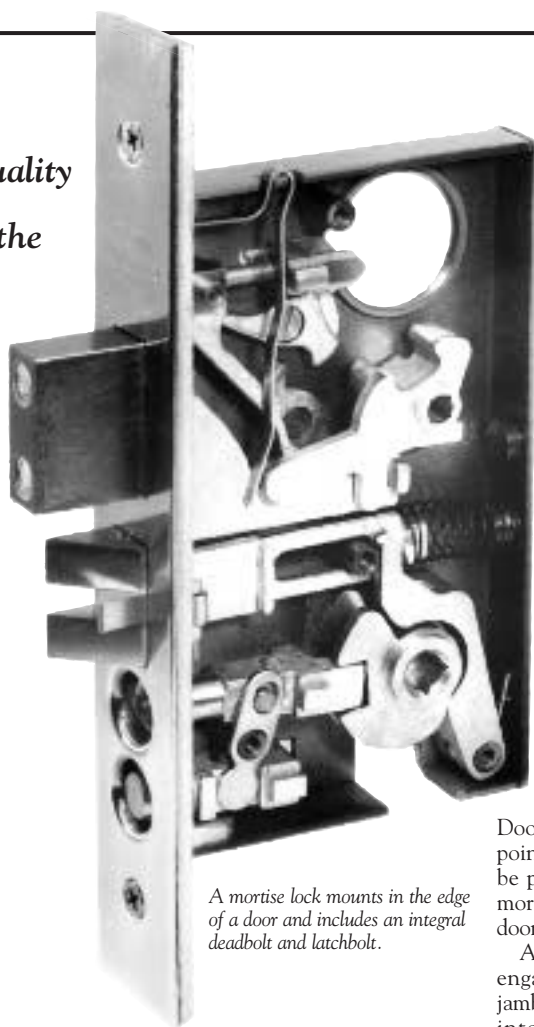


SELECTING RESIDENTIAL LOCKSETS

BY CLAYTON DeKORNE

To choose a quality lockset, learn the manufacturer's lingo and buy from a hardware specialist, not a lumberyard



A mortise lock mounts in the edge of a door and includes an integral deadbolt and latchbolt.

In some ways, choosing the right lockset for a commercial job is easy, since commercial building codes specify exactly which functions a lockset should have for a given situation. The commercial specifier then uses published resources that match code requirements to a manufacturer's product (see "Sources of Supply" at end of article). Because commercial-duty locksets reference ANSI and UL standards, the buyer can be reasonably assured of a product's quality.

However, residential standards are less exact. Few buyers pay attention to ANSI standards or UL ratings. As a result, it's not immediately apparent what makes the difference between a good-quality residential lockset and a poor one. This article describes the terms you should know to help make sense of the manufacturers' literature, and offers some guidelines for choosing a good lockset.

Lockset Types and Functions

Entry locks are available with

knobs, levers, or handles, or a combination of any two. Beyond this basic configuration, however, they are categorized by how they're installed, and by a specific locking function.

Mortise locks mount in a large squared-out mortise in the edge of a door (see lead photo). They typically have an integral deadbolt, as well as a latchbolt. The latch automatically locks, unless it is disarmed by pressing one of two buttons along the exposed edge of the lock case — a feature known as a *stop works*, or sometimes as *stops* or *night works*.

Bored locks, also called *tubular locks*, mount in a round hole drilled in the face on the door rail. While the latch may lock, a separate deadbolt is needed for security.

Rim locks mount on the interior surface of the door. Older deadbolts with either horizontal or vertical throwbolts are often rim-mounted. Once popular on Colonial homes, rim latches with added deadbolts are still available from Baldwin and specced for historic jobs (see Figure 1). These

use a skeleton key, and show a knob and covered keyway on the outside.

Three-point locks, as the name implies, secure a door in three places — high, low, and in the center. These not only provide excellent security, but they also prevent the door from warping when there is a strong temperature difference between the inside and the outside, so the door always fits tight to the weatherstripping around the perimeter, not just near the knob.

Two kinds of three-point locks are available. A *cremone* lock has bolts that engage vertically into the floor and into the head jamb (Figure 2). These are either surface-mounted (usually without a keyed mechanism), or run through the door rail (with a keyed mechanism). Typically, the latter type is installed by the door manufacturer. Pella, Weathershield, and Pease

Doors all sell products with three-point locks. The hardware can also be painstakingly retrofitted into a mortise along the full length of the door.

Another kind of three-point lock engages horizontally into the side jamb or, in the case of French doors, into a matching door. These are available with *flat-ended deadbolts*, beveled *tongues*, or *cam bolts* that actually pull the door tight against the weatherstripping. Edge locks typically install in a shallow mortise routed along the edge of a door. Hardware Technologies Ltd., G-U Hardware, and Resource Conservation Technology all sell this type of lock.

Function describes the combinations of locking and latching operations on the inside and outside of the door. For residential locksets,

there are only a few keyed functions:

- An *entry lock* can be locked with a turn button on the inside and a key on the outside.
- A *patio lock* can be locked by a key on both sides. The exterior knob stays locked after the key is removed, while the interior knob can be turned to a locked or unlocked position using the key.
- A *vestibule lock* has a plain knob on the interior that is always unlocked and a locking knob on the exterior that always stays locked after the key is removed.
- A *storeroom lock* can be locked with a key on both sides, and both knobs can be turned to a locked or unlocked position using the key.

The Anatomy of a Lockset

The "guts" of a bored knob or lever set is comprised of a spindle, cylinder, and latch. Mortise locks and handle sets have other mechanisms, but work on the same general principles.

Spindle. The spindle is simply the rod that holds the handles together. It's usually square in section, so it can turn the latch when the knobs or levers are turned.

Cylinder. The cylinder is the locking assembly that holds the spindle and handles rigid. It consists of a *keyway* and a series of *pins* that prevent the round *tumbler* from rotating. Each key is cut to match a specific configuration of pins. When the pins are aligned in this exact configuration, the tumbler is freed, which unlocks the handle. This combination of keyway shapes and pin configurations offers an enormous variety of different keyings.

Each manufacturer has an identifiable *keyway*, or key shape, with a coded label. For example, an SC-4 or KW-1 keyway refers to a specific Schlage or Kwikset keyway respectively. Locks with the same keyway can be keyed alike if desired.



Figure 1. A rim-mounted latchset, like this traditional model by Baldwin, mounts on the interior surface of the door. Only the knob and covered keyway are visible on the outside.



Figure 2. A cremone lock, shown here installed in a Pella door, has bolts that engage vertically into the floor and into the head jamb. This type of three-point lock offers excellent security and also helps prevent the door from warping, so the door always fits tight to the weatherstripping.

Commercial locks typically have a 6-pin cylinder. The added pin allows for a wide variety of keying combinations. These commercial cylinders have master pins that allow a single master key to open a number of separately-keyed locks, or additional access levels can be created using grand masters, grand grand masters, etc. The cylinder is usually removable, so the lock can be easily rekeyed.

Until recently, most residential locks had 5-pin cylinders. But these days, more of the better-quality residential locksets are being outfitted with removable 6-pin cylinders, as well. The removable cylinder allows you to rekey the lock to match other locks in the system, or to insert a construction keyway for temporary use during a job. Kwikset's new Titan line, for example, features a cylinder that can be removed for rekeying without removing the whole lockset (Figure 3).

Latch. The latch, also known as a latchbolt, is the retractable piece of a lockset that engages in the jamb. A latch has a beveled end, which can be reversed for either hand door, and is spring-activated, so this piece is also called a *springlatch*. Often the latch will include an added *deadlatch* — a second, narrow latch, sometimes called an *auxiliary latch* (Figure 4). When the door is closed, this deadlatch is pushed back into the lock; it does not engage in the jamb with the other latch. In this position, the spring latch is held rigid, so it can't be forced back with a knife or credit card. On a cheap lockset, the deadlatch will not function unless the reveal is less than 1/8 inch. So if you're dealing with an existing door that has a wide reveal, spec a top-quality knob set.

Throw. The depth a latch or throwbolt protrudes from a door

When replacing a lockset in an existing door, you'll often find that nothing conforms to standard lock dimensions. Before throwing your hands up in disgust and calling for a whole new front door and jamb, consider the following.

Thick doors. Most entry locks are made to fit a standard 1 3/4-inch-thick exterior door. If you have a thicker door, you may be able to get a "thick door kit" to extend the chassis and spindle.

Irregular backset. Consider using a handle set for a door with a narrow rail. Or, if you find yourself on a remodeling job with an odd-sized door rail, Baldwin makes mortise locks with 2 3/4-, 2 1/2-, 2-, and 1 1/2-inch backsets. However, when specifying a mortise lock, pay attention to the case length, as well as the

edge is called the throw. A 1/2-inch throw is typical for residential latches; 1 inch is typical for a deadbolt throw.

Backset. The distance measured from the spindle center to the edge of the door is called the backset. Standard backsets for residential locksets are 2 3/8 and 2 3/4 inches. Be sure to spec the same backset for the deadbolts and the latch set, otherwise the two locks won't align on the door rail. On better-quality deadbolts and locksets, you can interchange the throwbolt or latch for either backset.

The different backsets are made to center on standard 4 3/4- and 5 1/2-inch door rails. However, the centering on a door rail is often not as noticeable as the comfort of operating a lockset. A knob with a 2 3/4-inch backset is more comfortable to grasp, whereas a 2 3/8-inch knob is a knuckle buster. Consider a handleset for doors with a narrow rail and backset.

Hand And Swing

While the latch on most locksets can usually be reversed to match the swing of the door, you may still need to have a clear picture in your head of the hand and swing of the door for specifying some locksets. In general, any lockset design that has an asymmetrical design must be handed. This might include a latchset with a lever on one side and a handle or knob on the other. Occasionally you have to specify the hand of the door for some parts, as well. For example, a curved-lip strike plate for a mortise lock or an interconnected lockset can't be flipped around.

Since a handed lock part requires double inventory from a supplier, they may not be in stock and will have to be special-ordered. To avoid restocking charges in the event of a

Replacing Locksets

backset. A 2 3/4-inch backset usually has a 4 1/2-inch case length, which will be hard to cut a mortise for in a 4 3/4-inch door rail without blowing out. On the other hand, the throw of the deadbolt is limited by the case length, so a mortise lock with a 1 1/2- and 2-inch backset has a throw of only 1/2 inch.

Converting from mortise to tubular. If you're facing an old door that once held a mortise lock, but the budget calls for a simpler tubular lock, you might find out if your supplier can provide a *modernization kit* for the new lockset. This is usually a more economical option than repairing the door. The kit includes a large metal plate that spans the hollowed out section of the rail, and includes an extended latch front. These not only reinforce the weak-

ened rail, but also allow you to screw into undisturbed wood.

Metal door considerations. Metal doors are often a pain to retrofit with new hardware. For one thing, cutting through the skin always ruins a hole saw unless you use a boring jig. You may want to charge out an extra \$15 to cover the cost of sharpening a conventional hole saw. Also, a metal door can't be easily cut down, and you can't easily change the hardware locations. Often, auto body compound (Bondo) is used to repair metal doors if the lockset or deadbolt location is changed. Be sure to repaint the door before you replace the hardware; otherwise, the galvanic response between a brass rosette and the steel skin will lead to premature deterioration of the lockset.

— C.D.



Figure 3. Kwikset's new Titan locksets feature a cylinder that can be removed for rekeying without removing the whole lockset. The cylinder is removed with a special key, as shown.



Figure 4. A bored, or tubular, latchset, like this Schlage F-series knob set, mounts in a round hole drilled in the face on the door rail. Note the deadlatch, a feature found on better latchsets, which prevents the springlatch from being forced back with a knife or credit card.

change order, look for lever sets that have a set screw for the levers, so the handle can be reversed.

Hand. To determine the hand of the door, stand facing the outside of the door. If the hinges are on the right side of the door, the door is *right-handed*. If the hinges are on the left side of the door, the door is *left-handed*.

Swing. Typically an entry door

swings inward. If the door swings out, it is called a *left- or right-handed reverse door* (Figure 5).

Security Features

Locks are designed to protect against two types of unwanted entry: forced entry and surreptitious entry. Surreptitious entry includes picking a lock, drilling out the cylinder, or jimmying a latch open with a credit

The Hand of a Door

Left-handed: hinges on the left side, door swings in



Left-handed reverse: hinges on the left, door swings out

Right-handed: hinges on the right side, door swings in



Right-handed reverse: hinges on the right, door swings out

Figure 5. To determine the hand of a door, stand facing the outside of the door.

Figure 6. An interconnected lock, like this Baldwin bored model, includes both a latch and a deadbolt that “communicate,” so the door can be opened from the inside by operating either the lever or the thumbturn.

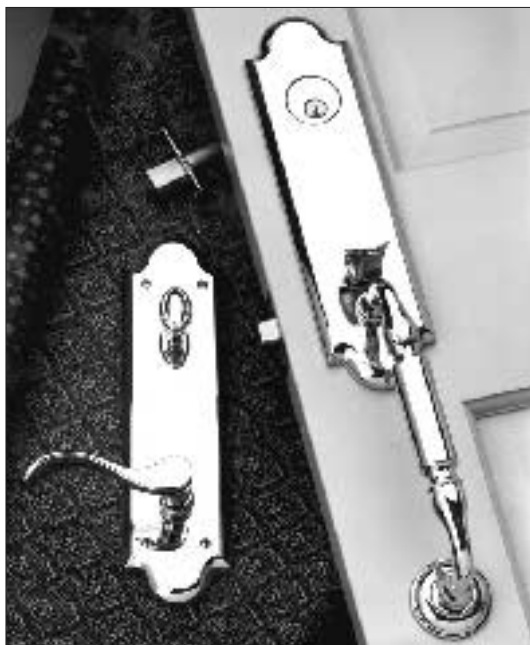


Figure 7. The WeiserBolt is a simple locking knob set, but the latch has a full 1-inch throw for added security.



card. Protection from this type of entry is provided by features inside the lock.

Pick-proof locks were invented in the 1970s, and include features such as keys with horizontal cutouts that activate *sidebars*, *horizontal pins*, or the usual series of vertical pins. High-security locks also include hardened-steel inserts that prevent a crook from drilling out the cylinder. But for the most part, these features are found only on the very best commercial-quality locks.

Forced, or attack, entry includes prying the door open with a crow bar, smashing the cylinder off with a hammer, or sawing through the latch with a hacksaw. Lock manufacturers claim that attack entry is the predominant means criminals use to

break into a house. As a result, manufacturers stress *deadbolt security* over a simple locking knob or lever set.

Deadbolt. A deadbolt, also known as a *throwbolt*, extends deeper than a latch into the jamb (1 inch is typical), has a flat end, and is not spring activated. Good-quality throwbolts are made of hardened steel to resist bending, and have a *roller*, or hardened steel pin, inside. This pin is loose, so it will roll when a hacksaw blade hits it. In addition, the face plate on the throwbolt should be reinforced with steel. Simple aluminum or brass face plates can rip out easily if the door is forced.

Most residential deadbolts mount in a 2¹/₈-inch face bore in the door. Better high-security deadbolts mount in a smaller, stronger 1¹/₂-

inch face bore.

Look for a deadbolt with a reinforced *security ring* that holds the *outside scalp* (the cone that surrounds the exterior cylinder). A security ring spins freely so a burglar can't twist the scalp off with a pipe wrench.

Deadbolts are available in two basic configurations. *Single-cylinder* deadbolts are operated by a key on the outside and a *turn* (also known as a *turnpiece* or *thumbturn*) on the inside. A *double-cylinder* deadbolt is operated by a key on both sides, and is usually specced for a door with lights to prevent someone from smashing the glass and using the turn to enter. However, bear in mind that it will be difficult and slow for an occupant to find a key to escape if the house is on fire. And, of course, leaving the key in the lock would void the advantage of the double cylinder. The need for security should be balanced with safety concerns when specifying a double-cylinder deadbolt.

Interconnected lock. One solution to this problem is to use an interconnected lock — a latchset and deadbolt combined (Figure 6). The deadbolt and knob “communicate,” so the door can be opened from the inside by operating either the knob or the thumbturn when the door is locked. An economical alternative to this might be Weiser Lock's *WeiserBolt* — a simple locking knob set with a full 1-inch latch throw (Figure 7).

Strike. A metal strike plate on the jamb is as important as the deadbolt in preventing a forced entry. Some strike plates include a *strike box*, otherwise known as a *dust box*, which is strictly an aesthetic option to cover the hole in the jamb. From a security standpoint, the most important part of this plate is the screws holding the strike to the jamb. Use minimum 3-inch screws to secure the strike plate to the framing. Also, pay attention to the amount of metal between the bolt and the edge of the strike. An *extended lip* increases the width of the plate at this point. An *ANSI preparation* ensures a minimum of 1¹/₄ inches at this point. As an alternative, Schlage provides a 1/8-inch steel *reinforcing plate* beneath the *finish strike* for a deadbolt.

But don't get too carried away with adding steel to a wood jamb. Heavy-duty *security plates* are often touted as the best defense against a forced entry, yet most locksmiths and hardware suppliers agree that security plates don't work since a 1x pine jamb will split out if the plate is forced. If high security is the top priority, you're best off specifying a *steel jamb*.

Electronic locks are coming into their own on the commercial end, and these will no doubt filter down into residential lines. One precursor

to this new technology is the Pease *Alert-Lock* — a high-quality inter-connected lockset with a built-in electronic alarm to scare off burglars.

Materials And Finishes

One way to be sure of the quality of a lockset is to look for ANSI Grade 2 rating — this is a light commercial performance standard that more and more manufacturers are using to market their products. However, you can tell a lot about a lockset just by opening the box and examining the parts.

Metal parts. In general, look for forged or wrought, not cast, handles and trim pieces.

The best products have *forged* parts. Forging starts with a lump of metal, such as brass or bronze, which is heated and then hammered into a mold with 30,000 pounds pressure. The metal is softened during forging but never becomes molten; it always stays in the same state and doesn't undergo a molecular change. This allows the metal to retain its "grain," so it maintains its strength. Also the metal stays smooth, so it holds a finish better.

The next level of quality is wrought metals. Wrought metal starts with sheet material that is rolled and then shaped with a hydraulic press. Again, the metal does not undergo a phase change, and while it isn't as strong as a solid lump of forged metal, it still maintains a high degree of strength.

The lowest-quality locksets use die cast metal (usually zinc) that is heated to a molten state and injected into a mold. This process is fast, but the metal is weakened by the phase change, and the surface becomes more porous, resulting in a poorer finish.

For the inner mechanism and latch parts, the best-quality locksets are made with cold-rolled steel instead of die-cast zinc. These inner parts should be coated for rust-resistance.

Brass plating vs. solid brass. Although it is more economical, brass-plated hardware won't match the durability of solid brass. A plated product is made of zinc that is first coated with nickel, then with brass, and finally dipped or sprayed with lacquer. Each layer is thin and susceptible to damage from weather and use, and the plating will eventually break down.

By contrast, a solid brass product starts with raw brass that is then simply buffed before the lacquer is applied.

Lacquer. A vast majority — 80% by some estimates — of the residential locksets sold in this country have a *bright brass* (US 3) finish, and all of these products are coated with lacquer to protect against oxidation, which dulls the finish. But there is a tradeoff for always having bright brass: Eventually keys, jewelry, and

fingernails will scratch most lacquer, and the mild acids from skin will break it down. Eventually the finish will look like bad nail polish.

Due to tightening EPA restrictions placed on manufacturers for using solvent-based cleaners, modern lacquers are water-based products, which aren't as durable as the old lacquer formulations. As a result, more manufacturers are going to powder-coat polyester and epoxy finishes. These coatings are thicker and baked on, so they tend to better resist UV light, salt, and the acids from skin. But they aren't as clear as lacquer, so they are used most on the low-end lines, while lacquer is still the only choice for a good-looking bright brass product.

On the very high end, manufacturers are going to a completely different technology. For example, Schlage's *Ultima* locksets are plated with a carbon that actually transforms the surface of metal rather than coats it. While these new

finishes carry warranties up to 25 years, they are very expensive.

As an alternative, manufacturers are recommending an *oil-rubbed bronze* (10B) finish. This has a dull sheen that is impregnated with an oil, so the lock is constantly polished with use. This is usually available only on the better-grade forged and wrought bronze products. If left alone, an oil-rubbed bronze will oxidize to a *verde* (green) patina, which is growing in popularity.

Other finishes for residential locksets include *antique brass* (US 5), *brushed bronze* (US 10), *blackened bronze* (US 10B), and *bright chrome* (US 26). The bright chrome finish is gaining in popularity because it is considered by decorators as a neutral finish. The most durable finish is *dull chrome* (US 23). This is seen a lot on commercial hardware but is rarely chosen for residences. ■

Clayton DeKorne is a senior editor at The Journal of Light Construction.

Sources of Supply

If you're looking for something other than a garden-variety, brass-plated lockset, you may have to look beyond the selection at your average lumberyard. It's worthwhile to go to a hardware supplier (usually found under "Doors" in the Yellow Pages). Some locksmiths might sell entry hardware, too, but generally a locksmith only fixes locks. Buying a lockset from a locksmith is like buying a car from a mechanic — you're likely to make a good purchase, but you'll have a better selection if you go to the dealer.

The following manufacturers of residential locksets can lead you to a distributor in your area:

Mortise locksets and deadbolts; bored locksets and deadbolts; rim-mounted latchsets:

Baldwin Hardware Corp.
841 E. Wyomissing Blvd.
Reading, PA 19611
215/777-7811

Bored locksets and deadbolts:

Arrow Lock
103-00 Foster Ave.
Brooklyn, NY 11236
800/233-0478

Kwikset Corp.
516 E. Santa Ana St.
Anaheim, CA 92803-4250
714/535-8111

Master Lock
P.O. Box 10367
Milwaukee, WI 53210
414/444-2800

Omnia Industries
Box 330
Cedar Grove, NJ 07009
201/239-7272

Sargeant Manufacturing Co.
100 Sargeant Dr.
New Haven, CT 06511
203/562-2151

Schlage
2401 Batshore Blvd.
San Francisco, CA 94134
415/467-1100

Weiser Lock
6660 S. Broadmoor Rd.
Tucson, AZ 85746
800/677-5625
602/741-6200 (in Ariz.)

Three-point locks:

G-U Hardware
11761 Rock Landing Dr., Ste. M6
Newport News, VA 23606
804/873-1097

Hardware Technologies Ltd.
P.O. Box 158
Fort Atkinson, WI 53538-0158
414/563-2626

Resource Conservation Technology
2633 North Calvert St.
Baltimore, MD 21218
410/366-1146

Alert-Lock:

Pease Industries
7100 Dixie Hwy.
Fairfield, OH 45014
513/870-3600