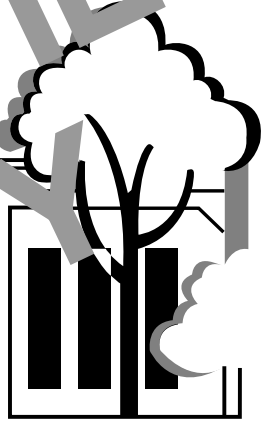
Table of Contents

LOCKS AND KEY SYSTEMS

Lesson One

Commonly Used Doors and Locks



TPC Training Systems

37401

Lesson

1 Commonly Used Doors and Locks

TOPICS

Terminology of Locks and Doors
Door Function and Operation
Door Construction and Material
Hinge Construction and Operation
Installing Hinges
Levels of Building Security
Mortise Lock
Auxiliary, or Rim, Lock
Tubular Bolt Lock
Key-in-Knob Lock
Unit Lock
Narrow-Stile Lock

OBJECTIVES

After studying this Lesson, you should be able to…

- Use standard lock and door terminology.
- Differentiate between right-hand and left-hand doors, and between hollow-core and solid-core doors.
- List four different types of hinges.
- Explain installation procedures for full-mortise, half-mortise, full-surface, and half-surface hinges.
- Identify the mortise lock, auxiliary lock, tubular bolt lock, key-in-knob lock, unit lock, and narrow-stile lock

KEY TECHNICAL TERMS

Dutch door 1.07 consists of separately hinged and locked upper and lower halves
Jamb 1.13 part of doorway that forms lining of door opening
Kalamein 1.16 metal-clad wood door
Trim projection 1.23 distance that surface of trim extends beyond surface of door
Security 1.32 measures taken to guard against attack and intrusion
Unauthorized entry 1.35 unlawful or illegal act of entering a building without permission

Locks are vitally important to every building that people enter, from private homes to industrial and commercial buildings. Rising rates of vandalism and burglary make building security a challenge for both owners and employers.

Burglars and other criminals have become highly skilled, often using means for robbery that are as sophisticated as building protection systems.

Completing this Unit will not make you a locksmith. But it will give you useful information that will enable you to make minor repairs that will maintain the security of your building until your supervisor calls a locksmith. You will learn how to select, install, and maintain locks used in today's buildings.

Terminology of Locks and Doors

1.01 Each system in a building—flat roof, electric wiring, steam piping, etc.—is made up of numerous parts. Locks also consist of many parts—most of them small and precision machined. To install and maintain locks successfully, you must know and understand the language of locks.

1.02 Because locks are so common and numerous, people who use them sometimes have different ideas about the right use or correct name of a lock part. Even the manufacturers of locks may disagree on names. One maker may call it an "auxiliary lock," while another calls it a "rim lock." Names of parts can also vary from one section of the country to another. Make sure you understand the "lock language" spoken at your plant.

1.03 The doors in which locks are installed are as important as the locks themselves. Doors come in a great variety of types and styles. The construction and operation of a door often determine the type of door hinges needed. Hinges, together with the lock, make a door function as it should. Door parts that are of interest in locking practice are labeled in Fig. 1-1.

Door Function and Operation

1.04 Each of the many types and styles of doors in service today performs specific functions. The proper installation of any door is important, especially in

Fig. 1-1. The parts of a common door

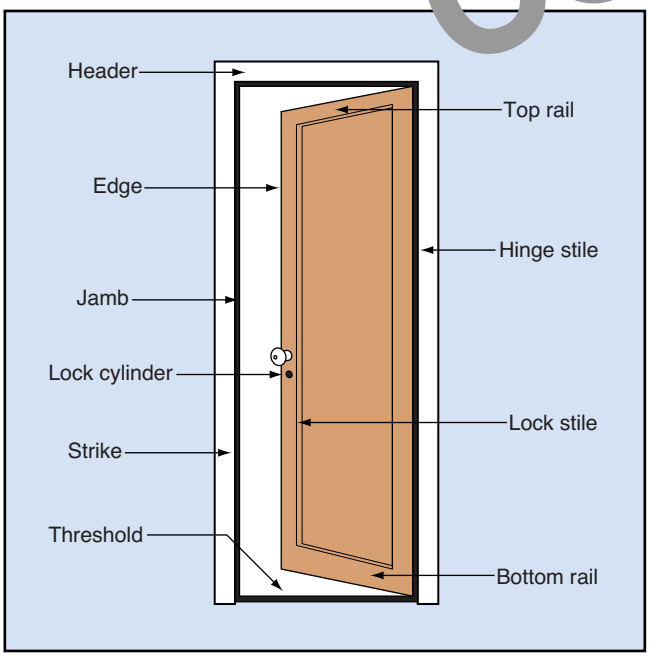
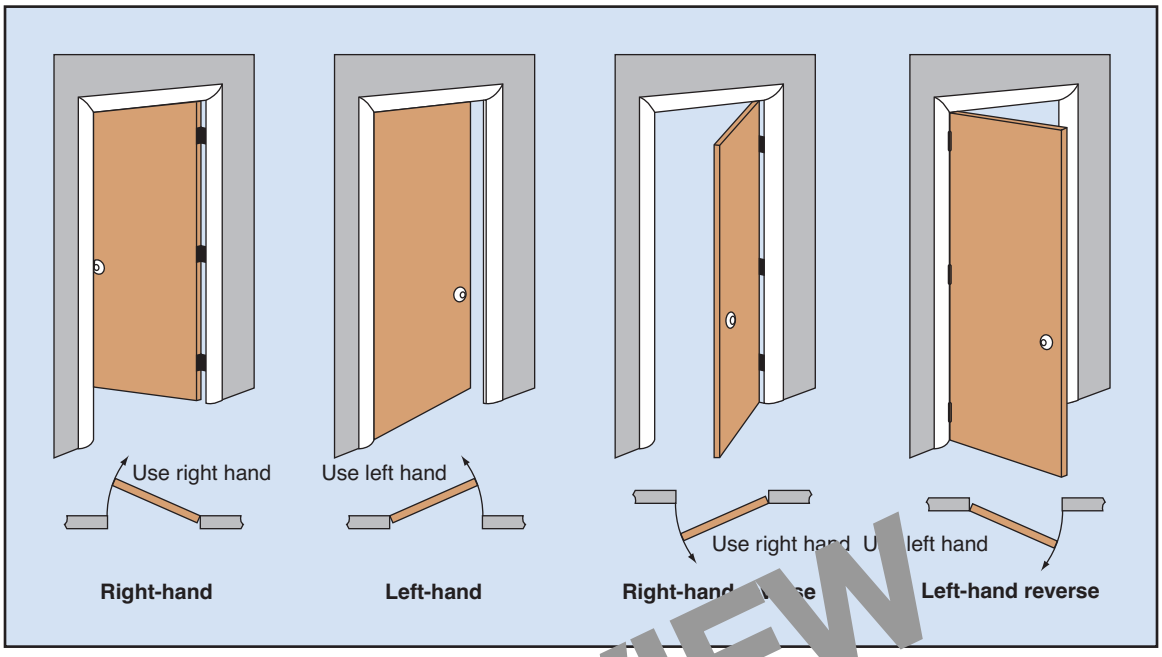


Fig. 1-2. A single-swing type of door

Fig. 1-3. Right-hand and left-hand doors



terms of locking and security. Five basic types of door are in use in industrial and institutional buildings: single-swing, double-swing, Dutch, sliding, and overhead.

1.05 **Single-swing door.** The most common type of door is the standard s*ingle-swing,* or hung, *door,* as shown in Fig. 1-2 on the previous page. It is used in both interior and exterior applications. The single-swing door opens in only one direction. Some doors can be equipped with double-acting hinges. Use of such hinges produces a *double-swing door* that can be opened in either direction.

1.06 A single-swing door may be either a right-hand or a left-hand door. You can determine this characteristic when facing the door from the outside—the street side of an entrance door, or the corridor side of a room door. As shown in Fig. 1-3, a right-hand door has hinges on the right and a knob or handle on the left. It opens inward. A left hand door has hinges on the left and a knob or handle on the right. It also opens inward. If the door opens outward (towards you), it is called a reverse door. Thus a door can be either right-hand, left-hand, right-hand reverse, or left-hand reverse.

1.07 **Dutch door.** The purpose of a Dutch door is to provide an opening for passing materials from one side of the door to the other while serving as a barrier to unauthorized entry. The upper half of the *Dutch door* provides the opening, while the lower half provides the barrier. A shelf or ledge is often mounted on top of the lower half (at waist height) for convenience. Each half of the door, of course, must be equipped with its own hinges and a lock.

1.08 The Dutch door is often used in a parts department or tool storage area of an industrial plant. The employee in charge of the area can hand out tools and materials through the open top half, while keeping the bottom half locked to prevent other employees from entering and obtaining equipment without permission. In a restaurant, those who serve food can pick it up at a Dutch door without entering the kitchen area.

1.09 **Sliding door.** In recent years, sliding doors have become popular for both interior and exterior applications. Available as a single unit, or in a double (overlapping) type, a sliding door can be hung either from top rollers with a guide track along the bottom, or mounted on bottom rollers with a guide track along the top.

1.10 In commercial and industrial buildings, a sliding door is useful at exterior access points and for storage closets, etc., in office areas. In residential structures—houses, high rises, and motels—a sliding door is frequently used on patios or balconies. The

big advantage of this type of door is that it doesn't require as much space for opening as other doors do.

1.11 **Overhead door**. Overhead doors made of wood or metal are widely used in the shipping and receiving areas of plants. Small overhead doors are usually of one-piece construction. Large, heavy doors are made in horizontal sections and are hinged so that they bend at several points. Depending on their size and weight, these doors can be lifted by hand, with a chain and winch, or with an electric motor. Rollers on the side edges of the doors operate in tracks on the door frame.

1.12 Large overhead doors in buildings, such as those used for the entrance of trucks and boxcars into loading areas, are equipped with sturdy springs and control cables that furnish the leverage necessary to lift them. When lifted, the hinged sections of the door follow the upward curved ends of the tracks—coming to rest in a horizontal position below the roof when fully open. An overhead door occupies little space. It protects goods in the loading area from pilferage and the weather. It also helps to conserve heat in the winter.

Door Construction and Material

1.13 The typical single-swing door can be made from almost any type of construction material. It is usually fastened to the jamb by three hinges. Single-swing doors come in either a panel style or a flush style.

1.14 **Panel door.** Panel doors without windows have panels extending almost from top to bottom. If the door includes a window, it usually occupies the upper third of the door, with the remainder of the area paneled (see Fig. 1-4A). The window is generally of clear or translucent glass. (Translucent glass lets in light, but you can't see through it.) Today, various types of break-resistant plastic are being used, in place of glass, to reduce forced entry into buildings.

1.15 Most panel doors are 1 3/8 in. thick at their outer edges. Some exterior doors are 1 3/4 to 2 in. thick. Figure 1-1 shows the door parts. The top rail is 4 to 6 in. wide. The *kick rail* (bottom rail) is somewhat wider. The *stiles,* or side rails, are at least 4 1/2 in. wide to permit the installation of locks. The side rail, on which the hinges are mounted, is called the *hinge stile;* the rail with the lock is the *lock stile.*

1.16 Wood doors may have either a wood or a metal jamb. A metal-clad (Kalamein) wood door in a metal jamb is widely used today because it is specified in so many fire codes and local ordinances. The metal covering is usually steel. For decorative purposes, however, the metal covering can be stainless steel, bronze, or aluminum.

1.17 **Flush door.** Flush doors (Fig. 1-4B) are the most popular style today. These have a flat surface with no panels or decoration. Made from almost any construction material, flush doors are available with either a hollow core or a solid core. They can also be metal-clad (Kalamein) regardless of the type of core.

1.18 A hollow-core door (Fig. 1-5A on the following page) has a rail framework around the outside—like a panel door. In less costly models the rails may be only 2 in. wide, with a small block of wood, just large enough for the lock, in proper position. Both faces (flat surfaces) can be of either wood veneer or sheet metal. In the hollow core, wood strips—or even a cardboard "honeycomb"—may serve to keep the faces out of contact with

Fig. 1-4. Panel-type and flush-type doors

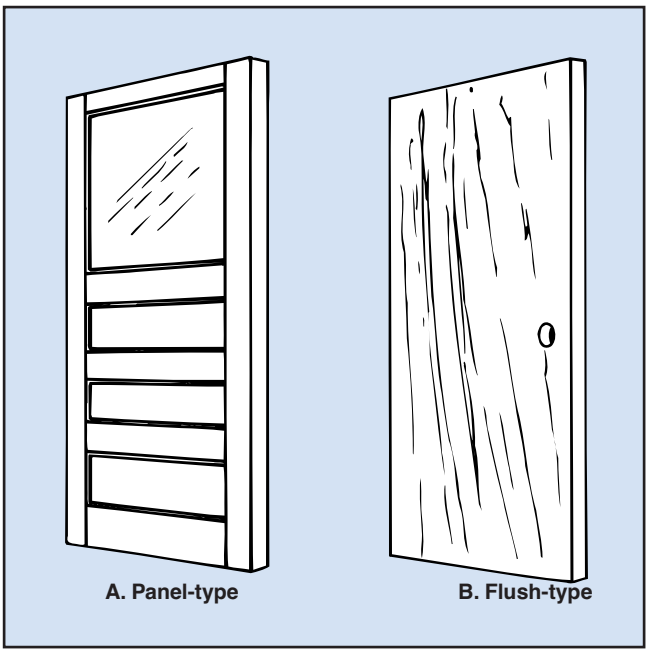
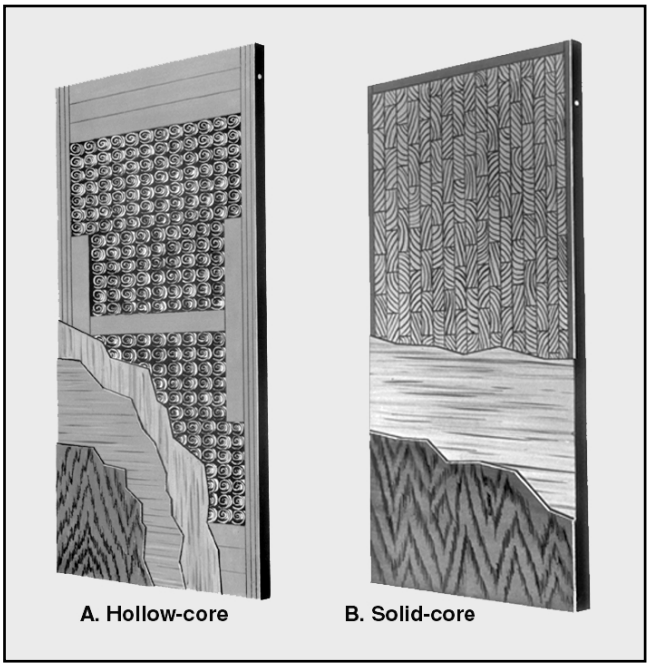


Fig. 1-5. Hollow-core and solid-core doors



each other. Without the strips, the faces can buckle and present a dished appearance under certain conditions of humidity, etc.

1.19 A solid-core door (Fig. 1-5B), as found in older buildings, is usually one piece of solid wood. Today, however, most so-called solid doors are actually of a sandwich construction. The faces are veneer or sheet metal, and the "filling" is chipboard or fire-resistant Styrofoam®. Solid wood doors are still available, but their cost is great. In most cases solid-core doors come pre-mortised for hinges and pre-drilled for knob and spring bolt installation.

® Styrofoam is a registered trademark of the Dow Chemical Co.

Hinge Construction and Operation

1.20 If you are going to install a lock in a door, the door must not sag—it must be well supported. A properly supported door ensures free operation and correct alignment of the lock in the door with the strike plate in the jamb. Two or three hinges provide the usual means of supporting a door.

1.21 When compared to the size of a door, hinges are small devices. The top hinge carries most of the weight of a door. The other hinges guide the door as it opens and closes. Hinges are simple in design, easy to operate, and capable of carrying heavy loads. Available in many materials and styles, hinges can harmonize with almost any door and surroundings.

1.22 A hinge consists of two leaves or plates cut and formed so that they can be held together with a pin. (See Fig. 1-6.) The pin allows the leaf fastened to the door to turn or move on the other leaf, which is fastened to the jamb. A hinge may have a fixed or tight pin (riveted at each end), or it may have a loose (removable) pin. If the hinges of a door are fixed, you must take off the hinges to remove the door. If they are loose, you can remove the door by simply removing the pins.

1.23 The size and thickness of the hinges used to hang a specific door are determined by the door's width, length, and weight. Usually the width (horizontal dimen-

Fig. 1-6. Basic types of hinges for doors

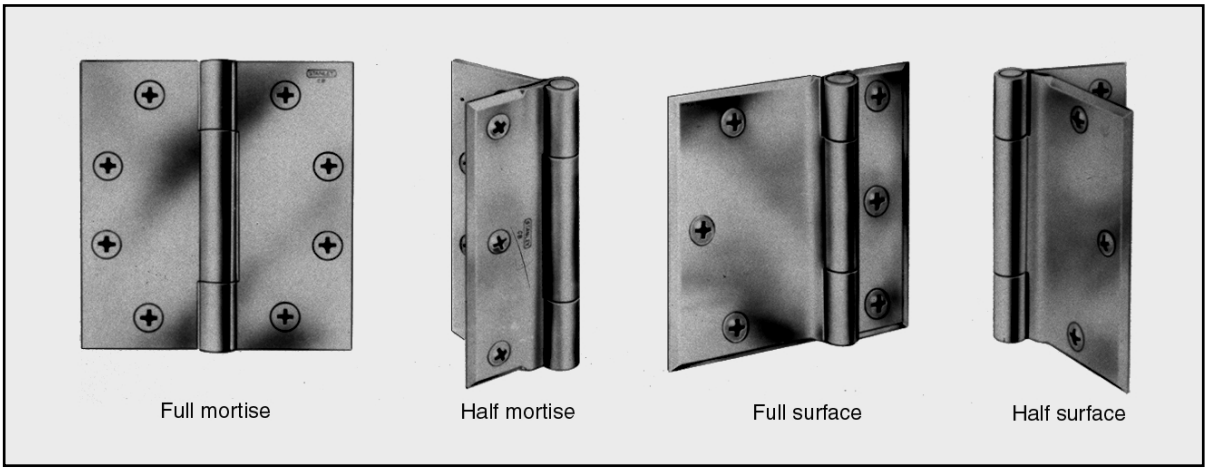
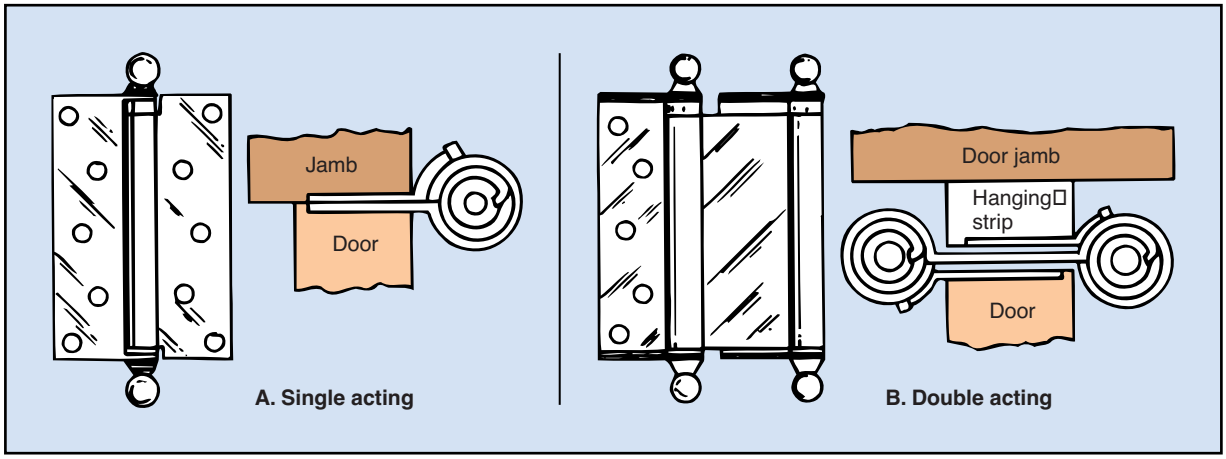


Fig. 1-7. Single- and double-acting spring hinges



sion) of hinges for doors up to 2¼ in. thick is equal to twice the door thickness, plus the trim projection, minus ½ in. Thus, a 2 in. thick door with a 1-in. trim projection would require:

$(2 \times 2) + 1 - \frac{1}{2}$, or a $4\frac{1}{2}$-in. hinge

1.24 The four common types of hinge in use today (see Fig. 1-6) are the full-mortise, half-mortise, full-surface, and half-surface. Each leaf of a *full-mortise hinge* requires a mortise or cutout—one in the edge of the door, and the other in the jamb. Only the barrel (a series of curls around the pin) is exposed when the door is closed. The *half-mortise hinge* has one leaf mortised into the door, and one applied to the surface of the jamb.

1.25 In the *full-surface hinge,* both leaves are applied to the surfaces—one to the door, and one to the jamb. Because no mortises are needed, this hinge can be installed quickly and easily. In the *half-surface hinge,* one leaf is mortised into the jamb, and one is applied to the surface of the door.

1.26 A spring hinge (see Fig. 1-7A) has a chamber in the barrel to house a spring. The spring closes the door after it has been opened. You can vary the spring tension to suit the size and weight of the door. The spring also lets you regulate the speed of the door closing.

1.27 The spring hinge is widely used with fireproof self-closing fire doors (FPSC) and similar devices that must comply with safety codes. In industrial and commercial buildings, it is used on janitors' cupboards, doors leading to stairwells, and frequently opened access doors. In many cases, only one spring hinge is needed on a three hinge door. It is placed in the center.

1.28 A double-acting hinge (Fig. 1-7B) is basically two spring hinges joined by a center leaf. This allows a door to open in either direction, and to return to the closed position automatically. Obviously, all hinges on a door would have to be this type in order for the door to operate.

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.

1-1. The type of hinges needed on a door is often determined by the door's _____.	1-1. CONSTRUCTION or OPERATION Ref: 1.03
1-2. You can determine whether a door is right- or left-handed when facing the door from the _____.	1-2. OUTSIDE Ref: 1.06
1-3. A door that opens inward is called a reverse door. True or False?	1-3. FALSE Ref: 1.06
1-4. Each half of a Dutch door must be equipped with its own hinges and a(n) _____.	1-4. LOCK Ref: 1.07
1-5. Single-swing doors come in either a panel style or a _____ style.	1-5. FLUSH Ref: 1.13
1-6. The rail of a panel door in which the lock is placed is called the lock_____.	1-6. STILE Ref: 1.15, Fig. 1-1
1-7. The metal-clad _____ wood door in a metal jamb is widely used today.	1-7. KALAMEIN Ref: 1.16
1-8. Both leaves of the _____ hinge are applied to the surfaces of the door and the jamb.	1-8. FULL-SURFACE Ref: 1.25

Installing Hinges

1.29 The most used rules for placing the hinges on a door are as follows:

- **top hinge**—top of hinge barrel 6 to 7 in. below underside of head jamb
- **bottom hinge**—bottom of barrel 10 to 11 in. above surface of floor
- **third hinge**—centered between top and bottom hinges. Always use a third hinge on heavy, solid doors.

1.30 When you fasten a hinge to a metal door or jamb, you must align the screw holes in the leaves with the holes that are pre-drilled in the metal door and jamb. This requires using a template hinge, which has holes of the same size and in the same pattern as the holes in the door and jamb. On wood doors a non-template hinge is used. The spacing of the holes is not as vital as in metal doors because wood doors and jambs generally are not pre-drilled.

1.31 Doors with sheet metal coverings are used in wood jambs in many old buildings. These require half-surface hinges, as shown in Fig. 1-6. Simply mortise the flat leaf into the jamb, and fasten it with wood screws. Then fasten the angled leaf to the door with bolts through the door. This avoids cutting out part of the metal door covering.

Levels of Building Security

1.32 Before selecting a lock for a specific area, you must determine the level of security required in the area. That level is based on the type of information or material you intend to protect. The material and construction of the door and door jamb also play a part in lock selection. A wood door can be easily breached without disturbing the lock, but a heavy metal door may cause an intruder to try to force the lock.

1.33 The accounting department of a company may require a high-security lock because of the cash it has on hand. Permanent financial records in the department must also be protected. A computer room, where vital business information is stored, also needs high security. On the other hand, a janitor's supply cupboard—where nothing of great value is stored—would be adequately protected by a low-security device like a key-in-knob lock.

1.34 The level of security and type of locking devices required are also determined by the nature of the company's business. What is the value, in dollars, of the building's contents? And how much would the loss be, in equipment damage and downtime, if the building were robbed or vandalized? It takes time, experience, and research to determine the level of security that each building needs. The research usually consists of consulting experts in the security field.

1.35 Locks are the first line of defense against unauthorized entry into your employer's property. The better the locks, the higher the level of security. However, remember that anything man made can be man-defeated. Locks by themselves, therefore, do not guarantee good security. The "unseen extras" that ensure security include: selecting the right lock initially, installing it correctly, and maintaining it properly.

1.36 No matter how sturdy a lock is, the security it provides can be no better than the care you use to install it. Incorrectly installed, it cannot give the protection that the lock manufacturer has built into it. And, because of metal-to-metal operation, locks must have regular maintenance to operate smoothly. Maintenance will be covered in a later Lesson in this Unit. Finally, the door itself must be in good shape. A high-security lock in a poorly fitting door is a waste of time and money.

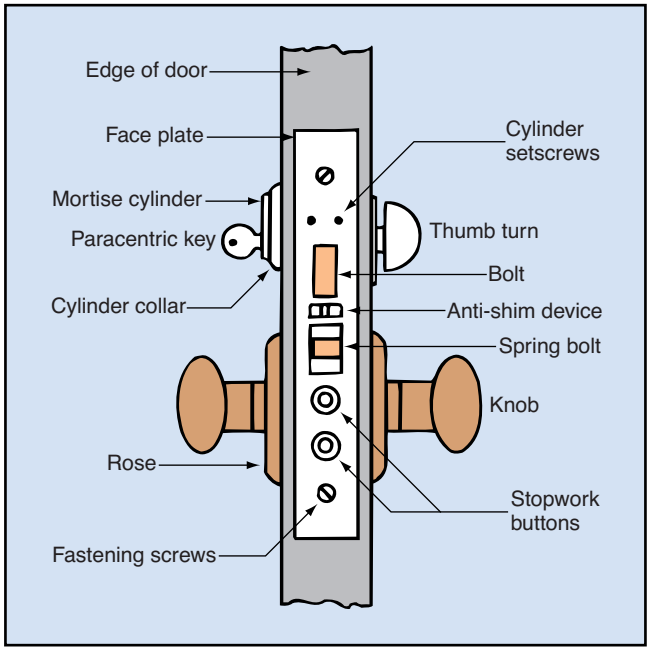
Mortise Lock

1.37 A *mortise lock* (Fig. 1-8 on the following page) gets its name from the mortise or cutout into which it fits. It is the oldest type of lock in common use today. Some early models that require an old-fashioned "bit" key are still in operation. In newer models, however, a paracentric key activates wafer or pin tumblers in the mortise cylinder.

1.38 The mortise lock is made by almost all major lock manufacturers. It is a very versatile device, and it has many applications and uses in both residential and industrial areas. A common use of the mortise lock is in locksets for the entrances of buildings.

1.39 The spring bolt of a mortise lock can be operated by turning the knob on either side of the door. By push-

Fig. 1-8. Details of a mortise lock



ing the stopwork buttons below the bolt, however, you can lock the outside knob—and still be able to open the door with the inside knob. In this case, it is necessary to use a key to open the door from the outside. For additional security, you can throw the bolt with a thumb turn on the inside or with a key on the outside.

1.40 Doors in which mortise locks are to be installed are usually cut out or pre-mortised by the door manufacturer. When it is necessary to replace a lock, the replacement should be ordered from the manufacturer of the original lock, if possible. This is because the cutouts for the cylinder, thumb turn, and knobs may vary in position from one manufacturer to another. Manufacturers' catalogs generally contain complete descriptions and installation diagrams of the various models of lock.

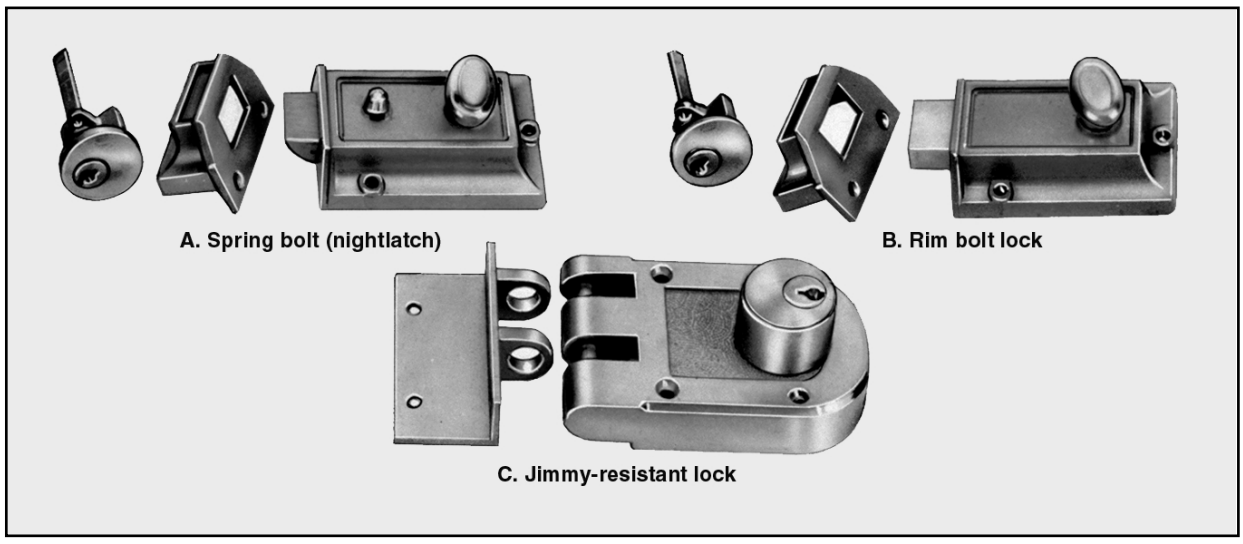
Auxiliary, or Rim, Lock

1.41 Figure 1-9 shows a typical *auxiliary lock*, which is also called a *rim lock*. This lock is basically a secondary, backup device mounted with screws on the inside face of a door. It is activated from the outside by means of a key and a rim cylinder. Mostly found in residential buildings, it is also quite often used in commercial structures.

1.42 Auxiliary locks have many shapes, sizes, and functions. The three most useful auxiliary locks are the rim spring-bolt, rim bolt, and jimmy-resistant locks. The *rim spring-bolt lock* (often called a nightlatch) has a bolt with a tapered or beveled end that retracts when it touches the strike plate as the door is closed. When the door is fully closed, the spring keeps the bolt extended into the hole in the strike plate. This device is intended more for privacy than for security.

1.43 The second type of auxiliary lock is the *rim bolt lock*—often incorrectly called a dead bolt. The bolt in this lock has a rectangular or square end. Like the rim spring bolt, this lock can be operated from the

Fig. 1-9. Common auxiliary or rim locks



inside by a key or a thumb turn. The size of the bolt and its throw are both variable. These factors determine the level of security offered by the lock.

1.44 The third type of auxiliary lock is the *jimmy-resistant lock*. Some manufacturers call it "jimmy-proof." This often misleads the customer, causing him to feel that he has an unbeatable lock. This isn't true. Though highly resistant to a jimmying attack, it is by no means foolproof.

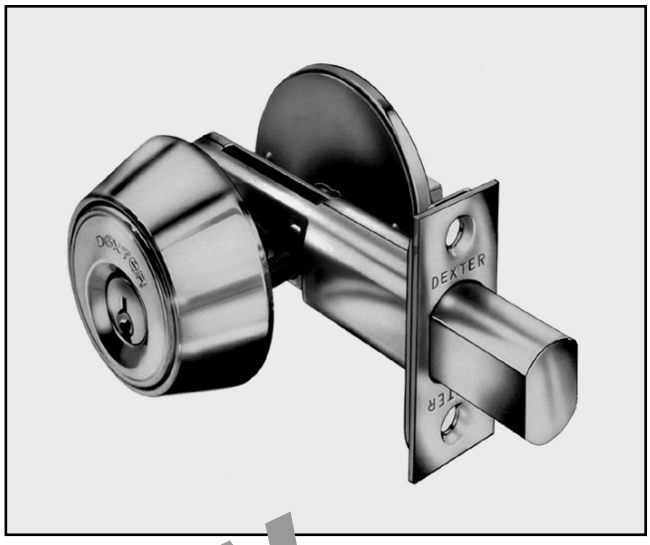
1.45 The jimmy-resistant lock has two vertical bolts instead of one horizontal bolt. The bolts are round instead of rectangular, and they enter a series of holes in a vertical strike plate. Like the bolt lock, this lock can be operated from the outside by a key and rim cylinder, or from the inside by a thumb turn. Its advantage is that it secures the door to the jamb so that the possibility of prying or spreading the jamb to release the bolts is very small.

Tubular Bolt Lock

1.46 As indicated by its name, the tubular bolt lock has a tube-like housing that contains the mechanism of the bolt or spring bolt. Shown in Fig. 1-10, this lock is often used in areas of low to medium security requirements. Equipped with a spring bolt, it automatically secures a door in a closed and locked position—like the nightlatch mentioned earlier.

1.47 A tubular bolt lock is usually operated from the outside by a key and from the inside by a thumb turn. Or, with a double cylinder, you can operate it with a key from either side. Some models have a device that retracts the spring bolt and holds it in the open position, which allows the user to open the door without a key.

Fig. 1-10. A tubular bolt lock



1.48 A simple bolt-type tubular lock, without the spring, can also be operated with a key or a thumb turn as described above. It must be operated manually. Depending on the model and manufacturer of the bolt, it has a throw of 5/8 to 1 1/4 in. The application of this lock is limited to secondary protection in low-to medium-security areas.

Fig. 1-11. Details of a key-in-knob lock

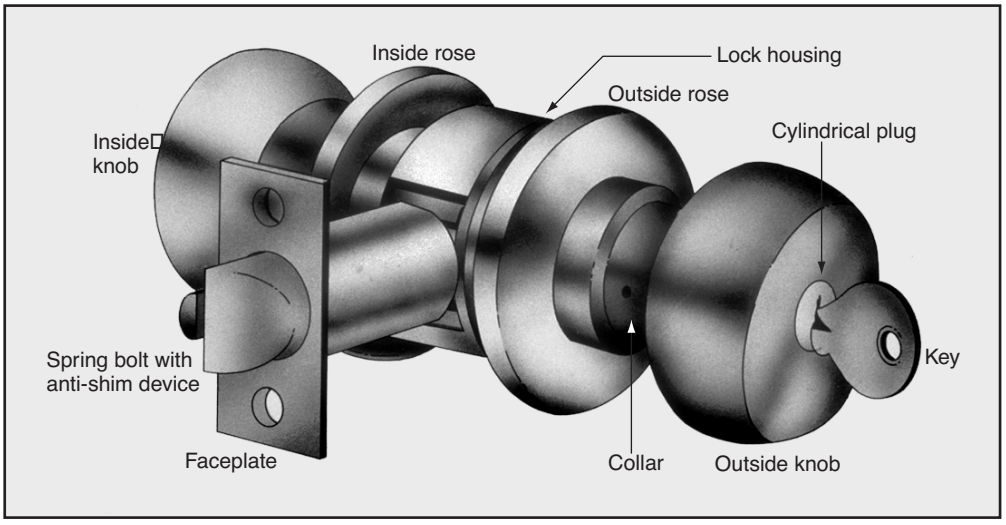


Fig. 1-12. The Ultra 700 unit lock

Fig. 1-13. Lock for a narrow-stile door

Key-in-Knob Lock

1.49 The lock cylinder of the key-in-knob lock (Fig. 1-11 on previous page) is housed in the knob. The mechanical parts are located in a cylindrical housing in the door. In some areas, the key-in-knob lock is called a "cylindrical lock." All key-in-knob locks have a spring-operated bolt—which may or may not be equipped with an anti-shim device. Used extensively in residential locations, the key-in-knob lock is convenient for keeping a door closed. Although it provides some measure of protection against unauthorized entry, it is not usually considered a secure locking device. However, some of the more costly models of this lock are good locking devices that provide a measure of security. The key-in-knob lock can also be used with an auxiliary lock to obtain a higher level of security.

Unit Lock

1.50 The unit lock illustrated in Fig. 1-12 provides both high security and an attractive appearance. It is normally equipped with two mortise cylinders, or with a single cylinder and a thumb turn. Free-turning hardened steel collars guard the cylinders. The outside collar is recessed into the lock escutcheon plate to provide maximum resistance to tampering.

1.51 This lock adjusts to door thicknesses from $1\frac{5}{8}$ to $1\frac{13}{16}$ in. The rectangular solid-steel bolt is $\frac{5}{8}$ in. wide and $1\frac{1}{4}$ in. high. Even with a $1\frac{1}{8}$ in. throw, 1 in. of bolt length remains in the lock body. For additional security, the strike plate is fastened to the door jamb with screws that are 2 in. long. There are no exposed screws on the lock itself.

Narrow-Stile Lock

1.52 The lock most often found on the entrance doors of newer commercial and industrial buildings is the narrow-stile lock shown in Fig. 1-13. These doors feature glass and aluminum construction. The plate glass, which is almost as large as the door itself, is mounted between narrow aluminum stiles.

1.53 The stiles, which operate in an aluminum jamb, are usually 2 in. or less in width. Because the stiles are so narrow, only this special narrow-stile lock can be used in the door. And, because the stiles are soft and thin ($\frac{1}{8}$ to $\frac{3}{16}$ in. thick), you must install the lock very carefully. One slip of the drill could shatter the glass—which could be both costly and dangerous. A Dremel® grinding tool with a disc is useful in performing this delicate operation.

® Dremel is a registered trademark of the Dremel Div., Emerson Electric Co.

1-9. If only one spring hinge is needed on a three-hinge door, it is placed _____.	1-9. IN THE CENTER Ref: 1.27
1-10. Doors with sheet metal coverings set in wood jambs require _____ hinges.	1-10. HALF-SURFACE Ref: 1.31
1-11. Before selecting a lock for a specific area, you must determine the _____ required in the area.	1-11. LEVEL OF SECURITY Ref: 1.32
1-12. Most key-in-knob locks are considered _____ security devices.	1-12. LOW Ref: 1.33
1-13. The auxiliary lock is also called a _____ lock.	1-13. RIM Ref: 1.41
1-14. The jimmy-resistant lock has two _____ bolts instead of one horizontal bolt.	1-14. VERTICAL Ref: 1.45
1-15. The lock cylinder of the key-in-knob lock is housed in the _____.	1-15. KNOB Ref: 1.49
1-16. Doors of plate glass and aluminum construction are fitted with _____ locks.	1-16. NARROW-STILE Ref: 1.52

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

1-1. The construction and operation of a door often determine

- ☐ a. the location of the door
- ☐ b. the type of hinges needed
- ☐ c. whether a lock is needed
- ☐ d. who should install it

1-2. Which of the following door types could be found in industrial or institutional buildings?

- ☐ a. Single-swing
- ☐ b. Sliding
- ☐ c. Dutch
- ☐ d. Any of the above

1-3. When viewed from the outside, a door that opens outward is a(n)

- ☐ a. right-hand door
- ☐ b. reverse door
- ☐ c. left-hand door
- ☐ d. interior

1-4. Which of the following could be found in a solid-core door?

- ☐ a. Strips of wood
- ☐ b. Fire-resistant Styrofoam
- ☐ c. A cardboard honeycomb
- ☐ d. Metal sheeting

1-5. In order for a door to open in both directions, it must have a

- ☐ a. two-way hinge
- ☐ b. sprung hinge
- ☐ c. swing track
- ☐ d. double-acting hinge

1-6. The third hinge to be installed on a door should be

- ☐ a. double-acting
- ☐ b. centered between the top and bottom hinges
- ☐ c. located above the kick rail
- ☐ d. placed along the lock stile

1-7. The type of locking device selected is determined by

- ☐ a. the material and construction of doors and jambs
- ☐ b. the value of a building's contents
- ☐ c. the level of security required
- ☐ d. all of the above

1-8. In order to keep the outside knob of a mortise lock from opening the door, you must

- ☐ a. push the stopwork button
- ☐ b. throw the bolt with the thumb turn
- ☐ c. throw the bolt with a key
- ☐ d. any of the above

1-9. All key-in-knob locks have

- ☐ a. a spring-operated bolt
- ☐ b. anti-shim devices
- ☐ c. their mechanical parts in the knob
- ☐ d. a low level of security

1-10. The cylinders on unit locks are protected by

- ☐ a. free-turning steel collar
- ☐ b. a screw-free faceplate
- ☐ c. cylindrical housing
- ☐ d. rigid steel collars

SUMMARY

The level of security needed for a particular building or department depends on the value of the equipment and/or records that require protection. A company's financial records and cash on hand, for example, need better protection than the contents of a janitor's closet.

You may install the best possible locks in your building to provide a high level of security, but you will not achieve that security if you mount the locks on weak or defective doors. No matter what type the door is, it must be sturdy. It must also have enough body in which to install the lock; some hollow core doors are not capable of supporting a lock. And you cannot lock a door properly if it is not hung on strong hinges. Good hinges keep a door from sagging, so the lock is always in line with the strike plate in the doorjamb.

The mortise lock is the most widely used type. The auxiliary or rim type has the most options for special applications. The tubular bolt type is good for low to medium security needs. The key-in-knob lock, which is a very attractive unit, is widely used in homes and residences. Only the more expensive models provide real security, however. Narrow-stile and unit locks are newer developments coming into wide usage.

Answers to Self-Check Quiz

1-1. b. The type of hinges needed. Ref: 1.03

1-2. d. Any of the above. Ref: 1.04

1-3. b. Reverse door. Ref: 1.06

1-4. b. Fire-resistant Styrofoam. Ref: 1.19

1-5. d. Double-acting hinge. Ref: 1.28

1-6. b. Centered between the top and bottom hinges. Ref: 1.29

1-7. d. All of the above. Ref: 1.32-1.33

1-8. d. Any of the above. Ref: 1.39

1-9. a. A spring-operated bolt. Ref: 1.49

1-10. a. Free-turning steel collars. Ref: 1.50

Contributions from the following sources are appreciated:

Figure 1-5. Weyerhaeuser Company
Figure 1-6. Stanley Hardware Div., The Stanley Works
Figure 1-9. Parker Hardware Co.
Figure 1-10. Kysor/Dexter Div., Kysor Industrial Corp.
Figure 1-12. M.A.G. Eng. & Mfg., Inc.
Figure 1-13 Adams Rite Manufacturing Company