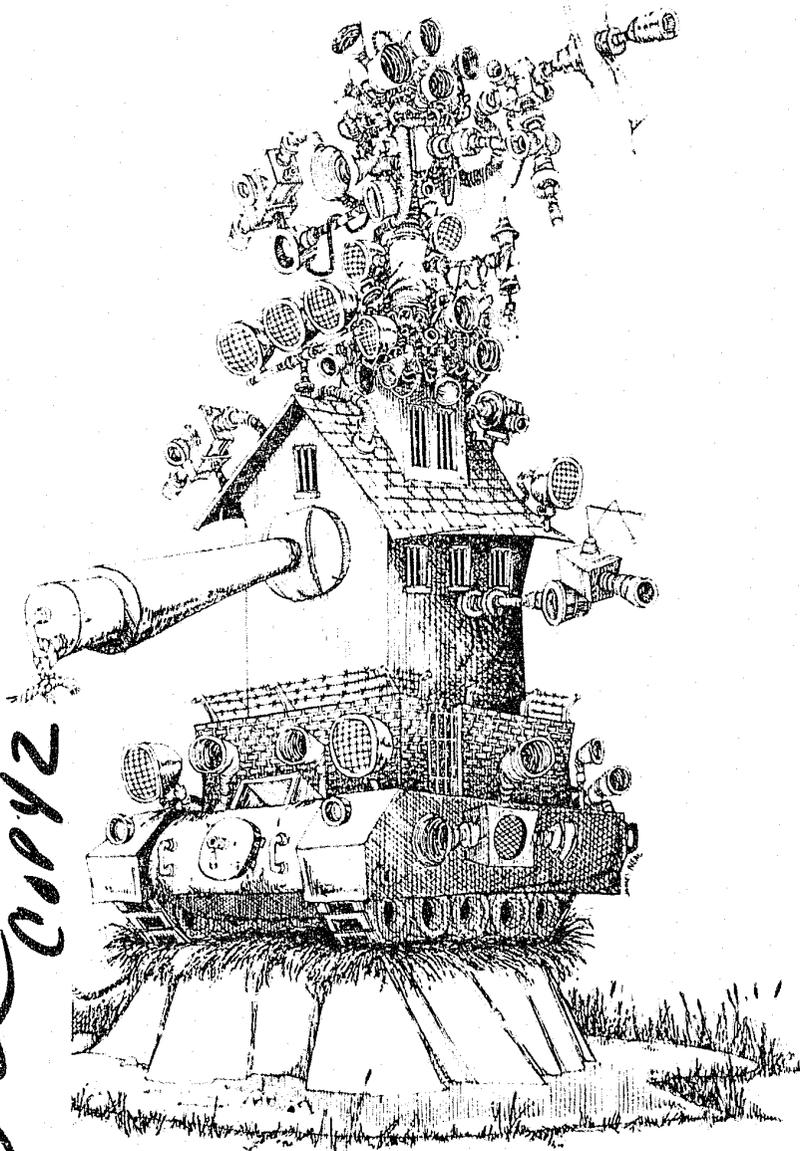


Home Security

Book Three: Choosing a Good Lock



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 National Institute of Law Enforcement and Criminal Justice
Law Enforcement Assistance Administration
United States Department of Justice

HOME SECURITY
BOOK THREE: Choosing a Good Lock

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A major part of your home security depends on your locks. Locks are probably the only items in or on your home that are there solely for the purpose of providing a defense against unwanted intrusion. How well they do their job depends on a number of factors: their design, construction, installation, and proper application. The locks most commonly found in American homes are door locks and padlocks. In this booklet we will concentrate on these two basic types of locks — but the principles we will present are also applicable to most mechanical locking devices, regardless of their application.

WHAT YOU DON'T NEED IN A LOCK

Some very good locks have features you really don't need in your home. For example, you probably don't need a highly pick resistant lock. The ordinary residential burglar knows about as much about lock picking as you do. An ordinary five-pin tumbler lock — which is the type usually used for residential security — is usually adequate. Nor are you likely to need a lock that contains hardened steel inserts to resist drilling. Few burglars will have thought to bring a drill with them, and it's even less likely that they're going to stick around for the amount of time necessary to drill out your locks. Drilling locks is a professional burglar's technique, and residential burglars are rarely professionals.

Some very good locks contain deadbolts which are reinforced in various ways to resist sawing. Again, this is a feature that provides more security than you are likely to need — and at extra cost. The risk that

a burglar will try to saw your lock bolt is negligible. Extra features like these are fine on locks for commercial buildings which are more often the targets of skilled professional burglars. The \$100 or more price tag for these high security locks is reasonable in these applications. But for most residences these locks are more protection than you really need.

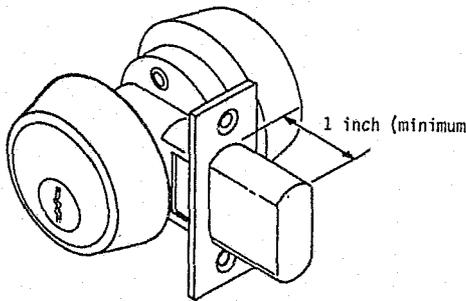
What you really need is a good deadbolt lock that resists the common methods that a residential burglar will likely employ to gain entry into your home. The case or body of the lock should be substantial enough to resist battering. The cylinder should be installed in the case or body with strong cylinder interlock bolts. A good rule of thumb is that interlock bolts less than 1/4" in diameter should be suspect. In most cases they are too small to adequately anchor the cylinder and can be broken or pulled out if enough force is applied. Either a long-throw horizontal deadbolt or a vertical-throw interlocking deadbolt should be used. The lock bolt to be avoided is the spring-loaded latch bolt which is never adequate security used alone. If your locks are properly installed in a good door, and these simple rules are followed, your risk of being victimized by a burglar will be substantially decreased. Most burglars get in by defeating inadequate locks.

DOOR LOCKS

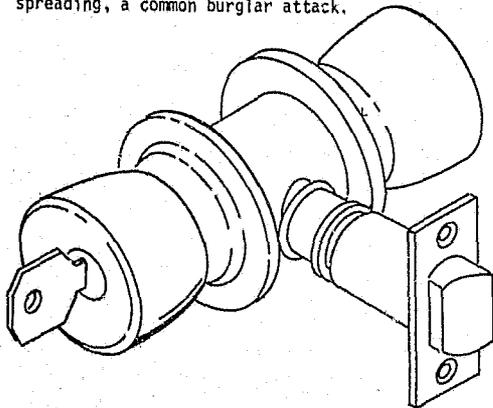
Door locks must withstand common burglary attacks. Otherwise you might as well not have them. Fortunately, the techniques used by the residential burglar are not very sophisticated, and if your locks are immune to them he will probably give up and go away.

Avoid the Lock-In-Knob Lockset

The most insecure door lock now in common use is the lock-in-knob lockset. The basic rule of the use of locks for home security is never rely on a lock-in-knob lockset for protection against forced entry. It is never adequate under any condition. On most deadbolt locks the locking mechanism is buried in the door, or mounted on the inside of the door — out of reach of the burglar. Not so the lock-in-knob lockset. The lock mechanism is inside the doorknob and once the burglar has knocked, wrenched, twisted, or pried off the knob, the mechanism is easily accessible.



HORIZONTAL LONG-THROW DEADLOCK. A deadlock is any lock containing a deadbolt. Any horizontal deadbolt must have a throw of at least one inch to be considered adequate security. Shorter throw deadlocks are too vulnerable to frame spreading, a common burglar attack.



LOCK-IN-KNOB LOCKSETS are also known as cylindrical locksets or key-in-knob locksets. Used alone they are never sufficient protection. A lock-in-knob lockset should be considered a privacy latch rather than a true lock. It must always be supplemented with a good deadlock properly mounted on the door.

Getting the knob off is a very simple matter. Even alleged "high security" lock-in-knob locksets which have been reinforced to resist attacks on the knob can usually be quickly defeated and are not worth the money (some are quite expensive). The best rule is to avoid them altogether. There are deadbolt locks now on the market which have been designed to replace the lock-in-knob lockset. One is illustrated in this booklet. They fit into the same hole in the door and are simple to install. They are relatively inexpensive and provide good protection. They incorporate either a long-throw horizontal deadbolt or a vertical-throw interlocking deadbolt, either of which is usually adequate for residential protection.

Types of Lock Bolts

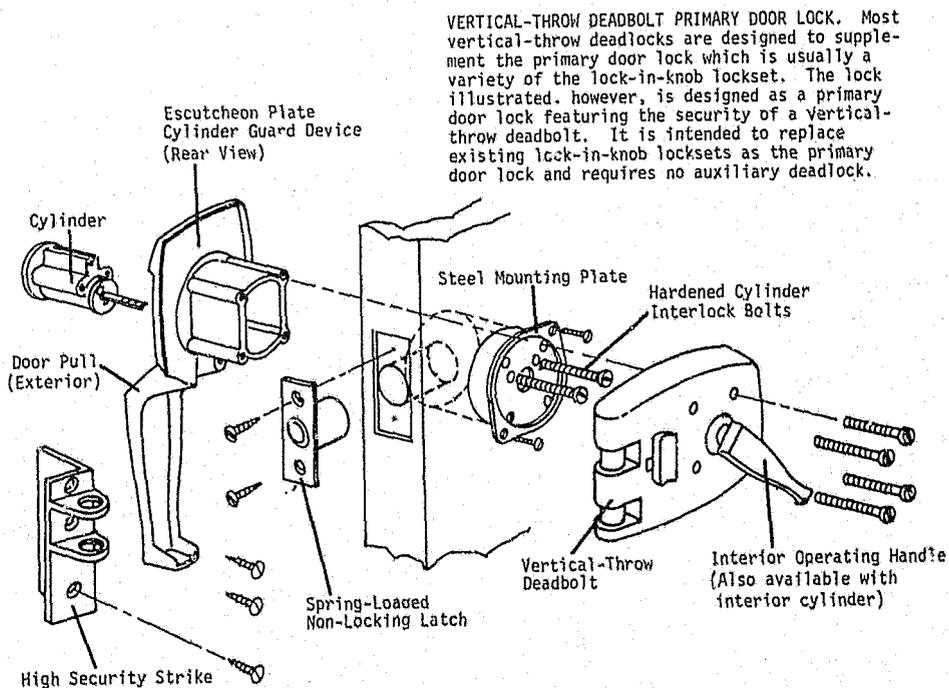
There are two basic types of lock bolts used in door locks, latch bolts and deadbolts. A latchbolt is short, spring-loaded, and has a beveled face (which makes it easy to identify). The horizontal deadbolt is long, not spring-loaded and has a square face. Latchbolts are never adequate protection. They are too short to securely fasten the door to the door frame. They are also spring-loaded which, from the point of view of providing security, is a very dangerous feature. Latchbolts are designed to retract automatically when the door on which they are used is closing. Once the door is fully closed, the spring pushes the bolt into the strike, latching the door closed. This is very convenient, which makes these latches very popular. But it is not very secure. Older latchbolts can be shimmed by inserting a piece of thin, springy steel or stiff plastic between the door and its frame. This shim makes contact

with the beveled portion of the latchbolt, forcing it to retract. With a little practice a burglar can shim a latchbolt faster than you can unlock it with a key. Newer latchbolts contain anti-shim devices which make this attack impractical. But even with these devices to protect against shimming, locking latches are still a hazard. They must be made fairly short in order to retract properly when the door is closing. Seldom do they have a throw of more than 5/8 inch, which means that on properly mounted doors, they will extend into the strike no more than one-half inch (There must be 1/8 inch clearance between the door and frame to enable the door to operate without binding.) On poorly hung doors, where the clearance is permitted to be larger than 1/8 inch, the latch may extend into the door as little as 1/4 inch. With a small prybar or large screwdriver, a burglar can easily apply enough force to the average door frame to deflect it away from the latch at

least one-half inch, thereby releasing the door. He then simply pushes the door open and he's in. This type of attack (called "frame spreading" or "jamb spreading") is perhaps the burglar's most common method of breaking in.

Lock-in-knob locksets are just one of many kinds of locks that contain locking latches rather than deadbolts. Any lock which relies solely on a latchbolt should be replaced, or a good deadlock added. There is no condition in which a locking latchbolt by itself is adequate protection against the burglar.

Some deadbolts, however, are also inadequate, and you should also be careful to avoid these. The most common fault, again, is that some deadbolts are simply too short — also about 5/8 inch. Obviously a short deadbolt provides no more protection against frame spreading than a latchbolt of the same length. Horizontal-throw deadbolts should be at least one full inch long

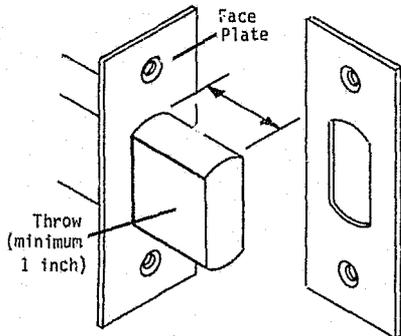
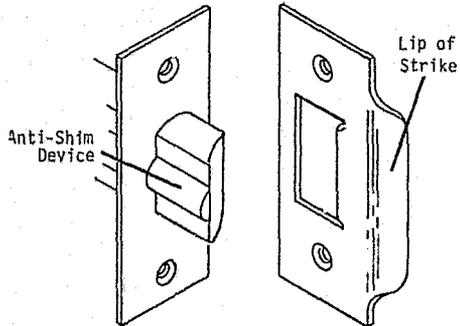


when measured as shown in the accompanying illustration. Anything less is not adequate protection.

Most security experts agree that even better protection can be achieved by using an interlocking deadbolt. The most common of

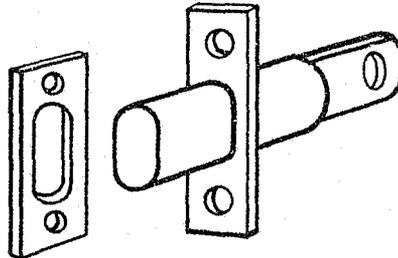
TYPES OF LOCK BOLTS

Latchbolt With Anti-Shim Device and Strike:
This type of bolt is never adequate protection and should not be used except with an auxiliary deadlock.

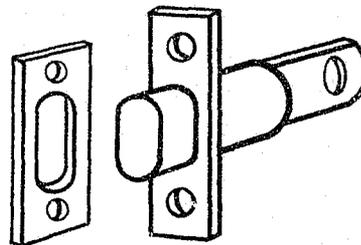


Horizontal Long-Throw Deadbolt and Strike:
Throw is measured from the face plate to the end of the bolt with the bolt in the fully extended position.

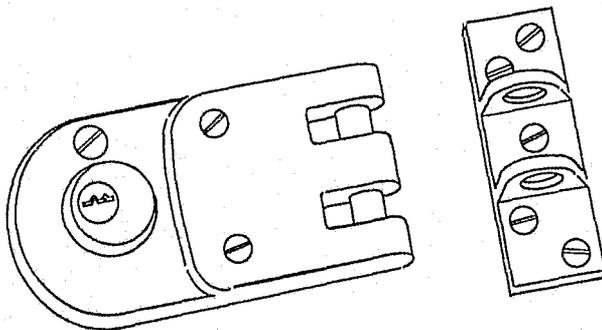
HORIZONTAL-THROW DEADBOLTS. If horizontal-throw deadbolts are used, the bolt should extend at least one inch from the leading end of the door. Most common (short-throw) deadbolts extend only one-half to five-eighths inches which does not provide the security needed.



Long-Throw Deadbolt



Short-Throw Deadbolt



VERTICAL-THROW INTERLOCKING DEADLOCK is the type of interlocking deadlock most commonly used on residential doors. It interlocks the door frame to the door providing good protection against frame-spreading. If not properly mounted with through-the-door cylinder interlock bolts, however, it is subject to being defeated by other types of attacks, especially punching. If properly mounted, it is excellent protection.

these for residential applications is the vertical-throw deadbolt shown in the accompanying illustration. Properly mounted, it interlocks the door and frame in a manner that makes frame spreading nearly impossible. For this reason they are often preferred even to long-throw deadbolts.

Installing Locks Securely

Most of today's in-the-door deadlocks (A deadlock is any lock containing a deadbolt.) are designed to be installed with steel interlock screws. These machine screws (more commonly called "bolts" by everyone but engineers) join a metal portion of the lock on the inside of the door to another metal part on the outside. Metal-to-metal is the key concept. This type of mounting in effect creates a sandwich of metal with the wood (or steel) door in the middle making it extremely difficult to punch, pull or hammer the lock out of the door.

In contrast to in-the-door locks, most inexpensive rim-mounted deadlocks are attached to the surface of the door with wood or sheet metal screws. They are nearly worthless. They can be quickly and easily knocked off the door with a punch and hammer. Your best buy is a rim mounted lock which installs with bolts extending through the door. Again the key concept is metal-to-metal. Locks mounted with through-the-door bolts cannot be knocked off by punching within the amount of time the average burglar wants to spend exposed on your doorstep.

One exception to this metal-to-metal rule is the mortise deadlock. A mortise lock fits inside the door in a cavity cut out for this purpose.

It is usually held in place by small bolts in the leading edge of the door. Today these are usually found only on hollow steel doors. Ordinarily it would take a burglar a considerable amount of time to hammer or chop one of these out of the door — so in that regard they are pretty safe. The weakness of mortise locks is that their cylinders are usually fairly easy to pull or wrench from the body of the lock, and they should be protected by cylinder guards.

LOCKS SHOULD BE MOUNTED WITH INTERLOCK MACHINE SCREWS (BOLTS), NOT WITH WOOD OR SHEET METAL SCREWS

Wood and sheet metal screws should not be used to mount locks to doors. They do not have adequate holding power to resist forceful attacks. Machine screws (commonly called "bolts") which fasten one half of the lock on the interior to the other half on the exterior of the door are much more secure.

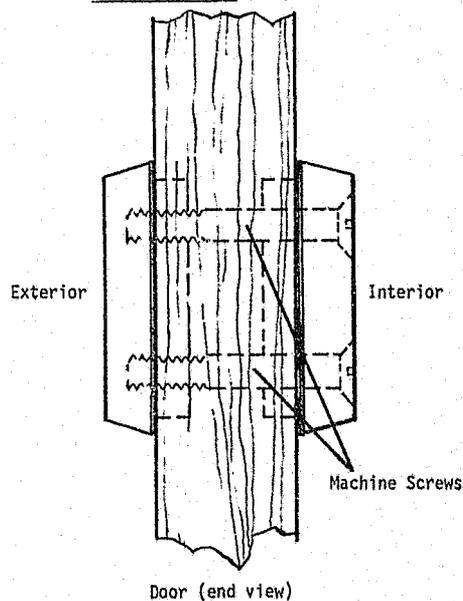


Sheet Metal Screw



Wood Screw

Proper Mounting (Simplified Illustration)

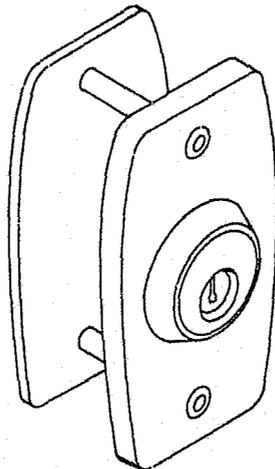
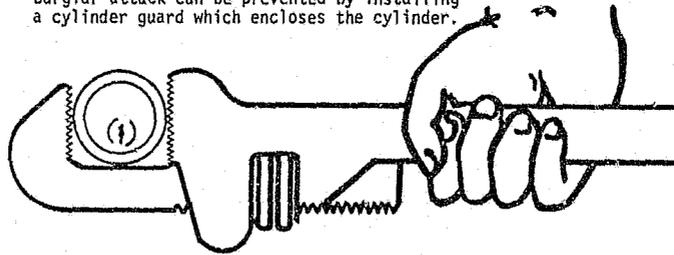


CYLINDER GUARDS

A common method used by residential burglars to open your locks is cylinder pulling or wrenching. All he needs is a pipe wrench. If the cylinder is exposed enough so the burglar can get a wrench on it, he can twist it until the mounting bolts break or are pulled out of the cylinder. There are also ways of yanking the cylinder even if it is not exposed enough to be wrenched.

So, to be on the safe side, use a cylinder guard. Many good locks contain a built-in steel cylinder guard which completely encloses the exposed part of the cylinder. The guard prevents the burglar from wrenching or pulling the cylinder. If you have an otherwise good lock which does not have a cylinder guard, you can add one. There are a variety of add-on guards which fit over most cylinders. These are well worth the few dollars investment.

DEFEATING EXPOSED DEADLOCKS BY WRENCHING THE CYLINDER OUT OF THE LOCK BODY. This common burglar attack can be prevented by installing a cylinder guard which encloses the cylinder.

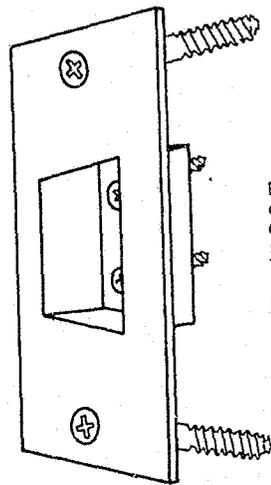


ADD-ON CYLINDER GUARD. Many good locks are designed with built-in cylinder guards to prevent attacks on the cylinder itself. If your lock does not contain a built-in guard, an add-on guard like the one shown provides excellent security. This commercially available guard is of heavy aluminum and is mounted from the inside of the door with hardened steel bolts that enter threaded holes in the guard. It combines good protection with good appearance.

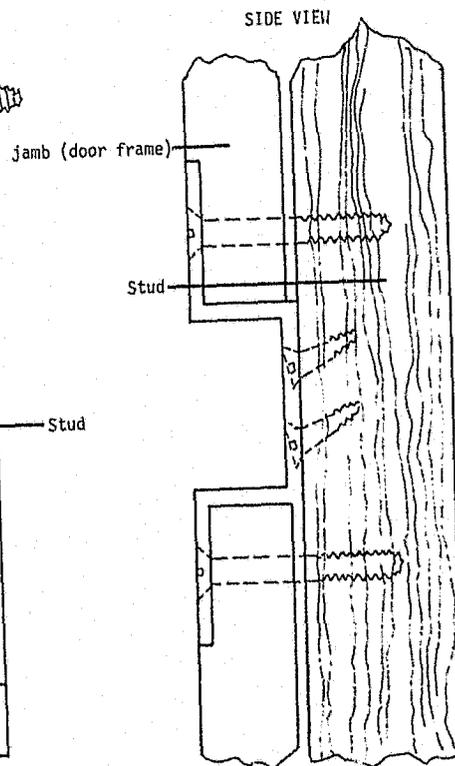
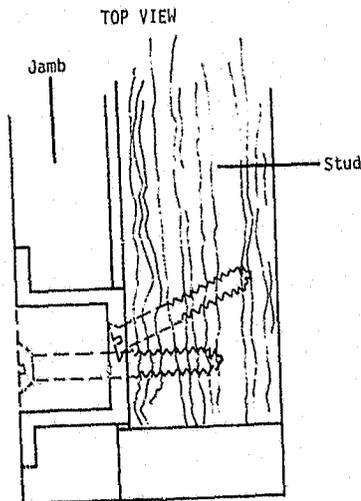
STRIKES

Strikes are the major weakness of many otherwise fine locks. There is one simple rule to follow when deciding on an appropriate strike — the common strike mounted with two short screws is never good enough. As a minimum, you must remount the strike with long (2 3/4 inch) screws after you've filled the gap between the doorframe and studs (see Book One). Many good locks come with security strikes which are much larger than com-

mon strikes and are mounted with at least four long screws. Many wrap around the door frame and are mounted with several screws at 90 degree angles to each other. These wraparounds are usually superior. They have more holding power, and serve to reinforce the frame itself so it doesn't break when force is applied to the lock. Your locksmith usually has a number of security strikes on hand and will be glad to help you select the one most appropriate for your needs.



HIGH SECURITY STRIKE BOX. This strike is designed for use with horizontal-throw deadlocks. It is intended to overcome the security limitations of wood door jambs. The strike is mounted with four long screws, two of which are offset to increase their holding power against forceful attacks.



SUMMARY

The basic rules for choosing secure door locks are:

1. Avoid the lock-in-knob lockset – it's useless. Replace it or supplement it with a good deadbolt lock.
2. The only two acceptable bolts to use on swinging doors are the long-throw (at least one inch) deadbolt or interlocking deadbolt. For most applications the interlocking deadbolt is preferred.
3. All locks (except mortise locks) must be mounted with through-the-door cylinder interlock bolts, (machine screws) or other, non-removable bolts. The bolts must be steel, not nylon or soft metal. Don't use wood or sheet metal screws to mount a lock.
4. Security strikes should be used – preferably the wraparound type. If you retain your common strike, remount it with long screws after filling the gap between the door frame and studs.
5. Cylinder guards should be used with all locks. These may be either the built-in or add-on type. They are an absolute must on most mortise and many rim-mounted locks.

PADLOCKS

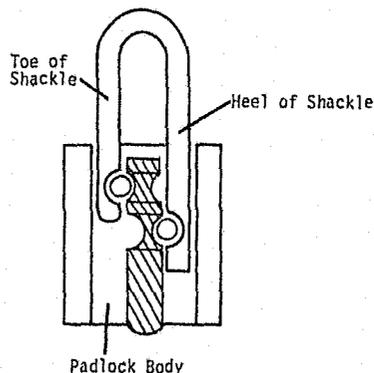
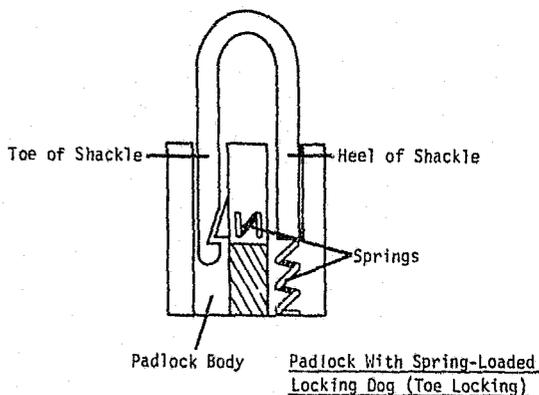
Padlocks are used in many places where built-in locks can't be used or were not provided. Your garage, storage shed, and bicycle are probably secured with padlocks (if they aren't they sure should be). Padlocks can be very effective in resisting common residential burglar attacks. Where a burglar gets past a padlock, it's usually because somebody used an inexpensive padlock to protect valuable items.

Don't you do it. Follow these simple rules and be safe.

THE PADLOCK MUST HAVE A TUMBLER MECHANISM

A padlock should contain a tumbler mechanism just like your door locks. Some inexpensive padlocks do not have tumbler mechanisms. They are similar to locks you used to see on old houses that anyone could open with a skeleton key. These are called warded locks. While the keys on warded padlocks don't look like old skeleton keys, they work on the same principle – and they are not secure. An amateur burglar could open one

COMMON METHODS OF SECURING A SHACKLE INSIDE THE PADLOCK BODY



Positive-Locking Padlock in Locked Position (Heel and Toe Locking).
The absence of springs eliminated the risk of shimming the lock open.

with a bent hairpin. When you buy a padlock, make sure it contains a tumbler mechanism. Its key should look something like your front door key - and it will usually be described as a tumbler mechanism on the box it comes in. If you're not sure, ask the salesman. If he's not sure, don't buy it.

POSITIVE LOCKING

Several methods are used to secure the shackle to the case. The least secure of all involve springloaded locking. Avoid these. They can often be shimmed by inserting a thin strip of metal alongside the shackle down into the case. Always look for positive locking. No springs are involved in positive locking, and the padlock cannot be shimmed. It's usually easy to tell spring-loaded locking from positive locking padlocks. When spring-loaded padlocks are unlocked, the shackle will spring open. When a positive locking padlock is unlocked, the shackle has to be pulled open. Again, read the boxes. It should tell you whether the padlock is positive locking.

HEEL AND TOE LOCKING

The shackle must lock on both ends: the "heel" (the end permanently fixed to the case) and the "toe" (the end which disengages). Otherwise a burglar can pry out the unlocked end with little effort. Heel-and-toe locking padlocks have locking notches on both ends of the shackle. Check for them.

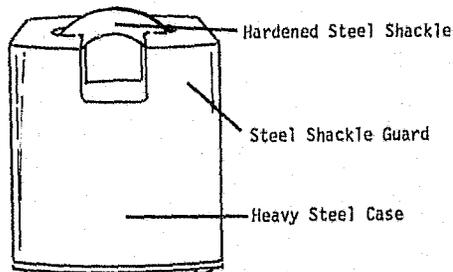
THE CASE MUST BE TOUGH

The body of your doorlocks are either buried in the door, or mounted to the back - not immediately accessible to the burglar (except for the lock-in-knob lockset).

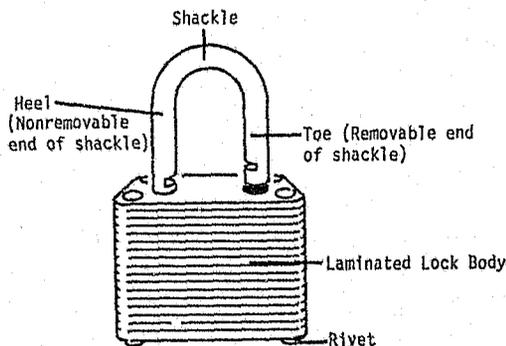
Not so the padlock. The case containing the mechanism is dangling at the end of its shackle fully exposed to whatever force a burglar might care to apply. Good padlocks are made with hardened steel cases - look for them. Some laminated cases are also fairly secure - but it would take an expert to tell the good ones from the flimsy ones. Ask the salesman, or check with a locksmith or a police crime prevention officer before buying one.

THE SHACKLE MUST BE CASEHARDENED AND SHIELDED

One of the burglar's favorite ways of getting past a padlock is to cut or saw the shackle. With some inexpensive padlocks, this approach is quick and easy. But the better



HIGH SECURITY PADLOCK
Note how little of the shackle is exposed to potential attack



LAMINATED PADLOCK: This is a typical laminated padlock in an unlocked position. The body consists of plates riveted, brazed, or soldered together. It provides only limited protection and is subject to a wide variety of attacks. Note the exposed shackle.

padlocks are protected against cutting and sawing by casehardening the shackle and by extending the case so that it shields most of the shackle making it inaccessible to the burglar. On one model, the shackle is entirely covered by the case when the padlock is locked.

THE HASP

No padlock is any better than the hasp it engages. Hasps must themselves be casehardened because the burglar is as likely to attack the hasp as he is to attack the padlock itself. It should be designed so that no mounting bolts are exposed when it is closed and locked. Otherwise the burglar will just unbolt it. It must be securely mounted with bolts not wood or sheet metal screws. Don't mount it on thin or rotting wood, or thin metal without reinforcing the back of the mounting surface with a steel plate.

If you use a chain with a padlock, make sure the chain is casehardened. Otherwise, even if the burglar can't cut your shackle, he can cut the chain, and you've just wasted your money on that new padlock.

OTHER LOCKS

There are so many specialty locks that we cannot begin to cover them all here. But many of the same general rules apply. Always look for sturdiness, good steel and avoid springs. Any lock used for security must contain a tumbler mechanism - otherwise it's too easy to open. Seek advice on any lock before you buy. Your local locksmith can help you, so can your police or sheriff's crime prevention unit. Usually the police cannot recommend a specific make of lock - but they usually will tell you whether a lock you

have in mind will do the job.

DON'T RELY SOLELY ON LOCKS

Good locks are an essential part of your home security, but only when they are part of a total security system. A burglar will pick the weakest point to make his entry. If your lock is good, but your door is weak, he'll ignore your lock and break down your door. It's that simple. A lock is only as good as its strike, the door it's mounted on, and the door frame. Each of these should provide an equal level of protection.

And, of course, now that you've got good locks, don't forget to use them. If you want to keep it, you've got to lock it. It couldn't be simpler.

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