on the blades, insufficient set, dullness, and unguided cuts can all cause an overheated blade.

Do not use more blade height than is required to cut the workpiece - 1/8 in. to 1/4 in. greater than the thickness of the stock is sufficient. This minimizes the amount of saw blade exposed.

Never use miter gauge with the rip fence.



The saw blade should project only 1/8 to 1/4 in. above the workpiece.



Feed with a pushstick to keep hands well away from the blade.

NOTE: Guard not shown in place for illustration purposes only.

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miter saws and abrasive cut-off machines (chop saws)

These tools are used for crosscutting, mitering and beveling wood, non-ferrous metals, and plastics. They cut through the workpiece at a predetermined angle or miter. Some also can cut at a beveled angle.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Because of the downward cutting motion, your safety requires that you stay very alert to keeping hands and fingers away from the path that the blade travels.

Be sure all guards are in place and working. If a guard seems slow to return to its normal position or "hangs up," adjust or repair it immediately. Be alert at all times—especially during repetitive, monotonous operations. Don't be lulled into carelessness due to a false sense of security. Blades are extremely unforgiving. Clean the lower guard frequently to help visibility and movement. Unplug before adjustment or cleaning.

Use only recommended size and RPM rated blades.

Abrasive cut-off wheels should not be used on miter saws. Miter saw guards are not appropriate for abrasive cut-off wheels.

Remember that loose blades can fly off. Regularly check and tighten the blade and blade attachment mechanism.

When installing or changing a blade be sure the blade and related washers and fasteners are correctly positioned and secured on the saw arbor.

To avoid loss of control or placing hands in the path of the blade, hold or clamp all material securely against the fence when cutting. Do not perform operations freehand.

Never cut small pieces. Support long material at the same height as the saw table.

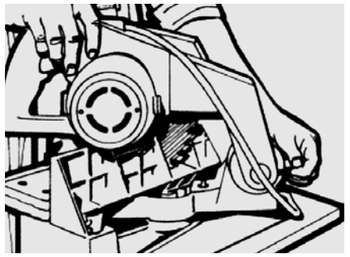
Never place your hands or fingers in the path of the blade, or reach in back of the fence. It's hazardous to do so. Do not cross arms or hands in front of blade to secure workpiece. Use clamps, if necessary. Saw blades coast after being turned off—use the brake if one is provided. To avoid contact with a costing blade do not reach into cutting areas until the blade comes to a full stop.

After completing a cut, release the trigger switch and allow the blade to come to a complete stop as mentioned, then raise the saw blade from the workpiece.

Miter saws have spring loaded saw heads to return the saw head to its up position. Adjust, repair, or replace the spring mechanism if the saw head does not automatically return to its up position when released. Hold or clamp the work firmly against the fence on the sawed end. Lock the miter saw and blades in the down position during transport or when not in use.

ABRASIVE CUT-OFF MACHINES

Although similar to miter saws in operation (see chapter on Miter Saws), abrasive cut-off machines are designed to crosscut ferrous metal. The wheel is made of abrasive materials held together with special resins. The wheel grinds through the metal rather than cutting with teeth. Accordingly, some special safety considerations come into play when suing abrasive cut-off machines.



Lock the miter box saw blade in the down position when not in use. (back view)

It is important to choose the proper cut-off wheel for the material and type of cutting you plan to do. All cut-off wheels have a maximum safe speed rating. Only use wheels whose rating exceeds the operating speed of your machine. Make sure the wheel is undamaged and properly aligned. With the power head all the way down, hand spin the wheel and check for clearance.

Make sure the wheel and arbor collars are clean, and the collars' recessed slides are facing the wheel.

When cutting any metals, sparks or hot fragments could cause a fire. Do not cut near flammable materials.

Always use the vise provided with abrasive cut-off machine. Any movement of your workpiece can cause the wheel to break and throw portions of the wheel.

When beginning a cut with the saw, care should be exercised not to bump or slam the wheel into the work. Once the cut is started, continue the cut with a smooth, even stroke. The faster a cut is made, the less heat is created in the workpiece. This helps prevent discoloring and prolongs wheel life. Cut with the maximum force that doesn't overload the motor.

NOTE: Never replace the abrasive wheel with a toothed blade. There will be no excuse for a claim that the instructions invite this kind of misinterpretation as to the purpose of the tool.

DANGER

WARNING

CAUTION

jig / saber saws

Portable jig/saber saws are light weight and generally easy to handle. For this reason, carelessness can easily enter the picture.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear loose clothing, jewelry or any dangling objects that may catch in moving parts or accessories. Tie back long hair.

The tool should be unplugged before checking or installing blades or accessories.

Check carefully that the blades are adequately secured in position before plugging in. Make sure the cord is out of your way and not in the line of cut.

Firmly position the tool's base plate/shoe on the workpiece before turning on the tool.

Keep your hands and fingers well clear of moving parts.

After making partial cuts, turn the tool off and remove the blade from the workpiece only after the blade has fully stopped.

Know what is behind a cut before you make it. Be sure that hidden electrical wiring, water pipes, hazardous objects of any kind are not in the path of the cut. If wires are present, they must be disconnected by a qualified person at their power source to prevent the possibility of lethal shock. Water pipes must be drained and capped. Always hold the tool by the insulated grasping surfaces.

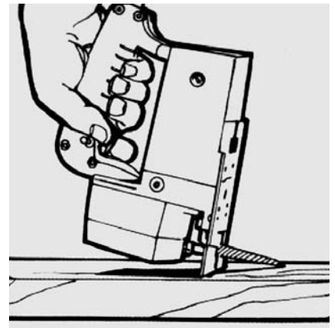
When plunge (pocket) cutting use a blade designed for that purpose and follow the manufacturer's recommended procedures.

Maintain firm contact between the base and the material being cut, throughout cutting procedures.

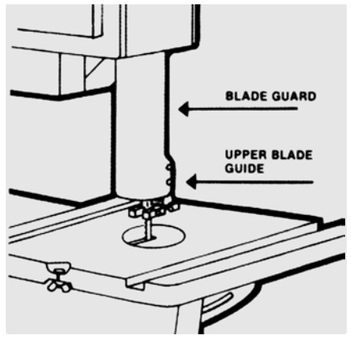
Remember that the blade and blade clamp may be hot immediately after cutting. Keep your hands away until cooled down.

Never overreach. It can be hazardous with small tools.

Do not leave saws unattended — unplug and secure the tool immediately after use. It is the type of tool that children can readily pick up and cause injury.



Plunge cutting requires blades designed for the purpose.



Adjust the blade guard so that only the necessary length is exposed.

Read and understand the warnings and instructions on the band saw and in the owner/operators manual.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Don't use the saw with tools, debris or objects of any kind other than the workpiece on the table.

Select the correct blade for the job. Be sure it is properly installed and aligned, and correctly tensioned.

Check the blade tension regularly and carefully. This helps prevent blade breakage.

Adjust the upper guide of the saw so it just clears your workpiece.

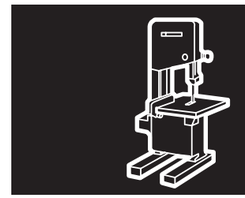
Use a holding device for small workpieces.

Don't force material through the saw. It can cause binding of the workpiece. Do not force curved cuts with too small a radius for the width blade being used. This will also cause unnecessary binding and possible blade breakage.

Provide adequate light for safe cutting.

Keep your hands away from the blade. Use a pushstick to free the work. Never place your fingers in line with the blade.

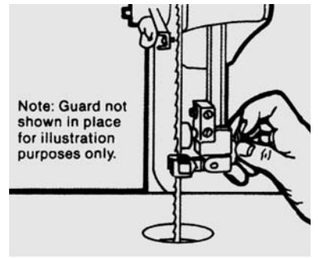
Be sure blade guides and thrust bearings are properly adjusted.



stationary band saws

Allow the blade to come to a complete stop before removing scrap stock from the table

Be attentive to thin cut off pieces hitting the end of the slot in the insert, or jamming in the slot.



To prevent blade breakage and assure a smooth cut, the thrust bearings must properly support the blade. Read your manual carefully.

DANGER

WARNING

CAUTION

wood lathes

Safe, effective use of a wood lathe requires detailed study and knowledge of all procedures for using this tool. Read and thoroughly understand the label warnings on the lathe and in the owner/operators manual.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Check the owner/operators manual for proper speed recommendations for the intended purpose and use.

The work area must be provided with shadow free lighting, and be open and uncluttered, so that the operator moves are not hindered.

Make certain that the belt guard or cover is in place and be sure that the workpiece is free but firmly mounted between centers. Check that all clamping devices (locks), such as on the tailstock and toolrest, are tight and that the workpiece clears the toolrest and other machine parts before operating the tool.

Never adjust the toolrest with the lathe turned "on."

Do not run a lathe in the wrong direction. This can cause the turning tool to be thrown from your hands.

The lathe spindle must rotate so the top of the workpiece turns toward you.

The clearance between the workpiece and the toolrest should be only about 1/8 in.

Use only defect-free stock, without cracks, checks, knots, splits and the like. Knots, for example, can fly out and cause serious injury.

A lathe should not be altered in any way, or set up to perform any operation not covered in the owner/operators manual.

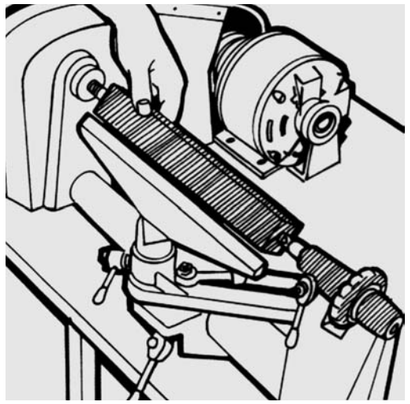
It is recommended that you rough out faceplate workpiece on a band saw or with hand tools before installing them on the lathe faceplate.

Hold turning chisels securely on the toolrest, and hold handle of chisel firmly. Always use the lowest speed when starting a new workpiece. Lathes should be operated at slow speed until the workpiece is cylindrical. This helps avoid the possibility of an unbalanced piece jumping out at high speed and striking the operator.

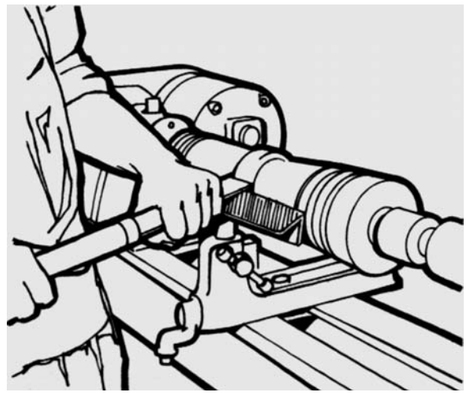
Also be sure to remove the toolrest before you sand a workpiece by hand.

Never remount a turned piece once it is removed from the faceplate.

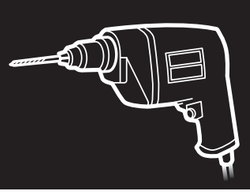
Turn off and, if possible, unplug the lathe after use. Lock switch, if lock is available, and store the key.



With the lathe "off," rotate your workpiece by hand to make certain it does not touch the tool rest.



Adjust the toolrest to allow only about 1/8 in. clearance with the workpiece. This prevents wedging of the tool between the tool rest and the workpiece and being thrown, possibly causing injury.



DANGER

WARNING

CAUTION

portable drills

Available in a wide variety of types and capacities, portable power drills are undoubtedly the most used power tools in the world. Because of their handiness and application to a very wide range of jobs, drills often receive very heavy usage. For this reason your safety demands that you carefully check capacity limitations and accessory recommendations of your drill. See the owner/operators manual.

Be sure the trigger switch actuates properly. It should turn the tool "on" and return to the "off" position after release.

If equipped with a lock-on, be sure it releases freely.

Check carefully for loose power cord connections and frays or damage to the cord. Replace damaged tool and extension cords immediately.

Be sure the chuck is tightly secured to the spindle. This is especially important on reversible type drills.

Tighten the drill bit securely as prescribed by the owner/operators manual. The chuck key must be removed from the chuck before starting the drill. A flying key can be an injury inflicting missile.

Check auxiliary handles, if part of the tool. Be sure they are securely installed. Always use the auxiliary drill handle when provided. It gives you more control of the drill, especially if stalled conditions occur. Grasp the drill firmly by insulated surfaces.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Always hold or brace the tool securely. Brace against stationary objects for maximum control. If drilling in a clockwise (forward) direction, brace the drill to prevent a counter clockwise reaction.

Don't force a drill — apply enough pressure to keep the drill bit cutting smoothly. If the drill slows down, relieve the pressure. Forcing the drill can cause the motor to overheat, damage the bit, and reduce operator control.

If the drill binds in the work, release the trigger immediately—unplug the drill from the power source, and then remove the bit from the workpiece. If you suspect that the drill operation you are performing can potentially bind, then under no circumstances should you actuate any switch "lock-on" that may be available to you.

Never attempt to free a jammed bit by starting and stopping the drill.

As you approach hole breakthrough, grip or brace the drill firmly, reduce pressure and allow the bit to pass through the hold easily.

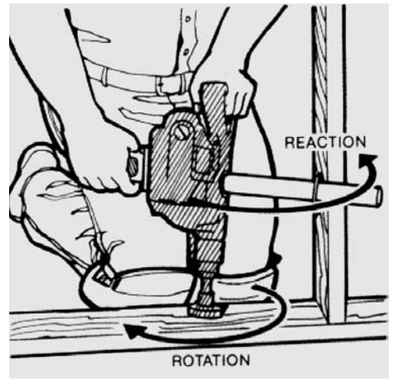
Always have firm footing when drilling. Brace or position yourself very carefully when working on ladders and scaffolding. Be sure of your balance and control before you start the job.

Unplug the tool before changing bits, accessories or attachments.

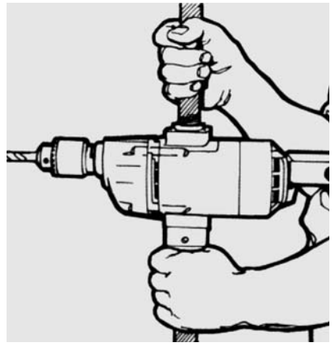
And remember — when drilling blindly (you can't see behind what is being cut), check carefully for possible electrical wiring or pipes in your path. If wires are present, they must be disconnected at their power source by a qualified person or avoided to prevent possibility of lethal shock. Water pipes must be avoided or drained and capped. Always hold the tool by the insulated grasping surfaces, if provided.

Remove materials or debris from the area that might be ignited by hot chips.

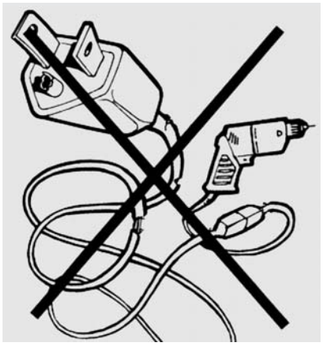
Unplug drills immediately after use and store in a dry place.



Know the rotation of drill bits and the reaction, to properly brace the drill against a stationary object. Caution should be taken not to trap hand between brace and handle.



Use auxiliary handles provided to maintain full control of the drill.



Check carefully for loose connections, faulty power and extension cords, and faulty switches. Electrical shorts can be dangerous.

DANGER

WARNING

CAUTION

DANGER

WARNING

CAUTION

drill presses

Read and understand the warnings and instructions on the drill press and in the owner/operators manual.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Remove material or debris from the area that might be ignited by hot chips.

Make certain the chuck key is removed before starting the tool. The key can be thrown at high velocity if not removed.

Be sure belt guards are installed and functioning properly.

Never hold the workpiece by hand. To prevent the workpiece and backup material from spinning, set them against the left side of the drill support column. Secure the workpiece with a clamp or the appropriate fixture if it is too short to reach the column.

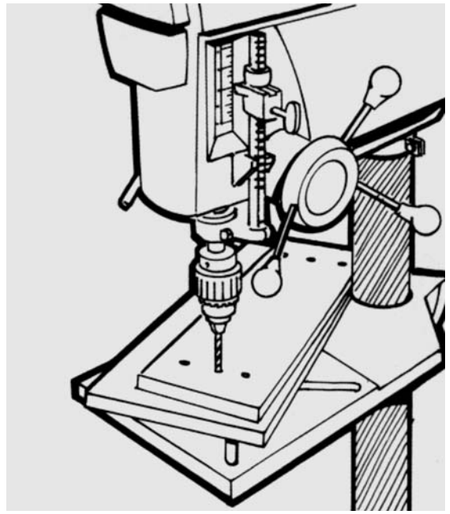
Carefully set the drill press speed appropriate for both the type of material and bit size you are using.

Don't touch the bit or chips. Drill bits and cuttings are hot immediately after drilling.

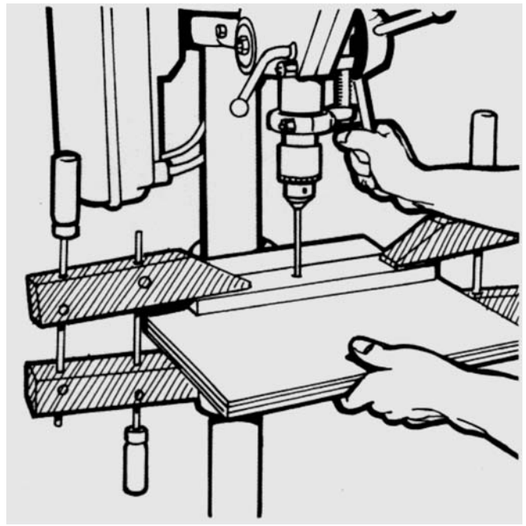
If something goes wrong, never attempt to correct a problem with the drill operating. Shut if off and unplug it if possible.

Never reach around or under the working head, or grab the chuck to stop a drill press. This can result in hand puncture or other serious injury.

Always shut off, unplug if possible, and lock the press if a lock is available, and store the key.



Securely clamp workpieces and back-up material not long enough to be braced against the left side of the column. This prevents either of them from being torn from your hand while drilling, causing injury.



jointers/planers

Operators must be fully alert at all times when using jointer/planers.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty working conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Read and understand the warnings and instructions on the jointer/planer itself and in the owner/operators manual.

Check often to assure that guards return to their normal position quickly. If a guard seems slow to return or "hangs up," repair or adjust it immediately. Never use a jointer/planer without a properly operating blade guard.

Set up knives and tables in accordance with the owner/operators manual.

Lock knives securely in place to the cutter head before start-up.

Knives must always be kept sharp.

Do not attempt to sharpen knives while they are installed in the cutterhead, unless proper attachment is provided.

Check the cutter guard and tension of cutter guard springs for proper closure.

Examine your workpiece very carefully. By all means do not joint or plane chipboard, panelboard or any stock containing nails, paint or varnish.

Be very cautious of knots in wood. Knots can fly out or cause kickback. Avoid this.

When edge jointing, planning or beveling, use holddown pushblocks to keep your hands well away from the cutter head.

Never operate a jointer/planer without belt guards (if so equipped) and cutter head guards in place and working properly.

The portion of the knives of the cutter head that isn't being used should be covered at all times.

Wood narrower than 3/4 in. or thinner than 3/8 in. should not be jointed or beveled. Wood shorter than 12 in. should not be planed, jointed or beveled.

Never reach up an exhaust chute to unclog chips. Stop the tool and unplug it. Clear the chute with something other than your bare hand. The knives up there are razor sharp.

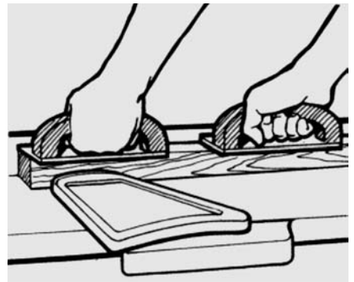
Make certain you support long lengths of stock to maintain 'control.' Use work supports as needed.

Feed your work with the grain. (See Illustration). Always feed against rotation of the cutting knives.

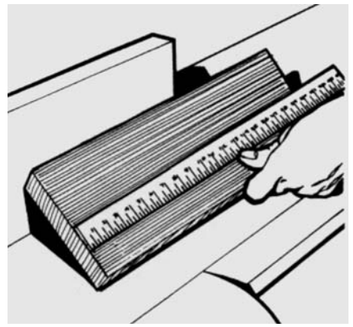
Don't try to take off too much in one cut. Not more than 1/8 in. per cut.

Your hands should never pass over the cutter head when feeding work. The only exception if both hands are protected by holddown pushblocks that keep hands separated from the cutterhead. Maintain complete alertness.

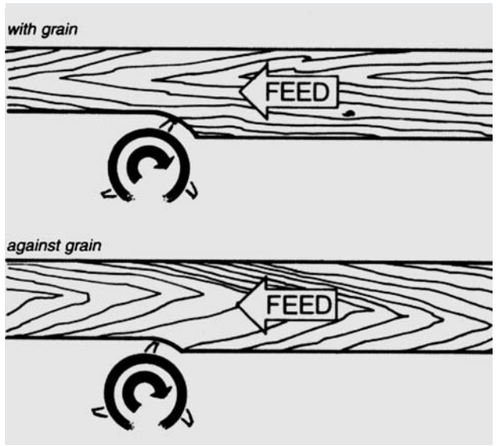
Always unplug if possible and lock the switch, if a lock is available, before changing blades or knives, making adjustments, performing maintenance jobs and when the tool is not in use. Store the key.



Work with holddown / pushblock when surfacing with a jointer.



Do not joint stock less than 12 in. long.



Feed with the grain whenever you can. Feed very slowly and take very light cuts if you must feed against the grain.

DANGER

WARNING

CAUTION

DANGER

WARNING

CAUTION

shapers

Before you use a shaper, make certain you are thoroughly informed of proper and safe procedures. Read and understand the warnings and instructions on the shaper and in your owner/ operators manual before operating.

Stay very alert when using any shaping tool. Carelessness can be extremely dangerous.

Always wear safety goggles or safety glasses with side shields complying with current national standards, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Be sure the keyed washer is correctly aligned and directly under the spindle nut, and that the nut is tight before operating the tool.

Cutters should be maintained and installed in strict compliance with the owner/operators manual. The direction of rotation of the spindle dictates cutter installation and feed direction.

Recheck all attachments to confirm they are securely tightened before start-up. If you hear, see or suspect problems, stop the tool immediately, unplug it, check the tool thoroughly. Correct any problem before proceeding.

Always feed the workpiece against the rotation of the cutter.

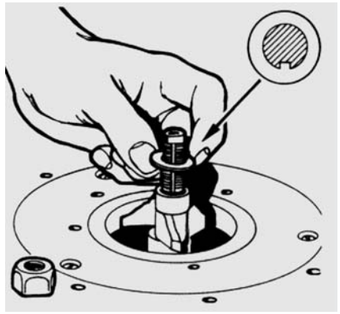
Shaping narrow stock can be particularly hazardous. Use a fixture to hold the workpiece. If the operation requires hands to come within 6 in. of the cutters, use a holddown/ push-block for workpieces from 6 to 2 in. For 2 in. and lower, use featherboards or appropriate fixtures.

When end shaping, use a miter gauge with holddown.

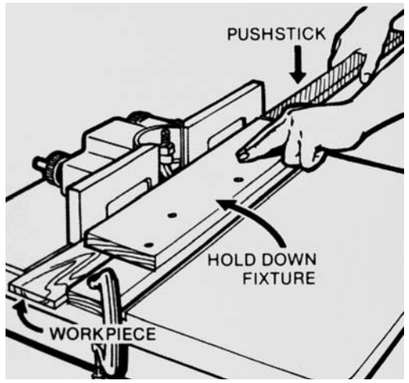
When edge shaping, use featherboards.

Use the ring or cup guard when the adjustable fence is not in place.

Never freehand shape—check your owner/ operators manual for safe procedures for use of an adjustable fence when straight-line shaping, and starting pin and collars when performing irregular (curved) shaping.

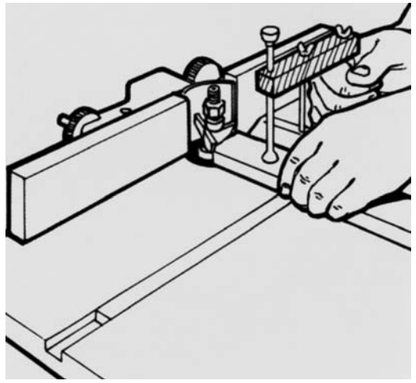


Make certain that the keyed washer is in proper position when installing shaper cutter heads. Loose heads could work free and cause serious injury.



Use a pushstick when shaping. The shaper fence should be used for straight edge shaping.

Guards removed for clarity. Always use proper guards.



A miter gauge should never be used on a shaper without installing a holddown clamp and the workpiece being clamped.

sanders

Sanding is often a prolonged operation. It is of utmost importance that you do not lose concentration, and that your working environment be correct, as pointed out below.

Read and understand your owner/ operators manual.

Stationary sanders may incorporate both belt and disc sanding features. Portable sanders are normally single feature sanders (disc, pad, or belt). You must exercise caution and alertness to avoid injuries, such as skin abrasions, that can result from contacting the sanding medium or other moving parts—belts, pulleys, and arbors.

Don't use a small sander for a big job or a large sander for a small job.

Read and understand the warnings on the sander itself.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Sanding dust may affect your breathing and overcome you if you are not protected against it—particularly when working with may of the exotic (tropical) hardwoods. Wear hearing protection during extended periods of operation.

Do not wear loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Adequate ventilation of your work area is very important when using any type of sander. The use of exhaust type systems or bag collection is also recommended. Dust can explode if the concentration becomes too great. Wood dust and the finishes from woodwork are very combustible.

Before connecting a portable sander to the power supply by sure the switch and switch lock (if provided) are in the "off" position. If not the sander will start immediately and loss of control could result in an injury.

Stay constantly aware of cord location.

Abrasive belts should be the width recommended by the manufacturer.

Always keep your face and hands well clear of moving parts such as belts and pulleys.

Never lock a portable sander in the "on" position when the nature of a job may require stopping the sander quickly, such as using a disc sander on an automobile's fender well, the rotating disc could get jammed and result in an accident. Hold sander firmly.

It should never be necessary to force a portable sander. The weight of the tool applies adequate pressure. Forcing too much pressure can cause stalling, overheating of the tool, burning of the workpiece, and possible kickback of the tool or workpiece.

With portable sanders be careful not to expose the tool to liquids, or to use in damp, wet locations.

Keep power supply and extension cords from entanglement with the moving parts of the sander. Damaged cords can result in an electrical shock.

A cord that is contacted by a moving belt can cause loss of tool control and possible injury.

When adjusting the tracking of the belt on a portable sander be certain that you have the sander supported and positioned to avoid accidental contact with yourself or adjacent objects.

Do not work with a faulty tracking sander. Discontinue work until the problem is corrected.

Your work area should be at least 3 ft. to 4 ft. larger than the length of stock you are sanding on all working sides of a stationary sander.

On stationary sanders, maintain a 1/16 in. maximum clearance between the table and the sanding disc or belt.

Always support your workpiece on a stationary sander with the table or backstop.

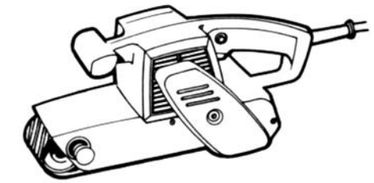
Use jigs or fixtures to hold your workpiece whenever possible.

Always unplug and, in the case of portable sanders, store sway after use.

Remove material or debris from the area that might be ignited by sparks from sanding metal.

Be sure you have proper ventilation, eye protection, and dust mask if necessary. Check your owner/operators manual.

NOTE: *Be sure rpm rating for backing pads is greater than no load speed of the tool.*



Portable belt sander: Don't work with a faulty tracking sander. Use work stops and suitable clamping when necessary. See your manual.

DANGER

WARNING

CAUTION

impact wrenches

It is most important that the sockets that are used are specifically designated "impact wrench sockets." Sockets and accessories which are made for hand use only will not stand up to impact wrench use. They are subject to premature failure, breaking and possibly causing injury. Impact type sockets usually are identified by a black finish on the outside, and have heavier section thickness.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

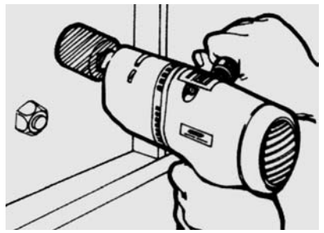
Never use a wire, soft pin or nail to hold the socket onto the square spindle of the impact wrench. If the proper retaining device on the tool is broken, the tool should be repaired.

Avoid excessive impacting, particularly on small bolt sizes. Small bolts could easily be broken or the threads stripped. Over torquing can cause premature failure of fasteners or other damage, and can lead to accidents.

On applications where a low or critical level of torque is required, it is recommended that you impact each fastener lightly, then perform the final tightening with a hand torque wrench.

If your owner/operators manual recommends using wood boring bits, with an impact wrench, be sure to unplug the tool before changing the bits.

Do not use an impact wrench in wet or damp environments.



Use only sockets designated as impact wrench sockets.

routers

The widespread use of routers is based on their ability to perform an extensive range of smooth finishing and decorative cuts.

Your safety in operating a router starts with an understanding that it operates at a very high speed – in the 20,000 RPM range. From 15 to 25 times faster than a drill.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Install router bits securely, and according to the owner/operators manual.

Always use the wrenches provided with the tool.

Keep a firm grip with both hands on your router at all times — failure to do so could result in loss of control, leading to possible serious injury.

Read your operators manual carefully regarding laminate trimmers and other small routers that are used one-handed.

Always face the cutter blade opening away from your body.

When starting a router equipped with carbide tipped bits, the router should be started beneath a work bench to protect operator from a possible flying cutter should the carbide be cracked.

Hold only those gripping surfaces of the router designated by the manufacturer. Check your owner/operators manual.

If your router is equipped with a chip shield, keep it properly installed.

Keep your hands away from bits or cutter areas when the router is plugged in.

Do not reach underneath the work while bits are rotating. Never attempt to remove debris while the router is operating.

Always disconnect the plug from the electrical outlet before changing bits or making any adjustments. If you are changing a bit immediately after use, be careful not to touch the bit or the collet with your hands or fingers. They could get burned because of heat build-up from cutting.

Your desired cutting depth adjustments should be made only according to the tool manufacturer's recommended procedures for these adjustments. Tighten adjustment locks. Make certain that the cutter shaft is engaged in the collet at least 1/2 in. Check your owner/operators manual carefully.

Be certain to secure clamping devices on the workpiece you are using before operating your router.

The switch should be in the "off" position before plugging into the power outlet.

For greater control, always allow the motor to reach full speed before feeding the router into the work.

Never force a router.

When removing a router from your workpiece, always be very careful not to turn the base and bit toward you.

Unplug and store your router immediately after use.

A router can inflict serious injury in the hands of children or the untrained.

DANGER

WARNING

CAUTION

percussion tools

Hammers, Rotary Hammer and Hammer Drills: This family of tools is primarily associated with masonry applications as varied as chipping, drilling, anchor setting and breaking of pavement. They range from pistol grip types to large demolition hammers. Normal operating modes include hammering, hammering with rotary motion and rotation or drilling only. Many models incorporate a varied combination of the above modes.

Capacity is normally rated in maximum diameter displayed on the nameplate. Do not attempt to use a bit larger than that which is specified unless otherwise recommended in the owner/operators manual.

Before operating, compare the date on the nameplate with the voltage source and be sure that the voltage and frequency are compatible.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

For maximum control and to resist torque caused by unexpected stalls, use the auxiliary handles provided with the tool.

Do not tamper with clutches on those models that provide them. Have the clutch settings checked at the manufacturer's service facility at the intervals recommended in the owner/operators manual.

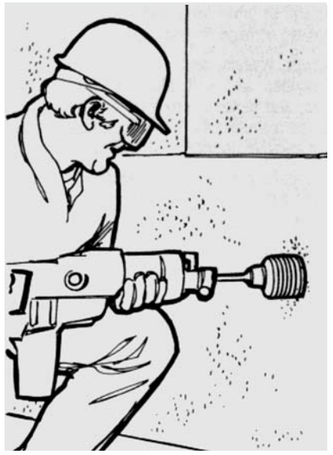
Check for subsurface hazards such as electrical conductors or water lines before drilling or breaking blindly into a surface. If wires are present, they must be disconnected at the power source by a qualified person, or be certain they are avoided to prevent the possibility of lethal shock or fire. Water pipes must be drained and capped. Always hold the tool by the insulated grasping surfaces.

Do not force the tool. Percussion tools are designed to hit with a predetermined force. Added pressure by the operator only causes operator fatigue, excessive bit wear and reduced control.

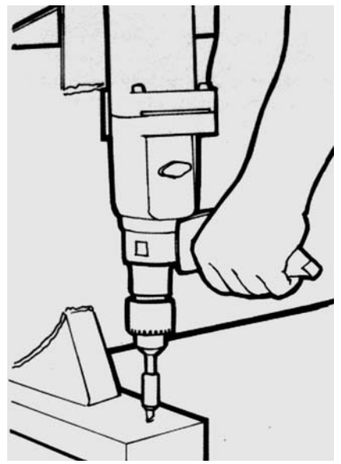
Keep the operators work area clear of debris.

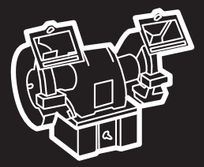
Always provide firm footing.

Percussion tools with rotating features require compliance with all of the operating considerations referred to under drills in this brochure. Remember to unplug the tool before changing bits or servicing.



Always use side handle and maintain a firm grip on the tool.





DANGER

WARNING

CAUTION

bench and portable disc grinders

General Grinder Precautions: Stationary bench grinders and portable grinders basically remove material by contact with an abrasive wheel or disc, wire wheel brushes and buffing wheels. There are safety precautions that apply to both type grinders and other specific recommendations that apply to specialized grinding operations.

Before operating a grinder compare the date on the nameplate with the voltage source and be sure the voltage and frequency are compatible.

Remove material or debris from the area that might be ignited by sparks. Be sure others are not in the path of the sparks or debris. Keep a properly charged fire extinguisher available.

Always wear safety goggles or safety glasses with side shields complying with current national standards and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear gloves, loose clothing, jewelry or dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Your work area should have adequate, shadow free lighting.

Maintain proper footing and balance. Never attempt to grind in an awkward position. A portable grinder can kick and glance off the work if not properly controlled.

Always disconnect the tool from the power source before installing or changing wheels or discs. Use only those wheels and discs marked with a rated speed that is at least as high as or above the speed rating on the nameplate of the tool. Don't use an unmarked wheel.

Handle or store discs and wheels carefully to prevent damage or cracking.

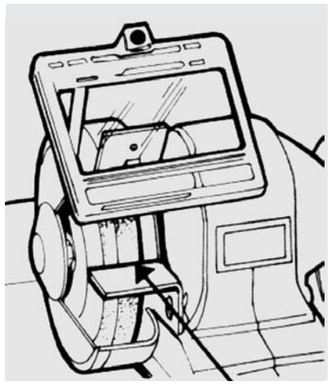
Mount wheels and discs in the manner described and with the hardware (flanges, nuts, and blotters) provided or recommended by the manufacturer of the tool, disc or wheel, in the owner/operators manual.

Be careful not to over-tighten the spindle nut. Too much pressure will deform the flanges and stress the wheel.

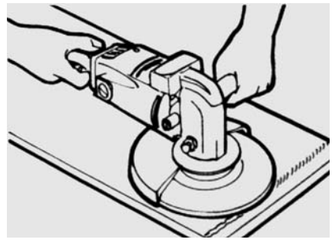
Never operate a grinder without the proper guard in place.

After mounting a wheel or brush and replacing the guard, stand to the side and allow a one minute run-up at no load to test integrity of the wheel. Your grinder should come up to full speed each time before you contact the workpiece.

Do not apply excessive pressure to the wheel or disc that will stress the wheel, overheat the workpiece and reduce your control.



Adjust grinder tool rests to provide 1/8 in. maximum clearance to prevent your workpiece from being caught between the wheel and the rest.



Maintain a firm, steady grip on portable grinders.

Bench Grinders: Safety eye shields provided with bench grinders must always be used in addition to operator eye protection.

Toolrests and spark guards are adjustable to compensate for wheel wear. They must be reset when a new wheel is installed or after a wheel has been worn or dressed. The distance between the spark guard and the wheel should be within 1/16 in. The toolrest should be slightly below the center of the wheel with 1/8 in. or less clearance from the wheel. This prevents accidental jamming between toolrest and the wheel.

Grinding wheels should be tested before mounting. Tap the wheel lightly with a nonmetallic implement such as the handle of a screwdriver. If it produces a ringing sound, it is in good condition. If it sounds dull, replace the wheel. DO NOT USE A CRACKED WHEEL. Check your owner/operators manual for proper procedures.

Grinding wheels should be trued and dressed when worn out of round, or the surface face is clogged or worn smooth. This provides a clean sharp grinding surface and rebalancing of the wheel.

New wheels should be balanced by dressing and truing to eliminate vibration and possible mishap. Check your owner/operators manual. Don't operate a grinder unless you are certain the grinder, its base and/or pedestal are securely mounted.

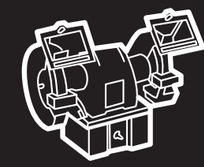
Use only the type and size flanges provided with the grinder.

(continued on next page)

DANGER

WARNING

CAUTION



portable disc grinders (continued)

PORTABLE GRINDER: If you drop a portable grinder or a wheel, inspect carefully for damage.

Portable straight grinders should use only high strength, bonded wheels. Position this type grinder away from you and allow to run for one minute before contacting work.

Tuck point grinders are a variation of straight grinders and are equipped with reinforced abrasive discs and the appropriate guard, and by purpose engage in very dusty work. A dust mask and face shield in addition to safety glasses with side shields is highly recommended. Maintain firm control of the tool. Never overreach. Carefully maintain balance.

Do not allow the grinding wheel to bend, pinch or twist in the cut. Kickback may result.

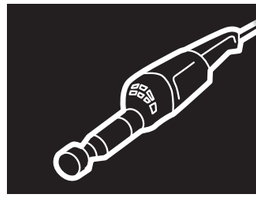
Angle grinders are primarily used with reinforced abrasive discs or wire cup brushes for the proper wheel and guard combination is critical and must follow the manufacturer's recommendations contained in the owner/operator manual.

Many angle grinders are equipped with guards that may be mounted with the opening in a variety of positions. Take care to position the guard to provide you with maximum protections.

Many angle grinders may be converted for use as sanders. When guards are removed for sanding operations, it is essential that guards be replaced before again being used for grinding.

Hold an angle grinder firmly with both hands to avoid recoil caused by jamming or wedging.

rotary die grinders



Rotary die grinders perform a wide variety of jobs. You must have a thorough understanding of all procedures for each type application that you utilize.

Grinders operate at high speeds. You must exercise particular caution and alertness to avoid injury by contact with the working end, or from thrown objects.

Use only those accessories recommended by your tool's manufacturer, and with speed rated at least as high as the no-load RPM on the tool's nameplate. The wrong accessory can shatter during use, possibly causing injury.

Always unplug the tool before making grinder/cutter installations.

Always wear safety goggles or safety glasses with side shields complying with current national standard, and a full face shield when needed. Use a dust mask in dusty work conditions. Wear hearing protection during extended periods of operation.

Do not wear loose clothing, jewelry or any dangling objects that may catch in rotating parts or accessories. Tie back long hair.

Be sure the switch is in the "off" position before plugging in.

Hold the wheel or cutter away from you and co-workers when starting a grinder.

Using grinding wheels when working with hard materials, and use rotary files for soft materials such as aluminum, brass, copper and wood. If you use grinding wheels on soft materials, it will excessively load the wheel and could cause the wheel to shatter or disintegrate. Dangerous flying objects can result.

Always check the cutter or wheel for tightness on the tool before each use. A loose cutter or wheel can be thrown from the rotary grinder and cause serious injury. If the grinder is dropped, inspect it for damage, such as a cracked wheel, broken collet, or bent mandrel. Repair or replace damaged parts to prevent further breakage and thrown objects.

Never use cracked or damaged grinding wheels. Carefully check them before each use.

Excessive pressure during use can bend or break the collet, mandrel, or wheel/cutter. If the grinder runs smoothly when not under load, but does not run smoothly under load, then excessive pressure is being used.

Never over-tighten the collet. It can damage the collet cutter or wheel.

If the tool does not run smoothly, the cutter may be bent or out of balance. Replace the cutter.

Keep your hands and fingers away from the working area; contact with the cutter or wheel will cause injury.

Use a vise or other recommended clamping to hold the workpiece securely.

Never hold a small workpiece by hand.

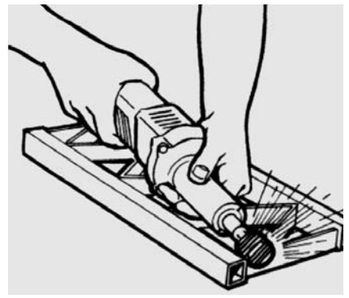
To avoid burns, wait before touching work surfaces. Allow time to cool.

Never use a rotary die grinder with the cutter pointing towards you. If the grinder should slip, the cutter could cause injury.

When placing a mounted grinding wheel, burr or cutter in the collet, keep the distance between the back of the wheel and the front of the collet (overhang) at a minimum. This prevents bending the shank and wheel damage that could cause injury.

Make sure the shaft is engaged in the collet at least 1/2 in.

Remove all materials and debris from the area that might be ignited by sparks.



Maintain a firm grip on all grinding tools.

Accessories and Attachments

There is a very wide variety of accessories available for use on or with power tools. Caution must be exercised when selecting and using any accessory with any power tool. The choice of a wrong accessory or the incorrect use of an accessory on a power tool can result in serious injury.

Read and understand the recommendations in the owner/operators manual for the tool, and the accessory literature.

Don't use an accessory or attachment unless:

- The power tool manufacturer recommends its use on his product.
- The accessory's limitations and specifications (such as speed, size, mounting and guarding requirements, power requirements, etc.) match the limitations and specification of the power tool as shown in its owner/operators manual.
- The use of the accessory does not require the removal of, or defeating of any guards, barriers, or other safety related devices on the power tool, unless they are replaced by other appropriate guards or protective devices.
- After removing accessories or attachments, original equipment and safety devices are replaced and in proper working order.
- You understand the instructions that describe the safe use of the accessory or attachment.

Unplug tools before installing, adjusting, and changing any accessory or attachment of any kind.

Safety Program Materials

Safety information to meet the needs of professional tradesmen, consumer, vocation students, educators and do-it-yourselfers.

"On the Job Power Tool Safety Maintenance Check List" - No. 102
A 1-page check list of 11 items including owner's manual, cord sets and extension cords, switches, tool holding devices, guards, housings, adjustments, blades and bits, maintenance, mechanical operation and electrical safety.

"Power Tool Safety" – No. 105
a 4-page cartooned brochure consisting of recommendations for the safe use of portable, stationary, lawn and garden power tools on the job or at home.

"A Teacher's Reference Guide To Power Tool Safety" (Includes a copy of "Safety Is Specific")– No. 118
Provides lesson plans, student activities and quizzes, support materials, and references to additional information on each power tool category.

"Safety Is Specific" – No. SIS-585
A 24-page illustrated brochure which includes a straightforward compilation of rules and safe practices for each category of power tool use (Specific cautions, warnings and dangers). The guidelines discuss the safe operation of widely used portable, stationary, lawn and garden tools.

General Safety Recommendations

1. Know the power tool. Operators must read and understand the owner's manual. Tool applications and limitations must also be understood. Labels affixed or included in the shipping container must be read and understood. Keep owner/operators manuals and literature in a safe place for future reference.

2. Keep your work area clean, free of clutter and well lighted.

3. Ground all tools unless double insulated. When a tool is equipped with a 3-prong plug, it must be plugged into a 3-hole electric receptacle known to be grounded. If an adapter is used to accommodate a 2-hole receptacle, attach the adapter with a screw to a know ground. NOTE: The use of adapters is not allowed in Canada.

4. Avoid dangerous environment. Do not use power tools in damp, wet and/or explosive atmospheres (fumes, dust or flammable materials).
5. Keep children and all bystanders at a safe distance from work areas.

6. Be aware of all power lines and electrical circuits, water pipes and other mechanical hazards in your work area, particularly those below the work surface, hidden from the operators view, that may be contracted.

7. Be alert. Using power tools in confined work areas may put you dangerously close to cutting tools and rotating parts.

8. Keep guards in place and in proper working order.

9. Secure work. Use clamps or a vise to hold workpieces. Danger: Loose workpieces can cause injury.

10. Do not force tools. Tools do a better and safer job when used in the manner for which they are designed.

11. Store idle tools. When tools are not in use, store them in a dry, secure place. Inspect tools for good working condition prior to storage and before re-use.

12. Wear proper apparel. Do not wear loose clothing, dangling objects, or jewelry. Long hair must be restrained. Gloves should not be worn when operating certain power tools. See individual sections in this brochure, and check appropriate tool manuals.

13. When a tool is used outdoors, use only extension cords marked "For Outdoor Use." Extension cords, when not in use should be stored in a dry and well ventilated area.

14. Use the correct tool. Plan your work, and use the correct tool for the job.

15. Use safety apparel and equipment. Use safety goggles or safety glasses with side shields, complying with current national standard and, when needed, a face shield. Use a dust mask in dusty work conditions. This applies to all persons in the work area. Also use a hard hat, ear protection, gloves, safety shoes and dust collection systems when specified or required.

16. Disconnect tools when not in use, before servicing, adjusting, or installing accessories and attachments.

17. Switches. Never use a tool with a malfunctioning switch. Have it repaired or replaced before using the tool.

18. Do not overreach. Keep proper footing and balance at all times.

19. Do not abuse cords. Never carry a portable tool by its power cord or yank tool or extension cords from the receptacle. Danger: Keep power and extension cords away from excessive heat, sharp edges, and damp/wet areas.

20. Avoid accidental starting. Do not carry a plugged-in tool with your finger on the switch. Be certain the switch is "OFF" when plugging a tool into the electrical power supply. In event of power failure, while a tool is being used, turn the switch off to prevent surprise starting when power is restored.

21. Remove adjusting keys and wrenches. Always check tools before use to see that keys and wrenches are removed before connecting the tool to its power supply.

22. Maintain your tools. It is recommended that the general condition of any tool be examined before it is used. Keep your tools in good repair by adopting a program of conscientious repair and maintenance in accordance with the manufacturer's recommended procedures. Keep cutting edges clean and sharp for safer operation of the tool. If any abnormal vibrations or noise occurs, turn the tool off immediately and have the problem corrected before further use. Have necessary repairs made by qualified service personnel.

23. Extension Cord Use.

A. Use only 'Listed' extension cords. If used outdoors, they must be marked "For Outdoor Use." Those cords having 3-prong grounding type plugs and mating receptacles are to be used with grounded tools.
B. Replace damaged or worn cords immediately.
C. Check the name plate rating of your tool. Use of improper size or gauge of extension cord may cause unsafe or inefficient operation of your tool. Be sure your extension cord is rated to allow sufficient current flow to the motor. For the proper wire gauge for your tool, see chart.

D. CHART FOR MINIMUM WIRE SIZE OF EXTENSION CORD:

Nameplate AMPS	CORD LENGTH IN FEET 25'	50'	100'	150'
0-6	18	16	16	14
6-10	18	16	14	12
10-12	16	16	14	12
12-16	14	12	(NOT RECOMMENDED)	

Wire Gauge Size
If in doubt, use larger cord.

Be sure to check voltage requirements of the tool to your incoming power source.

24. Ground fault circuit interrupters. If work area is not equipped with a permanently installed Ground Fault Circuit Interrupter outlet (GFCI), use a plug-in GFCI between power tool or extension cord and power receptacle.

(continued on next page)

25. Cordless tools (battery powered). Cordless tools get their electrical power from batteries. They demand the same respect that "corded" tools demand. Remember, cordless tools are very capable of causing injury if all safety precautions are not followed. Read and thoroughly understand the instruction manual that is provided with the tool.

Electrical power source and cord recommendations in this brochure do not apply to cordless tools themselves, but do apply to their chargers. If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical power source and cord recommendations in this brochure.

Perform charging in a dry location, away from all combustible materials.

If the battery of your tool no longer recharges properly with its specified recharge unit, return the tool and charger to your distributor service center as listed in the yellow pages or your tool's instruction manual.

Do not operate cordless tools in or near flammable liquids or in gaseous or explosive atmospheres. Motors in these tools normally spark and the sparks may ignite fumes.

Always recharge a cordless tool and its battery with its own specified charging unit. Never attempt to recharge a cordless tool in a recharging unit not specifically recommended for that tool or battery pack by the manufacturer.

Keep both tool and recharging unit in an area not accessible to children or inexperienced persons.

Be aware that a cordless tool can always be in an operating condition because it does not have to be plugged into an electrical outlet. Unless the batteries are removed, the tool can function at any time the switch is turned on.

Remove batteries or lock the switch in its "OFF" position before changing accessories, adjusting or cleaning tools. This removes the power supply while hands are in vulnerable locations such as near switches, bits, or blades. Consult your instruction manual.

Do no short the battery pack. A battery pack short can cause a large current flow, overheating, and possible burns or a fire. Do not touch the terminals with any conductive material. Do not store the battery pack in a container with metal objects such as wire, nails or coins. Do not expose the battery pack to moisture.

Do not incinerate battery pack or throw it into water even if it is damaged or is completely worn out. Battery packs can explode in a fire.

Cordless tools may contain nickel cadmium batteries. To preserve natural resources, please recycle or dispose of properly. Local, state or federal laws may prohibit disposal of nickel cadmium batteries in ordinary trash. You may call 1-800-8-battery for disposal information.

Keep hands away from rotating or moving parts as with all power tools.

When cutting, drilling, or driving into walls, floors, or wherever "live" electrical wires may be encountered, do not touch any metal pars of the tool. Hold the tool only by the insulated gripping surfaces to prevent electric shock if you contact a "live" wire.

Do not touch the drill bit, blade, cutter or the workpiece immediately after operation. They may be extremely hot and may burn you.

Do not expose battery cartridge to moisture, frost or temperature extremes of over 110 degrees Fahrenheit or under -20 degrees Fahrenheit.

26. Cleaning and Lubrication. Use only soap and a damp cloth to clean your portable tools. Many household cleaners are harmful to plastics and other insulation. Never let liquid get inside a tool. Clean and lubricate your tools only as directed in the owner/operators manuals that describe them. It is generally recommended that portable tools be taken or sent to the manufacturer's authorized service facility for cleaning, inspection and lubrication. A service call for the same purpose is appropriate for stationary tools.

Do not operate power tools while under the influence of drugs or alcohol.