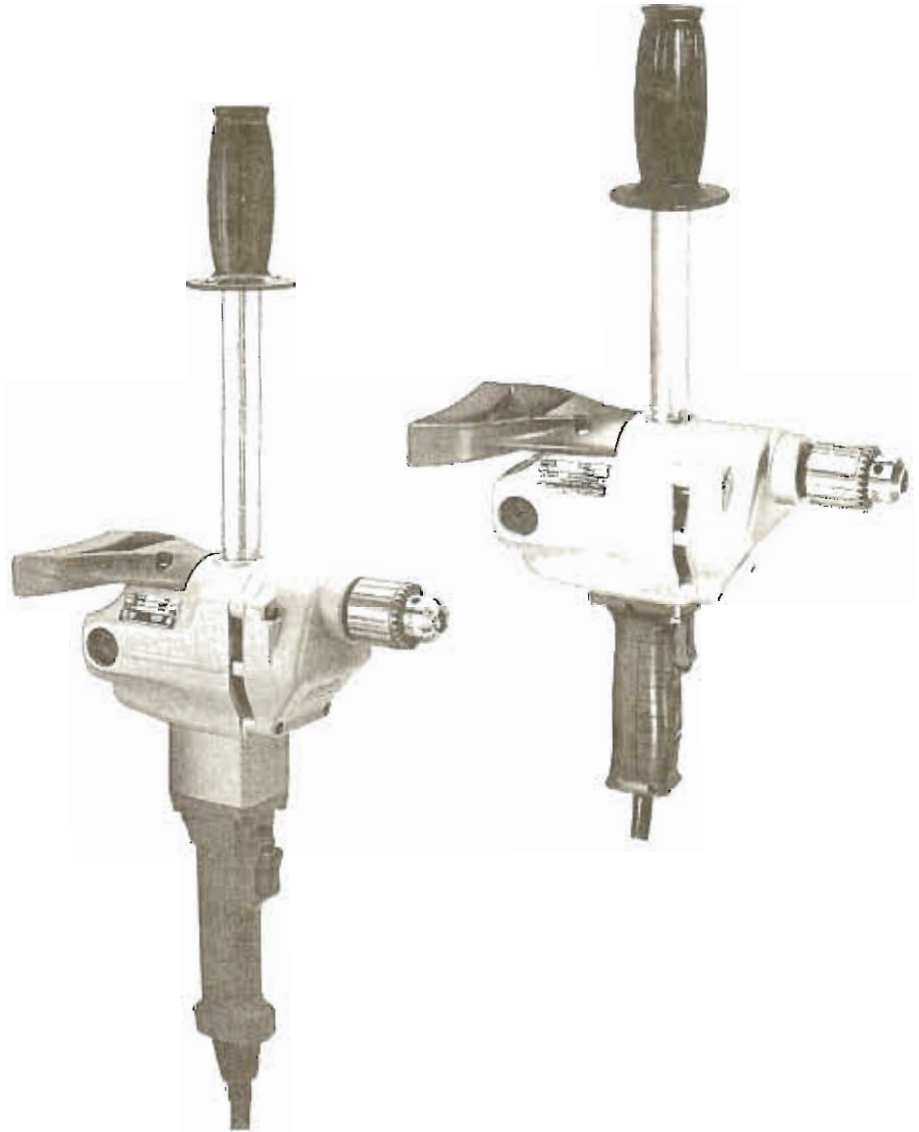




**OPERATOR'S MANUAL
MANUEL de L'UTILISATEUR
MANUAL del OPERADOR**

**Catalog No.
No de Cat.
Catálogo No.
1610-1
1630-1
1660-1
1663-20**



**HEAVY-DUTY COMPACT HOLE-SHOOTERS
PERCE-TROUS COMPACTS ET EXTRA ROBUSTES
TALADROS HEAVY-DUTY HOLE-SHOOTERS**

*TO REDUCE THE RISK OF INJURY, USER MUST READ AND UNDERSTAND OPERATOR'S MANUAL.
AFIN DE RÉDUIRE LE RISQUE DE BLESSURES, L'UTILISATEUR DOIT LIRE ET BIEN COMPRENDRE LE
MANUEL DEL'UTILISATEUR.
PARA REDUCIR EL RIESGO DE LESIONES, EL USUARIO DEBE LEER Y ENTENDER EL MANUAL DEL
OPERADOR.*

GENERAL SAFETY RULES



WARNING!

READ AND UNDERSTAND ALL INSTRUCTIONS.

Failure to follow all instructions listed below, may result in electric shock, fire and/or serious personal injury.

SAVE THESE INSTRUCTIONS.

WORK AREA

1. Keep your work area clean and well lit. Cluttered benches and dark areas invite accidents.
2. Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Power tools create sparks which may ignite the dust or fumes.
3. Keep bystanders, children, and visitors away while operating a power tool. Distractions can cause you to lose control. Protect others in the work area from debris such as chips and sparks. Provide barriers or shields as needed.

ELECTRICAL SAFETY

4. Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. Do not use any adaptor plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded. If the tools should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.
5. Double Insulated tools are equipped with a polarized plug (one blade is wider than the other). This plug will fit in a polarized outlet only one way. If the plug does not fit fully in the outlet, reverse the plug. If it still does not fit, contact a qualified electrician to install a polarized outlet. Do not change the plug in any way. Double insulation eliminates the need for the three wire grounded power cord and grounded power supply system
6. Avoid body contact with grounded surfaces such as pipes, radiators, ranges and refrigerators. There is an increased risk of electric shock if your body is grounded
7. Do not expose power tools to rain or wet conditions. Water entering a power tool will increase the risk of electric shock.
8. Do not abuse the cord. Never use the cord to carry the tools or pull the plug from an outlet. Keep cord away from heat, oil, sharp edges or moving parts. Replace damaged cords immediately. Damaged cords increase the risk of electric shock
9. When operating a power tool outside, use an outdoor extension cord marked "W-A" or "W". These cords are rated for outdoor use and reduce the risk of electric shock.

PERSONAL SAFETY

10. Stay alert, watch what you are doing, and use common sense when operating a power tool. Do not use tool while tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating power tools may result in serious personal injury.
11. Dress properly. Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and gloves away from moving parts. Loose clothes, jewelry, or long hair can be caught in moving parts

12. Avoid accidental starting. Be sure switch is off before plugging in. Carrying tools with your finger on the switch or plugging in tools with the switch on invites accidents.
13. Remove adjusting keys or wrenches before turning on the tool. A wrench or a key that is left attached to a rotating part of the tool may result in personal injury.
14. Do not overreach. Keep proper footing and balance at all times. Proper footing and balance enables better control of the tool in unexpected situations.
15. Use safety equipment. Always wear eye protection. Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.

TOOL USE AND CARE

16. Use clamps or other practical way to secure and support the workpiece to a stable platform. Holding the work by hand or against your body is unstable and may lead to loss of control.
17. Do not force tool. Use the correct tool for your application. The correct tool will do the job better and safer at the rate for which it is designed.
18. Do not use tool if switch does not turn it on or off. Any tool that cannot be controlled with the switch is dangerous and must be repaired.
19. Disconnect the plug from the power source before making any adjustments, changing accessories, or storing the tool. Such preventive safety measures reduce the risk of starting the tool accidentally
20. Store idle tools out of reach of children and other untrained persons. Tools are dangerous in the hands of untrained users.
21. Maintain tools with care. Keep cutting tools sharp and clean. Properly maintained tools with sharp cutting edge are less likely to bind and are easier to control. Do not use a damaged tool. Tag damaged tools "Do not use" until repaired.
22. Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the tool's operation. If damaged, have the tool serviced before using. Many accidents are caused by poorly maintained tools.
23. Use only accessories that are recommended by the manufacturer for your model. Accessories that may be suitable for one tool, may become hazardous when used on another tool.

SERVICE









24. Tool service must be performed only by qualified repair personnel. Service or maintenance performed by unqualified personnel could result in a risk of injury
25. When servicing a tool, use only identical replacement parts. Follow instructions in the Maintenance section of this manual. Use of unauthorized parts or failure to follow Maintenance Instructions may create a risk of electric shock or injury.

SPECIFIC SAFETY RULES

1. Hold tool by insulated gripping surfaces when performing an operation where the cutting tool may contact hidden wiring or its own cord. Contact with a "live" wire will make exposed metal parts of the tool "live" and shock the operator.
2. Wear ear protectors when using the tool for extended periods. Prolonged exposure to high intensity noise can cause hearing loss.
3. Keep hands away from all cutting edges and moving parts.
4. Maintain labels and nameplates. These carry important information. If unreadable or missing, contact a MILWAUKEE Service facility for a free replacement.
5. **WARNING!** Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:
 - lead from lead-based paint
 - crystalline silica from bricks and cement and other masonry products, and
 - arsenic and chromium from chemically-treated lumber

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

Symbology

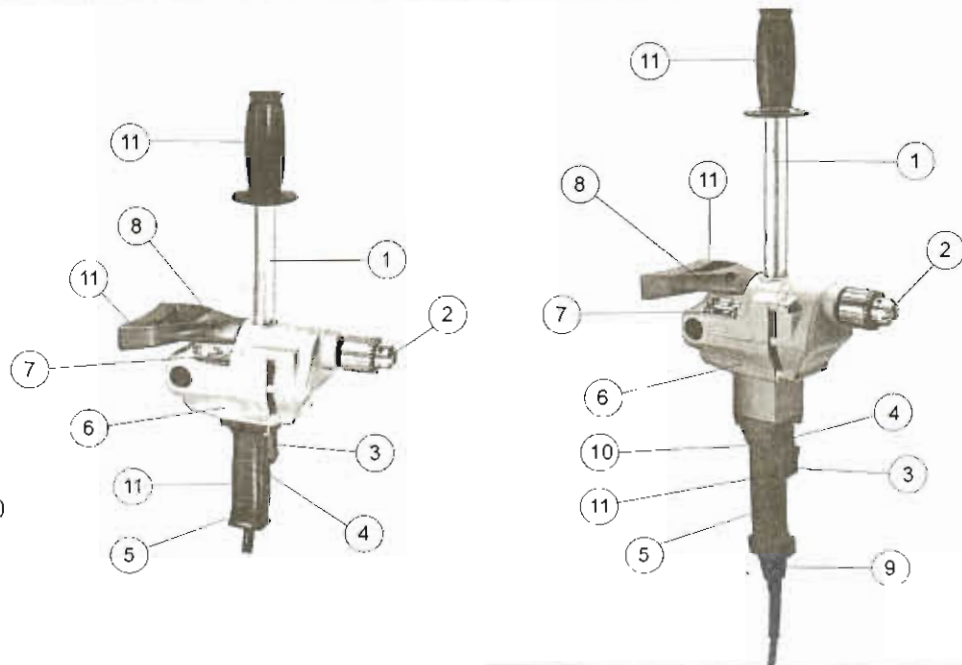
	Double Insulated
	Alternating Current Only
	Direct or Alternating Current
	Amps
	Volts
	No Load Revolutions Per Minute (RPM)
	Underwriters Laboratories, Inc.
	Canadian Standards Association

Specifications

Cat. No.	Volts AC/DC	No Load RPM	Wood						Mild Steel	
			Twist Drills	Selffeed Bits	Hole Saws	Auger Bits	Ship Auger Bits	Flat Boring Bits	Twist Drills	Hole Saws
1610-1	120AC	650	1/2"	2-9/16"	3-1/2"	1-1/2"	1-1/2"	1-1/2"	1/2"	2-1/4"
1630-1	120AC	900	1/2"	2-1/4"	3"	1-1/2"	1-1/2"	1-1/4"	1/2"	1-3/4"
1660-1	120AC/DC	450	1/2"	3"	4"	1-1/2"	1-1/2"	1-1/2"	1/2"	2-5/8"
1663-20	120AC	115-450	1/2"	3"	4"	1-1/2"	1-1/2"	1-1/2"	1/2"	2-5/8"

FUNCTIONAL DESCRIPTION

1. Pipe handle
2. Chuck
3. Trigger switch
4. Reversing switch
5. Switch handle
6. Motor housing
7. Nameplate
8. Spade handle
9. Quik-Lok® cord (1663-20 only)
10. Speed control dial (1663-20 only)
11. Insulated gripping surfaces



GROUNDING



WARNING!

Improperly connecting the grounding wire can result in the risk of electric shock. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with the tool. Never remove the grounding prong from the plug. Do not use the tool if the cord or plug is damaged. If damaged, have it repaired by a **MILWAUKEE** service facility before use. If the plug will not fit the outlet, have a proper outlet installed by a qualified electrician.

Grounded Tools:

Tools with Three Prong Plugs

Tools marked "Grounding Required" have a three wire cord and three prong grounding plug. The plug must be connected to a properly grounded outlet (See Figure A). If the tool should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user, reducing the risk of electric shock.

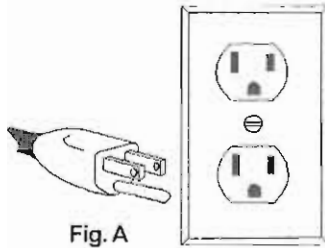


Fig. A

The grounding prong in the plug is connected through the green wire inside the cord to the grounding system in the tool. The green wire in the cord must be the only wire connected to the tool's grounding system and must never be attached to an electrically "live" terminal.

Your tool must be plugged into an appropriate outlet, properly installed and grounded in accordance with all codes and ordinances. The plug and outlet should look like those in Figure A.

Double Insulated Tools:

Tools with Two Prong Plugs

Tools marked "Double Insulated" do not require grounding. They have a special double insulation system which satisfies OSHA requirements and complies with the applicable standards of Underwriters Laboratories, Inc., the Canadian Standard Association and the National Electrical Code. Double Insulated tools may be used in either of the 120 volt outlets shown in Figures B and C.

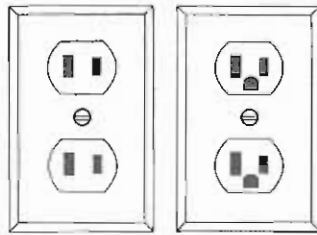


Fig. B

Fig. C

EXTENSION CORDS

Grounded tools require a three wire extension cord. Double insulated tools can use either a two or three wire extension cord. As the distance from the supply outlet increases, you must use a heavier gauge extension cord. Using extension cords with inadequately sized wire causes a serious drop in voltage, resulting in loss of power and possible tool damage. Refer to the table shown to determine the required minimum wire size.

The smaller the gauge number of the wire, the greater the capacity of the cord. For example, a 14 gauge cord can carry a higher current than a 16 gauge cord. When using more than one extension cord to make up the total length, be sure each cord contains at least the minimum wire size required. If you are using one extension cord for more than one tool, add the nameplate amperes and use the sum to determine the required minimum wire size.

Guidelines for Using Extension Cords

- If you are using an extension cord outdoors, be sure it is marked with the suffix "W-A" ("W" in Canada) to indicate that it is acceptable for outdoor use.
- Be sure your extension cord is properly wired and in good electrical condition. Always replace a damaged extension cord or have it repaired by a qualified person before using it.
- Protect your extension cords from sharp objects, excessive heat and damp or wet areas.

Recommended Minimum Wire Gauge
for Extension Cords*

Nameplate Amperes	Extension Cord Length					
	25'	50'	75'	100'	150'	200'
0 - 5	16	16	16	14	12	12
5.1 - 8	16	16	14	12	10	--
8.1 - 12	14	14	12	10	--	--
12.1 - 15	12	12	10	10	--	--
15.1 - 20	10	10	10	--	--	--

* Based on limiting the line voltage drop to five volts at 150% of the rated amperes.

**READ AND SAVE ALL INSTRUCTIONS
FOR FUTURE USE.**

TOOL ASSEMBLY

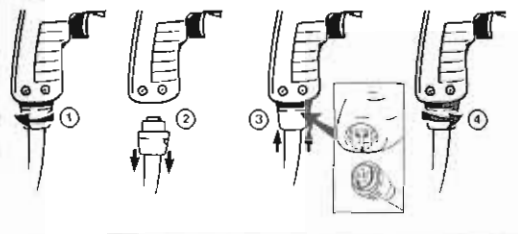


WARNING!

To reduce the risk of injury, always unplug tool before attaching or removing accessories or making adjustments. Use only specifically recommended accessories. Others may be hazardous.

Removing and Replacing Quik-Lok® Cords (Fig. 1)

Fig. 1



MILWAUKEE's exclusive Quik-Lok® Cords provide instant field replacement or substitution.

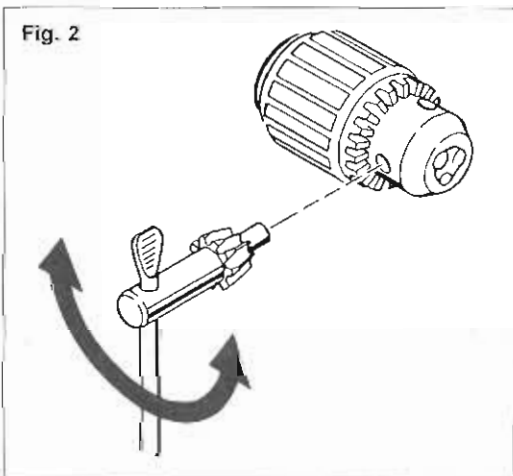
1. To remove the Quik-Lok® Cord, turn the cord nut 1/4 turn to the left and pull it out.
2. To replace the Quik-Lok® Cord, align the connector keyways and push the connector in as far as it will go. Turn the cord nut 1/4 turn to the right to lock.

Pipe Handle

Thread pipe handle into the threaded hole in the motor housing.

Installing Bits into Keyed Chucks (Fig. 2)

Fig. 2



1. Unplug tool
2. Open the chuck jaws wide enough to insert the bit. Be sure the bit shank and chuck jaws are clean. Dirt particles may prevent the bit from lining up properly.
3. Insert the bit into the chuck. Center the bit in the chuck jaws and lift it about 1/16" off of the bottom. Then, tighten the chuck jaws by hand to align the bit.
4. Place the chuck key in each of the three holes in the chuck, turning it clockwise as shown. Tighten securely.
5. To remove the bit, insert the chuck key into one of the holes in the chuck and turn it counterclockwise.

OPERATION



WARNING!

To reduce the risk of personal injury when drilling, always hold tool by the insulated gripping surfaces when performing an operation where the cutting tool may contact hidden wiring or its own cord. Contact with a "live" wire will make exposed metal parts of the tool "live" and shock the operator.



WARNING!

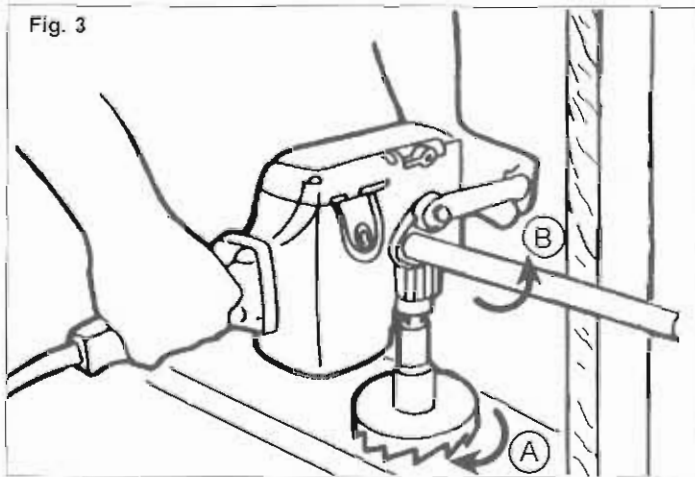
When drilling, always hold the drill securely using the pipe handle, or brace the drill against a solid fixed object in preparation for a sudden reaction.

When drilling, never use your body to brace drill.

Never put your hands (or other body parts) between the part of the drill being braced and the object it is being braced against. Hands (or other body parts) that are in the path of the reaction can be pinched, crushed, and broken.

Bit Binding (Fig. 3)

Fig. 3



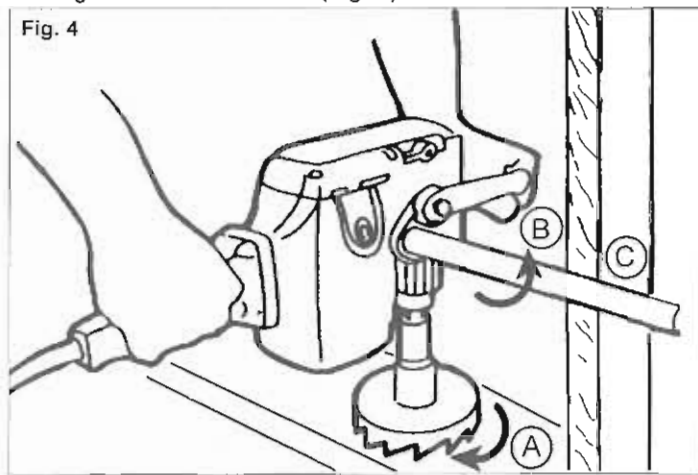
If the bit binds, the drill will suddenly react in the opposite direction of the rotation of the bit. Figure 3 shows the path of reaction, (B) if the drill bit binds while being driven in forward (A). The operator should reduce the chances of a sudden reaction by following the instructions listed below. The operator should also prepare for a sudden reaction by holding securely using the pipe handle or bracing against a solid fixed object.

To reduce the chance of bit binding

- Use sharp bits. Sharp bits are less likely to bind when drilling.
- Use the proper bit for the job. There are many types of bits designed for specific purposes.
- Avoid drilling warped, wet, knotty, and or pitchy material if possible.
- Avoid drilling in material that you suspect contains hidden nails or other things that may cause the bit to bind.

The direction of reaction is always opposite of the direction of bit binding. Reaction is even more likely to occur when enlarging already existing holes and at the point when the bit breaks through the other side of the material.

Bracing for forward rotation (Fig. 4)



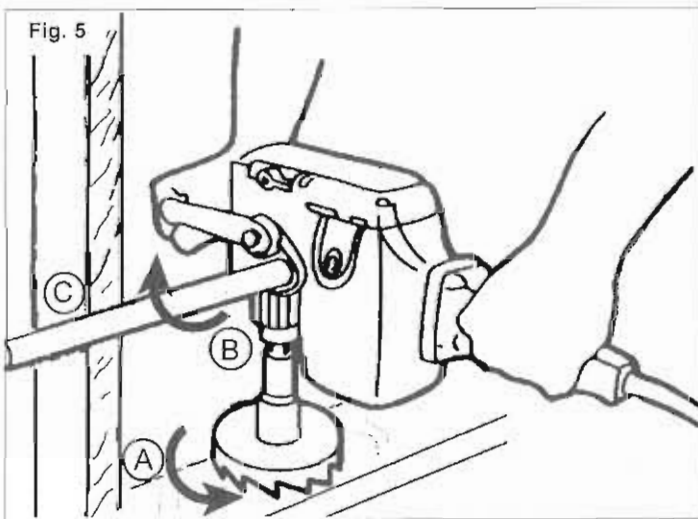
When drilling in forward, the bit will rotate in a clockwise direction. If the bit binds in the hole, the bit will come to a sudden stop and drill will suddenly react in a counterclockwise direction.

Figure 4 shows an example of a Compact Hole-Shooter properly braced for forward rotation.

- A. Forward (clockwise) rotation
- B. Reaction
- C. Brace drill with pipe handle here

If the bit binds, the pipe handle or the motor housing braced against the stud will hold the drill in position.

Bracing for reverse rotation (Fig. 5)



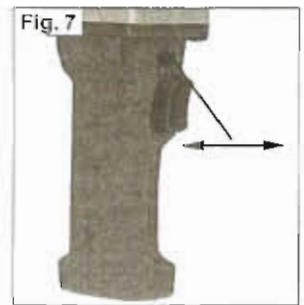
When drilling in reverse, the bit will rotate in a counterclockwise direction. If the bit binds in the hole, the bit will come to a sudden stop and the drill will suddenly react in a clockwise direction.

Figure 5 shows an example of a Compact Hole-Shooter properly braced for reverse rotation.

- A. Reverse (counterclockwise) rotation
- B. Reaction
- C. Brace drill with pipe handle here

If the bit binds, the pipe handle or the motor housing braced against the stud will hold the drill in position.

Reversing (Fig. 6 & 7)



A reversing switch is located below (Fig. 6) or above (Fig. 7) the trigger switch for removal of bits from holes. Permit the motor to come to a complete stop before reversing. Reversing the tool with the gears in motion may cause severe damage. When removing selffeed bits from partially drilled holes, a flick of the trigger switch will free the threaded pilot screw. When the threads are loose, lift the bit from the workpiece with the motor stopped.

Bit Selection

- Use sharp bits. Sharp bits are less likely to bind when drilling.
- Use the proper bit for the job. There are many types of bits designed for specific purposes. Check the information on the bit's packaging for proper usage.
- Do not use bits larger than the rated capacity of the drill. Gear damage or motor overload may result. See Specifications.

Drilling

Before drilling, clamp the material down securely. A poorly secured piece of material may result in personal injury or inaccurate drilling. When drilling in light gauge metal or wood, use a wooden block to back up the material to prevent damage to the workpiece.

Mark the center of the hole to be drilled with a center punch to give the bit a start and to prevent it from "walking." Lubricate the drill bit with cutting oil when drilling iron or steel. Use a coolant when drilling nonferrous metals such as copper, brass or aluminum.

To start a selffeed bit, run the threaded feed screw into the work by flicking the trigger switch, permitting the bit to coast until the teeth contact the work surface. Align the bit properly before proceeding. This will reduce cocking and jamming when starting. To reduce jamming on breakthrough, decrease the drilling pressure when the feed screw point breaks through the workpiece. Proceed with steady, even pressure.

Speed Control Dial

Catalog number 1663-20 has a Speed Control Dial to provide electronic speed control. (The trigger does not control the speed - it only turns the tool on and off). The dial is located on rear of the handle. The dial has positions numbered 1-8. Position 8 provides full speed at no load. Position 1 provides approximately 25% of the full no load speed. Reduced speed can be useful for starting bits and obtaining the optimum speed for a given bit size. Do not adjust the speed while drilling. This tool is furnished with Electronic Feedback to provide a more constant speed under load.

MAINTENANCE



WARNING!

To reduce the risk of injury, always unplug your tool before performing any maintenance. Never disassemble the tool or try to do any rewiring on the tool's electrical system. Contact a **MILWAUKEE** service facility for ALL repairs.

Maintaining Tools

Keep your tool in good repair by adopting a regular maintenance program. Before use, examine the general condition of your tool. Inspect guards, switches, tool cord set and extension cord for damage. Check for loose screws, misalignment, binding of moving parts, improper mounting, broken parts and any other condition that may affect its safe operation. If abnormal noise or vibration occurs, turn the tool off immediately and have the problem corrected before further use. Do not use a damaged tool. Tag damaged tools "DO NOT USE" until repaired (see "Repairs").

Under normal conditions, relubrication is not necessary until the motor brushes need to be replaced. After six months to one year, depending on use, return your tool to the nearest **MILWAUKEE** service facility for the following:

- Lubrication
- Brush inspection and replacement
- Mechanical inspection and cleaning (gears, spindles, bearings, housing, etc.)
- Electrical inspection (switch, cord, armature, etc.)
- Testing to assure proper mechanical and electrical operation



WARNING!

To reduce the risk of injury, electric shock and damage to the tool, never immerse your tool in liquid or allow a liquid to flow inside the tool.

Cleaning

Clean dust and debris from vents. Keep the tool handles clean, dry and free of oil or grease. Use only mild soap and a damp cloth to clean your tool since certain cleaning agents and solvents are harmful to plastics and other insulated parts. Some of these include: gasoline, turpentine, lacquer thinner, paint thinner, chlorinated cleaning solvents, ammonia and household detergents containing ammonia. Never use flammable or combustible solvents around tools.

Repairs

If your tool is damaged, return the entire tool to the nearest service center listed on the back cover of this operator's manual.

ACCESSORIES



WARNING!

To reduce the risk of injury, always unplug the tool before attaching or removing accessories. Use only specifically recommended accessories. Others may be hazardous.

For a complete listing of accessories refer to your **MILWAUKEE** Electric Tool catalog. To obtain a catalog, contact your local distributor or a service center listed on the back cover of this operator's manual.

Type "E" Grease
Cat. No. 49-08-4122
Chuck Key Holder
Cat. No. 48-66-4040
Chuck Key
Cat. No. 48-66-3280

WARRANTY

Every **MILWAUKEE** product is warranted to be free from defects in material and workmanship. **MILWAUKEE** will repair or replace any product which examination proves to be defective in material or workmanship.

Limitations: This warranty does not cover: 1) repairs made or attempted by other than **MILWAUKEE** or **MILWAUKEE** Authorized Service Station personnel; 2) normal wear and tear; 3) abuse; 4) misuse; 5) improper maintenance; 6) continued use after partial failure; 7) tools that have been modified, or product used with an improper accessory.

Battery Packs are warranted for one (1) year from the date of purchase.

Should a problem develop, return the complete product to any **MILWAUKEE** Factory Service Center or **MILWAUKEE** Authorized Service Station, freight prepaid and insured. If inspection shows the problem is caused by a defect in material or workmanship, all repairs or a replacement will be made at no charge and the product will be returned, transportation prepaid. No other warranty, written or verbal, is authorized.

THE REPAIR AND REPLACEMENT REMEDIES DESCRIBED HEREIN ARE EXCLUSIVE. IN NO EVENT SHALL **MILWAUKEE** BE LIABLE FOR ANY INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES, INCLUDING LOSS OF PROFITS.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED WHETHER FOR MERCHANTABILITY OR FITNESS FOR PARTICULAR USE OR PURPOSE.

This warranty gives you specific legal rights. You may also have other rights that vary from state to state. In those states that do not allow the exclusion of implied warranties or limitations of incidental or consequential damages, the above limitations or exclusions may not apply to you.