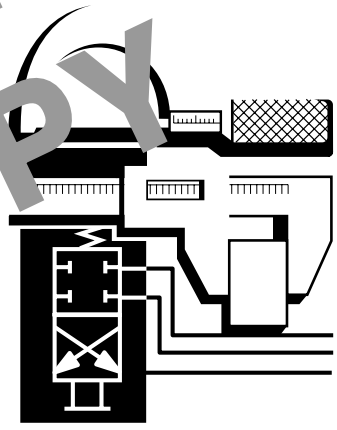
Portable Power Tools

Table of Contents

PORTABLE POWER TOOLS

Lesson One

Electric Drills



TPC Training Systems

10801

Lesson

1 Electric Drills

TOPICS

Parts of Electric Drills
Light-Duty Drills
Heavy-Duty Drills
Accessories
Drill Sizes
Drill Bits
Preparing to Drill
Using the Electric Drill
Electric Drill Maintenance
Drill Safety

OBJECTIVES

After studying this lesson, you should be able to…

- Name four parts that are common to both the light-duty drill and the heavy-duty drill.
- Name the parts of a drill bit.
- Explain how to drill a blind hole.
- Explain how to inspect a drill bit, both visually and through testing.
- List the safety rules to follow when using electric power tools.

KEY TECHNICAL TERMS

Chuck 1.14 clamping device that grips a drill bit
Flutes 1.21 grooves in a drill bit
Web 1.22 metal between flutes in a drill bit
Lips 1.23 cutting edges of a drill bit
Dead center 1.24 point where lips meet on a drill bit
Margin 1.25 largest diameter of a drill bit

The electric drill is one of the most widely used portable power tools. It is easy to operate, and it accepts many attachments. Drills are available in two basic styles—light duty and heavy duty. They range in size from small models with plastic housings to large units with metal housings. Most light-duty drills have pistol-grip handles. Heavy-duty drills usually have D-shaped handles. Many have extension handles that can be attached to the top of the housing.

The part of the drill that cuts the hole is called the drill bit. The twist drill bit is most commonly used. Augers, spade bits, reamers, screwdriver bits, and grinding attachments are variations of the drill bit. The drill bit used depends on the size of the drill, the material being drilled, and the type of hole.

As with any power tool, there are safety rules to follow when you use an electric drill. Most of these rules are matters of common sense. However, you should always read the manufacturer's operating manual before using any power tool that is new to you.

Parts of Electric Drills

1.01 The portable electric drill is one of the most useful of all power tools. The most basic attachment used with the drill is the *drill bit*. Various other accessories make the drill a multipurpose tool.

1.02 Designs of electric drills vary, but certain parts are common. Figure 1-1 shows what is inside an electric drill. The parts shown are found in all drills. The materials these parts are made of varies from drill to drill. Methods of mounting bearings and motors also differ from drill to drill.

1.03 Electric drills are divided into two types—*light-duty drills* and *heavy-duty drills*. Each type is designed to do specific jobs on a number of materials. Always make sure the drill you use is powerful enough for the job.

1.04 The light- and heavy-duty drill have several parts in common. In each type, the outer body is called the *housing*. The housing is usually made of

Fig. 1-1. Inside an electric drill

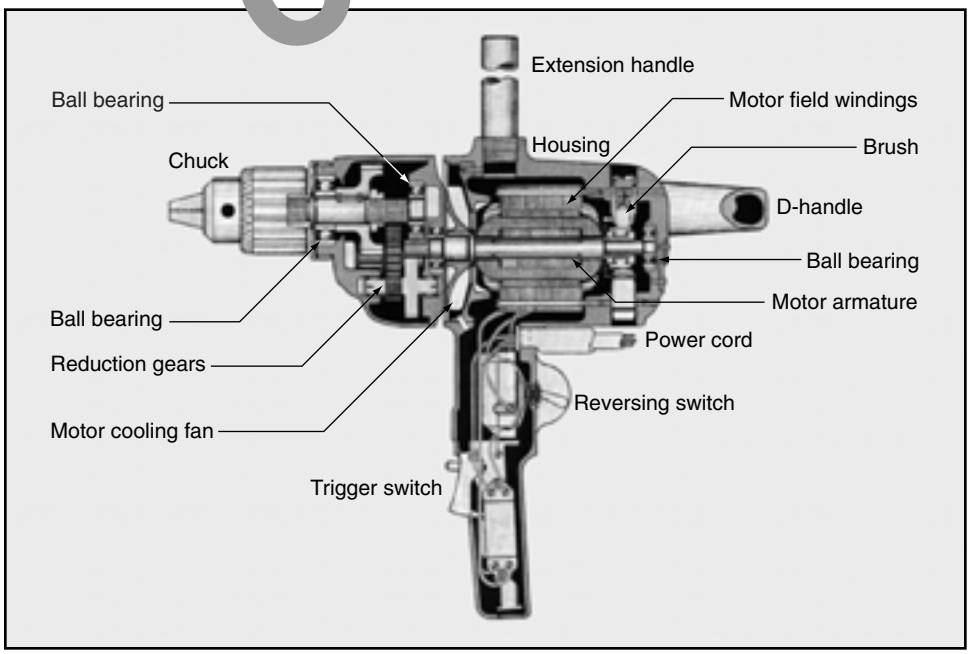


Fig. 1-2. Light-duty drill

metal, but it may be made of plastic. Another common part is the *chuck*. The chuck is a clamping device that holds the drill bit.

1.05 Can you list other parts these drills have in common? Examine Figs. 1-2, Fig. 1-3, and Fig 1-4. Then make a list of common parts in the spaces below.

_____ _____

_____ _____

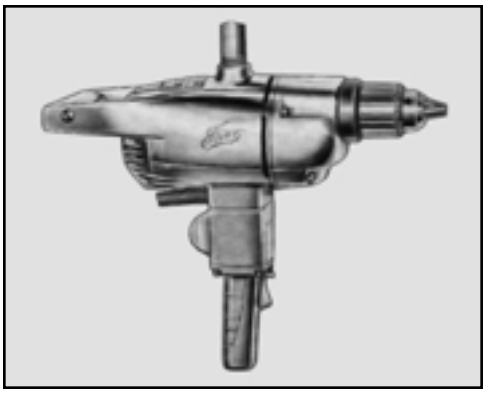
Light-Duty Drills

1.06 You can usually identify a light-duty drill by its size. It is smaller than a heavy-duty drill. Figure 1-2 shows a light-duty drill. Notice the pistol-grip handle.

1.07 The light-duty drill is best suited for jobs that do not require the drill to run for a long time. Motors in light-duty drills provide from 1/3 horsepower (hp) to 1/2 hp. The drills work best at high speeds. Bits for light-duty drills range in size from 1/64 to 1/2 in.

Fig. 1-3. Heavy-duty drill

Fig. 1-4. Heavy-duty drill with extension handle



1.08 Some drills have a variable speed control. It is a trigger-like device. The tighter you squeeze the trigger, the faster the chuck spins.

Heavy-Duty Drills

1.09 Figure 1-3 shows a heavy-duty drill. The drill is larger than a light-duty drill. It has a D-shaped grip. Motors in heavy-duty drills provide 3/4 hp and up. The drills operate at slower speeds than light-duty drills. A heavy-duty drill can drill holes from 1/4 in. to more than 1 in.

1.10 Figure 1-4 shows a heavy-duty drill with an extension handle. The extension handle screws into the top of the drill housing. By gripping both the extension handle and the D-shaped handle, you can exert more force on the bit and still have good control of the drill.

Accessories

1.11 A *drill press stand* converts an electric drill into a stationary tool for precision work. The drill press stand shown in Fig. 1-5 is being used with a heavy-duty drill.

1.12 The stand has an electromagnet in its base. It can be attached to an iron or steel surface. The stand remains firmly in place as long as electricity flows through the magnet. The drill can be removed from the stand and used normally at any time.

1.13 Sometimes you must work in very close quarters when drilling. A *right-angle adapter* can be attached to the drill, as shown in Fig. 1-6. The adapter allows the chuck to operate at right angles to the drill axis. Only a small working space is required.

Drill Sizes

1.14 The *chuck* is a clamping device that holds the drill bit. The size of the chuck defines the size of the drill. The chuck size is the maximum diameter that the chuck can grip.

1.15 Chuck jaws are adjustable so that the chuck can grip drill bits of different sizes. A 1/2 in. chuck can grip drill bits up to 1/2 in. in diameter.

1.16 The end of a drill bit that fits into the chuck is called the *shank*. The shank is usually the same diameter as the cutting part of the bit. However, some bits have smaller shank diameters so they can fit a smaller drill. For example, a 3/8 in. bit will not fit a 1/4 in. drill unless the shank of the bit is reduced to 1/4 in.

1.17 Most drill chucks have three steel jaws. These jaws grip the shank of the drill bit. Figure 1-7 shows the *three-jaw chuck*.

1.18 A *chuck key* tightens or loosens the jaws. The teeth on the key match teeth on the movable outer sleeve of the chuck. Always make sure the chuck grips the shank securely. If the bit seems loose, tighten the jaws with the key. Do not use pliers or wrenches to tighten the chuck.

WARNING

Always remove the chuck key before operating a drill.

Fig. 1-5. Drill press stand

Drill Bits

1.19 A drill bit cuts the hole in the material being drilled. Figure 1-8 on the following page shows a twist drill bit. Note the shank, body, flutes, and point.

1.20 The *shank* of a drill bit is the section opposite the point. The shank is gripped by the chuck.

1.21 The *body* of a drill bit includes the flutes, a web, and lips. The *flutes* are spiral grooves in the bit. The flutes perform four functions:

- They form properly shaped cutting edges on the point.

Fig. 1-6. Drill with right-angle adapter

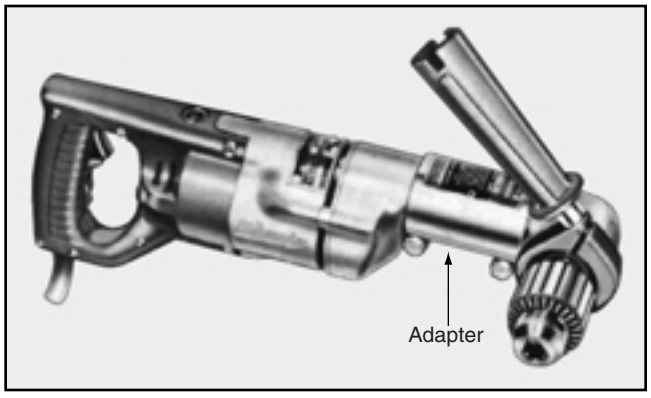


Fig. 1-7. Three-jaw drill chuck and key

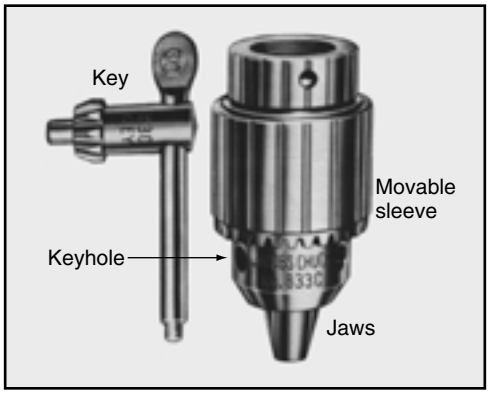


Fig. 1-8. Twist drill bit

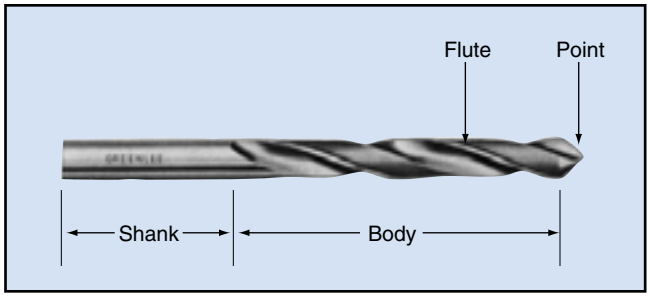
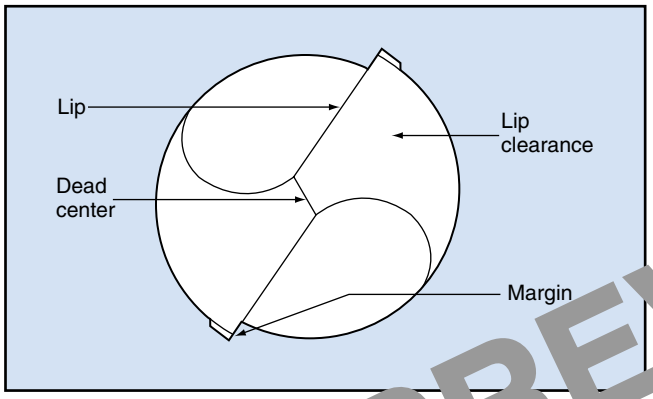


Fig. 1-9. Drill bit point



- They make the chip curl.
- They channel chips out of the hole.
- They allow lubricants to reach the cutting edges of the bit.

1.22 The *web* of the drill bit is the metal between the flutes. The web runs the entire length of the drill bit. It serves as the supporting section of the bit. The web becomes thicker toward the shank.

1.23 The *lips* are the cutting edges of the drill bit. The intersections of the flutes and point form the lips. The angle behind the lip edge provides clearance so the drill does not bind as it cuts.

1.24 The point is cone-shaped on many drill bits. Figure 1-9 shows a point. The place where the two lips meet is called *dead center.* Dead center should always be at the exact center of the drill.

1.25 The largest diameter of a drill bit is called its *margin*. The margin runs the full length of the flutes. The smaller diameter of the drill bit is called *body clearance.* Body clearance reduces friction between the bit and the wall of the hole.

1.26 The *twist drill bit* is often used in electric drills. It can drill almost anything. Twist drill bits are made either of high-speed steel or of carbon steel.

1.27 High-speed steel drill bits can drill medium-hard to hard steel. High-speed steel bits can run at high temperatures without distorting or weakening. Under normal conditions, they do not need a cooling agent.

1.28 Carbon steel bits are used in drilling wood, soft metals, and plastics. They cost less than high-speed steel bits. They also wear out sooner. A carbon steel bit used in drilling soft metals usually requires oil at the tip which prevents the bit from burning the metal. You can remove the bit from the hole and dip it in the oil, or place the oil directly in the hole.

Fig. 1-10. Wood screw pilot

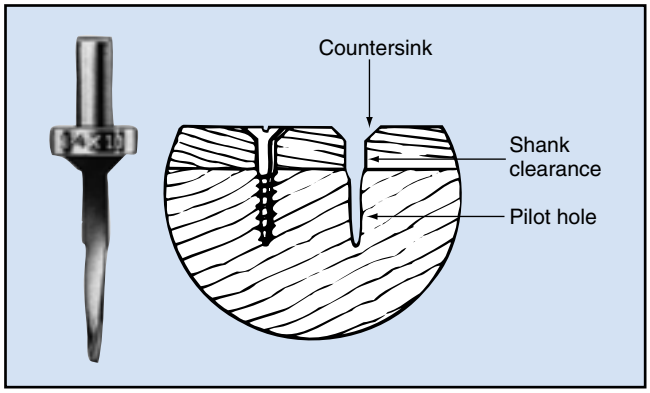
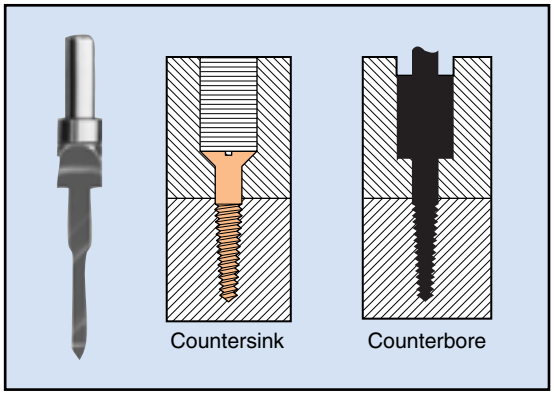


Fig. 1-11. Countersink-counterbore bit



1.29 Three systems are used to indicate drill bit sizes. The smallest bits are *numbered.* The next larger sizes are *lettered.* The largest bits are numbered in *fractional* parts of an inch.

1.30 Numbered drill bits are measured in terms of wire gauge sizes. They range from No. 80, with a diameter of 0.0135 in., up to No. 1, with a diameter of 0.2280 in. The diameters of the numbered bits do not increase in equal steps from No. 80 to No. 1.

1.31 Lettered drill bits range from A to Z. An A drill bit has a diameter of 0.2340 in., and a Z bit has a diameter of 0.4130 in. The diameters do not increase in equal steps from A to Z. The lettered drills begin where the numbered drills leave off. Size A is larger than No. 1. Fractional drill sizes range from 1/64 (0.0156) in. in diameter to 3 1/2 in. in diameter.

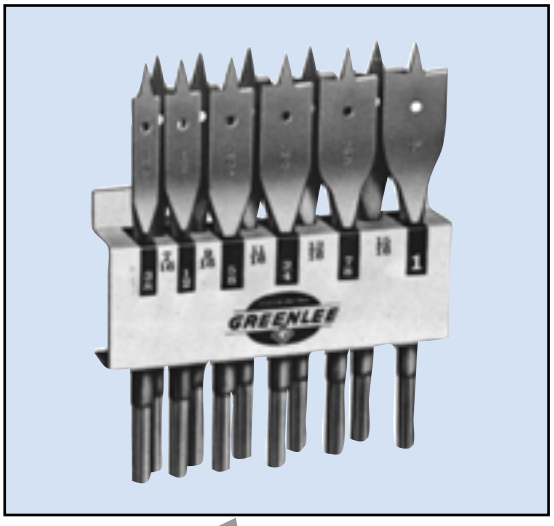
1.32 Metric measurements are also used to indicate drill bit sizes. The smallest metric size is 0.35 mm. Metric drills of 3.00 mm diameter and smaller are made in steps of 0.05 mm. Sizes larger than 3.00 mm are made in steps of both 0.10 mm and 0.25 mm.

1.33 Special drill bits are available for drilling holes in metal, wood, glass, plastic, and masonry. Special attachments include augers, spade bits, reamers, screwdriver blades, and grinding bits.

1.34 Special bits serve special purposes. Figure 1-10 shows a wood screw pilot bit. It drills the hole for the body of the screw to the required depth, and also countersinks for the screw head. These bits come in sizes based on the screw number. For example, drill size 4 to 5 is for No. 4 and No. 5 screws.

1.35 The bit shown in Fig. 1-11 drills, countersinks, and counterbores. Counterboring allows the screw head to be set below the surface of the wood. Similar special bits are made for drilling metal.

Fig. 1-12. Spade bits



1.36 Spade bits may also be used for wood boring. Figure 1-12 shows a set of spade bits. Each bit has a sharp point. It also has a flat blade with cutting edges on each side of the point.

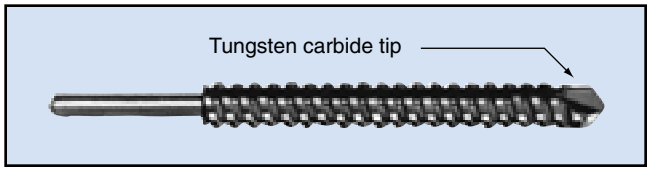
1.37 Figure 1-13 shows a *boring bit extension, which* adds to the reach of the drill. When using an extension, you should always center punch to hold the drill point in place when you start drilling. Otherwise, the point of the bit can whip around when the drill starts turning.

1.38 *Masonry bits* are used for drilling holes in cement, brick, stone, plaster, and slate. Masonry bits have very hard tungsten carbide tips to resist wear. Bit sizes range from 1/8 to 1 1/2 in. in diameter. Figure 1-14 shows a masonry bit.

The Programmed Exercises on the next page will tell you how well you understand the material you have just read. Before starting the exercises, remove the Reveal Key from the back of your book. Read the instructions printed on the Reveal Key. Follow these instructions as you work through the Programmed Exercises.

Fig. 1-13. Boring bit extension

Fig. 1-14. Masonry bit



1-1. What is the most basic attachment used with a power drill?	1-1. DRILL BIT Ref: 1.01
1-2. What are the two main types of power drills?	1-2. LIGHT DUTY, HEAVY DUTY Ref: 1.03
1-3. What is the outer body of a drill called?	1-3. HOUSING Ref: 1.04
1-4. What accessory converts a portable drill to a stationary tool?	1-4. DRILL PRESS STAND Ref: 1.11
1-5. What defines the size of a drill?	1-5. THE CHUCK Ref: 1.14
1-6. Label the three parts of the drill bit shown below. 	1-6. SHANK, BODY, POINT Ref: Fig. 1-8
1-7. What does this bit do? 	1-7. DRILLS, COUNTERSINKS, COUNTERBORES Ref: 1.35, Fig. 1-11
1-8. What is this drill bit called? 	1-8. SPADE BIT Ref: 1.36, Fig. 1-12

Preparing to Drill

1.39 Almost every hole drilled requires a layout mark. The *layout mark* shows the location of the center of the hole.

1.40 Tools used in laying out the work include a combination square, ball peen hammer, center punch, and scratch awl.

1.41 **Marking centerlines.** When marking centerlines on polished steel, dark metals, or cast iron, first coat the surface with white or blue chalk. Liquid layout dye also works well. It comes in several colors. A pencil may be used to mark light colored surfaces.

1.42 You can use your combination square in locating centerlines of the holes to be drilled. Figure 1-15 shows a combination square in use. A *centering head* is used for locating the center of a circular piece. Figure 1-16 shows a centering head in use.

1.43 When you use a ruler, set it on its edge instead of laying it flat. This method provides a more accurate measurement.

1.44 **Center punching.** Figure 1-17 shows how to mark a workpiece for drilling several holes. Begin by scratching a centerline and locating the first hole from the end of the workpiece. Use the center punch and hammer to center punch this hole. Then set a pair of dividers to the distance required between holes. Place one leg of the dividers in the punch mark. Use the other leg to scratch a line across the centerline where the next hole is to be drilled. Then center punch the point where the lines cross.

1.45 The punch mark keeps the drill from "walking" around the hole location when you start to drill. Use this method to mark the center of each hole.

1.46 Figure 1-18 on the following page shows how to mark holes in doweled pieces. First clamp the two pieces together and lay out the centerlines. Next drill the holes in one part. Then insert dowel centers in the holes. Place the workpieces on a flat surface. Line up the mating pieces and press them together. The dowel centers will mark the centers for the dowel holes in the undrilled piece.

Fig. 1-15. Combination square

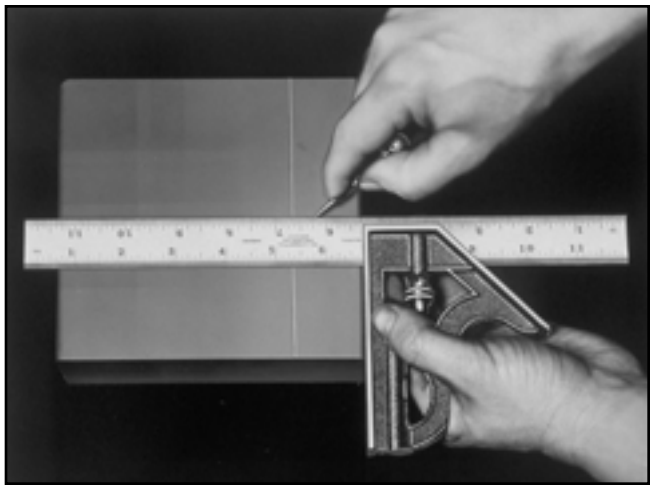


Fig. 1-16. Centering head

Fig. 1-17. Centerlining with dividers

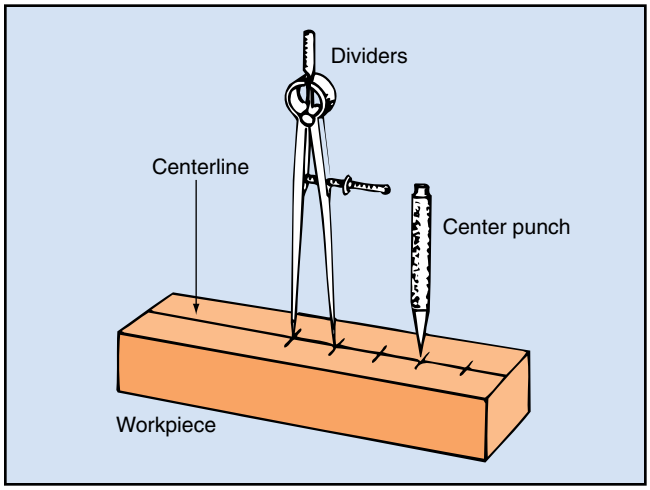
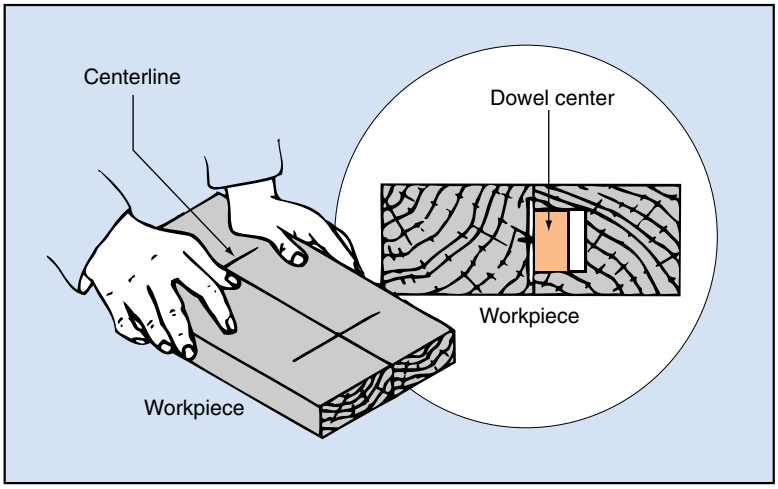


Fig. 1-18. Using dowel centers



1.47 **Using a doweling jig.** Figure 1-19 shows a *doweling jig*. The jig has a drilling guide to keep the drill at a right angle to the workpiece. Using the jig saves layout time. It also prevents the drill from making a hole that is off-center or slanted.

Using the Electric Drill

1.48 You can drill an accurate hole in any material if you use the proper tools and they are in good condition. But remember that you must use the tools safely.

1.49 **Holding the work.** Make sure your workpiece is held securely. The chuck should be properly tightened on the bit. Check to see that the exact location of the hole is marked and punched.

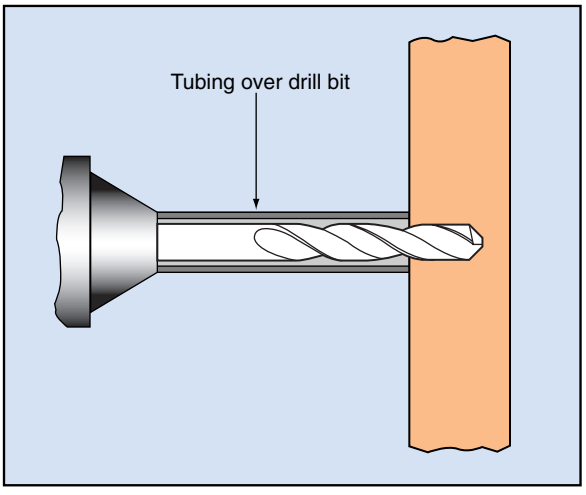
1.50 Always hold the drill firmly. The more powerful the drill, the more turning effort is available at the bit point. Large drills can twist out of your hands if the bit jams.

1.51 Never hold the piece being drilled in your hand. You might drill through the workpiece and into your hand. Fasten the workpiece to a bench with clamps or a vise.

1.52 **Drilling the hole.** To drill, place the drill bit point in the punch mark. Hold the drill firmly in position, and then start the drill. A handheld drill does not feed itself into the material. You must apply pressure. Keep an even, steady pressure on the drill bit. Apply only enough pressure to keep the tool cut-

Fig. 1-19. Doweling jig

Fig. 1-20. Tubing used as depth gauge



ting. Do not force the drill bit into the piece. Let the drill do the work.

1.53 If the hole is to go all the way through the workpiece, ease up on the pressure as you approach the other side. Do not *push* the bit through. Let it *cut* its way through. Keep the bit turning as you withdraw it from the hole. Turning off the drill might jam the bit and break it.

1.54 **Drilling blind holes.** A *blind hole* is a hole that does not go all the way through the material. You must use a depth gauge to stop the bit from cutting too deep. You can make a depth gauge from a piece of metal tubing cut to the proper length. Slip it over the drill bit as shown in Fig. 1-20. The length of drill bit left exposed should equal the desired depth of the hole.

1.55 Another way to make a depth gauge is to drill through a small piece of scrap wood of the proper thickness. Slip the wood over the drill bit. A third method is to use a stop rod. A *stop rod* clamps onto the drill housing. It bumps against the workpiece when the drill reaches the proper depth.

1.56 **Choosing the right speed.** On drills without variable speed control, the operating speed of the drill is marked on the housing. The *operating speed* of a drill is the no-load speed of the drill bit. If you are drilling and the drill starts to slow down, back the bit out of the hole. Slowing down is an indication of overload.

1.57 Many drills have variable speed controls. You can run such a drill at slow speeds for hard materials to prevent overloading the drill. Slow drilling speeds also keep the bit from overheating. Cuts made at slower speeds usually will be smoother.

1.58 It is not necessary to use the highest speed available on a drill. Be patient and let the bit do its work. Practice will help you determine the best speed for a job.

1.59 As a rule, use high speeds for small holes and low speeds for large holes. A correct combination of pressure and speed keeps the bit cutting without jamming.

1.60 You should see chips when you drill. If you do not, then the bit is polishing, burning, or scoring the hole. When drilling deep holes in wood, back the bit partly out of the hole several times. This clears the chips or shavings from the flutes. When drilling through thin materials, support the workpiece with a thicker piece of scrap material underneath. Supporting the work in this way helps keep the material from being pushed out of shape by the force of the drill.

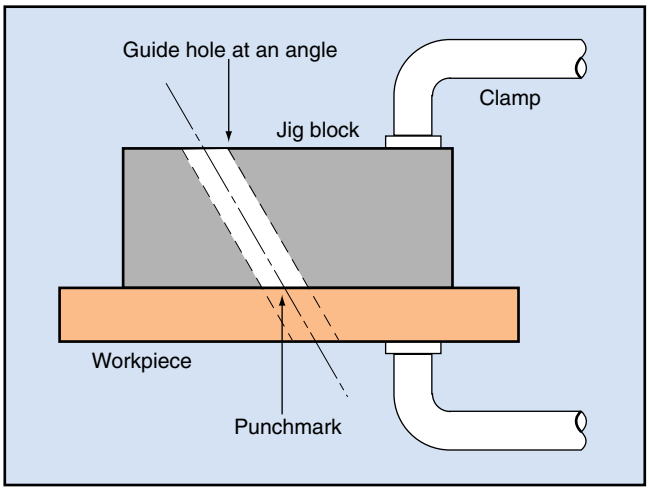
1.61 **Drilling at the proper angle.** It is usually important to keep the drill bit at right angles to the material as you drill. You can use a try square on the surface of the workpiece. Align the blade of the square against the drill housing. Once you have aligned the drill, keep firm pressure on it to prevent wobbling.

1.62 If you must drill a hole at an angle, you can use a *jig* to hold the bit at the proper angle. Make the jig by drilling a hole at the desired angle through a piece of wood. Then clamp the jig over the punch mark when you start each hole. After the hole is started, remove the jig and finish drilling the hole. Figure 1-21 shows a jig for drilling at an angle.

1.63 **Planning your work.** Planning ahead will save you time. For example, you can arrange your work so that you can drill all holes of the same size one after another. This kind of planning saves time, because you do not have to change the bit every time you drill.

1.64 **Using the correct bit.** Certain materials should be drilled at slow speeds. Use a tungsten bit with a car-

Fig. 1-21. Jig for angle drilling



bide tip to drill glass, slate, ceramic, and masonry. You should have oil or another recommended coolant on hand whenever you drill holes in hard materials.

Electric Drill Maintenance

1.65 Simple maintenance will keep an electric drill in good working condition. Inspect your drill bits regularly. Look for sharpness, straightness, and a lack of burrs on the shanks.

1.66 You can check a bit for sharpness by looking directly at the point. It should be exactly in the center. You can also drill a hole to test for sharpness.

1.67 You can check the bit for straightness by rolling it on a flat surface. The bit should remain flat against the surface throughout the roll.

1.68 Burrs form on the shank when the bit is too loose and slips in the chuck. A burr can misalign the bit in the chuck and make it wobble during drilling. Grind the burr off, but be careful not to grind a flat spot on the shank.

1.69 Use a vacuum cleaner with a brush attachment to clean the drill housing. Vacuuming removes sawdust and metal chips that accumulate in cracks and crevices. Dirt can make the motor overheat and burn out the windings.

1.70 Inspect the motor regularly. The gear housing of most electric drills is usually packed with grease at the factory. If your drill requires oiling, add a drop or two of high-grade lubricating oil to the motor bearings at least once a month.

Drill Safety

1.71 Tools generally do not cause accidents. People cause most accidents by misusing tools. Following the safety rules below will help you operate all

Table 1-1. Causes of drill b[illegible]ak[illegible]e, d[illegible]g[illegible], and inaccuracy

Symptom	Probable cause	Remedy
Breakage of drill bit.	[illegible] little lip clearance. Too slow speed in p[illegible]ion [illegible]he[illegible]ed. Dull drill bit.	Regrind properly. Increase speed or decrease feed. Sharpen drill bit.
Breaking down of outer corners of cutting edges.	Materia[illegible]ing dril[illegible] has h[illegible]d sp[illegible]ts, scale, or sand incl[illegible]ons. Too m[illegible]h speed. Improp[illegible]uttin[illegible]ompound. No lubrica[illegible]oint of drill.	Reduce speed. Use proper cutting compound and correct application.
Breaking of drill bit when drilling brass or wood.	Chips clog flutes.	Increase speed. Use drills designed for these materials.
Chipping of lip or cutting edges.	Too much feed. To much lip clearance.	Reduce feed. Regrind properly.
Chipping or checking of a high-speed drill bit.	Heated and cooled too quickly while grinding or while drilling. Too much feed.	Warm slowly before using. Do not throw cold water on hot drill while grinding or drilling. Reduce feed.
Change in character of chips while drilling.	Change in condition of the drill bit, such as chipping of cutting edge, dulling.	Regrind drill bit properly.
Hole too large.	Unequal angle or length of the cutting edges, or both. Loose chuck.	Regrind properly. Check chuck for rigidity.
Only one lip cutting.	Unequal length or angle of cutting lips, or both.	Regrind drill bit properly.
Splitting up center.	Too little lip clearance. Too much feed.	Regrind with proper lip clearance. Reduce feed.
Rough hole.	Dull or improperly ground drill bit. Lack of lubricant or wrong lubricant. Too much feed.	Regrind properly. Lubricate or change lubricant. Reduce feed.

power tools safely. Following these rules will also make your tools last longer:

- Read the manufacturer's operating manual carefully before you try to use any power tool for the first time. Know what the tool can and cannot be used for. Learn about the potential hazards involved.

- Ground all electric power tools to prevent electric shock. All such tools, unless double-insulated, are equipped with a three-prong power plug. Plug it into a grounded three-hole power outlet. Do not pull out the grounding prong to make the plug fit an ungrounded two-hole outlet.

- Do not use electric power tools while standing on a damp or wet floor. Do not use electric tools near flammable gases or liquids.

- Always unplug the tool before you change any attachment.

- Keep the power cords in good repair. Replace damaged, frayed, or broken cords.

- Make all adjustments before turning the tool on. Do not try to make any adjustments while the tool is running.

- Never hold the workpiece in your hand while operating a power tool.

1.72 Table 1-1 lists some common problems in using electric drills. Use this table as a reference. If you have trouble drilling with an electric drill, you may find the cause and the remedy listed in this table.

1-9. What marks show where holes are to be drilled?	1-9. LAYOUT MARKS Ref: 1.39
1-10. What tools are used to make punch marks?	1-10. CENTER PUNCH, HAMMER Ref: 1.44
1-11. When drilling a blind hole, what can you use to keep the bit from going all the way through the material?	1-11. DEPTH GAUGE OR STOP ROD Ref: 1.54, 1.55
1-12. What does the slowing down of a drill indicate?	1-12. OVERLOAD Ref: 1.56
1-13. What device should you use in starting to drill a hole at an angle?	1-13. JIG Ref: 1.62
1-14. What important condition of a drill bit can you check by rolling the bit on a flat surface?	1-14. STRAIGHTNESS Ref: 1.67
1-15. What may form on the shank of a drill bit if it slips in the chuck?	1-15. BURR Ref: 1.68
1-16. What should you read before trying to operate any power tool for the first time?	1-16. OPERATING MANUAL Ref: 1.71

Answer the following questions by marking an "X" in the box next to the best answer.

1-1. What kind of hand grip does a light-duty drill usually have?

- ☐ a. D-shaped
- ☐ b. Extension
- ☐ c. Pistol
- ☐ d. Variable

1-2. What accessory can be added to a drill for working in small spaces?

- ☐ a. Drill press stand
- ☐ b. Jig
- ☐ c. Right-angle adapter
- ☐ d. Three-jaw chuck

1-3. On an electric drill, what does the chuck size indicate?

- ☐ a. Maximum bit diameter
- ☐ b. Maximum hole size
- ☐ c. Minimum bit diameter
- ☐ d. Minimum hole size

1-4. What part of the bit does the chuck grip?

- ☐ a. Body
- ☐ b. Dead center
- ☐ c. Point
- ☐ d. Shank

1-5. The layout mark on a workpiece shows the location of the

- ☐ a. center of the hole
- ☐ b. center of the workpiece
- ☐ c. softest part of the workpiece
- ☐ d. thickest part of the workpiece

1-6. When drilling a hole all the way through a workpiece, what should you do as the bit nears the other side?

- ☐ a. Ease up on the pressure
- ☐ b. Increase the drill's speed
- ☐ c. Push the drill through
- ☐ d. Turn off the pressure

1-7. What should you see as you drill?

- ☐ a. Chips
- ☐ b. Dirt
- ☐ c. Smoke
- ☐ d. Sparks

1-8. What should you use to keep the bit positioned properly when drilling at an angle?

- ☐ a. Jig
- ☐ b. Right-angle attachment
- ☐ c. Stop rod
- ☐ d. Tubing

1-9. What should you do if you find a burr on a drill bit?

- ☐ a. Cut off the end of the shank
- ☐ b. Grind the burr off
- ☐ c. Throw the bit away
- ☐ d. Use the bit anyway

1-10. Power tools should be grounded to prevent

- ☐ a. electric shock
- ☐ b. explosion
- ☐ c. fire
- ☐ d. overheating

SUMMARY

The electric drill has many uses in maintenance work. You can use it to drill holes of many sizes in many different materials. Drills of different sizes make it possible to choose the best combination of speed and power for each job.

The chuck grips the tools used in an electric drill. The maximum diameter the chuck can grip is called the size of the drill. The most common tool used in a drill is the drill bit. Drill bit sizes are indicated in four ways—by numbers, letters, fractions of an inch, and metric sizes.

Other tools used with the electric drill include the combination square, center punch, scratch awl, and ball peen hammer. Tools used in the chuck include special cutting bits, combination bits, screwdriver blades, reamers, and grinding bits. Accessories include the drill press stand and the right angle adapter.

Safety is a major concern when using an electric drill. You must hold both the drill and the work firmly, using the proper speed and a drill having the proper amount of power. You should let the bit do the work, rather than forcing the bit through the material. Above all, you must observe safety rules to avoid injuring yourself and others.

Answers to Self-Check Quiz

1-1. c. Pistol. Ref: 1.06

1-2. c. Right-angle adapter. Ref: 1.13

1-3. a. Maximum bit diameter. Ref: 1.14

1-4. d. Shank. Ref: 1.20

1-5. a. Center of the hole. Ref: 1.39

1-6. a. Ease up on the pressure. Ref: 1.53

1-7. a. Chips. Ref: 1.60

1-8. a. Jig. Ref: 1.62

1-9. b. Grind the burr off. Ref: 1.68

1-10. a. Electric shock. Ref: 1.71

Contributions from the following sources are appreciated:

Figure 1-1. Thor Power Tool Co.
Figure 1-2. Thor Power Tool Co.
Figure 1-3. Thor Power Tool Co.
Figure 1-4. Thor Power Tool Co.
Figure 1-5. Milwaukee Electric Tool Corp.
Figure 1-6. Milwaukee Electric Tool Corp.
Figure 1-7. The Jacobs Mfg. Co.
Figure 1-8. Greenlee Tool Co./Div. of Ex-Cell-O Corp.
Figure 1-10. Stanley Tools
Figure 1-11. Stanley Tools
Figure 1-12. Greenlee Tool Co./Div. of Ex-Cell-O Corp.
Figure 1-13. Irwin Auger Bit Co.
Figure 1-15. L.S. Starrett Co.
Figure 1-16. L.S. Starrett Co.
Figure 1-19. Stanley Tools