

# SARGENT®

## Basic Technical Fundamentals of Builders Hardware



Mortise Locks



Bored Locks



Auxiliary Locks

Inside Cover  
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## Preface

Ever since people have felt the desire to protect hearth, home and family, they have used locks to protect what is theirs.

There are probably more lock mechanisms in the world than any other mechanical device. You have probably used various types of locks ever since you were a child, without really thinking about them – but how much do you know about these products from a technical perspective?

Over the last 150 years, many industry terms, products, functions and specifications have been created for hardware applied to doors, but what are they and how are they used?

This booklet covers only the fundamentals of the most basic products that Sargent manufactures. Using this basic knowledge, you can build on your expertise by using product catalogs and other related publications.

## Sargent History

In the mid 1850's, Sargent and Company moved from New Britain to New Haven, Connecticut and began to grow in size. By the late 1800's, the Sargent catalog exceeded 800 pages and offered a broad array of products. The line included virtually every product a small hardware store might need to fill its shelves. What Sargent didn't manufacture itself was bought, packaged and resold to meet the hardware stores' needs. The products listed in the late 1800's catalog ranged from cow bells and cake turners to kitchen food choppers, screws, coal shovels, "C" clamps, carpenter squares, animal traps, mop handles, such window and door hardware as hinges and sash fasteners and door locks of many variations. The list of products sold under the Sargent name at the turn of the century goes on and on.

Because the company's product line was so vast, the Sargent name became known in homes, on farms and in businesses throughout the country. But as the company evolved, it began to specialize in its more profitable and mechanically complicated products – namely, locks and door closers. Throughout the early to mid-1900's, Sargent pared down its line and introduced its first exit devices, a focus which has intensified in recent years.

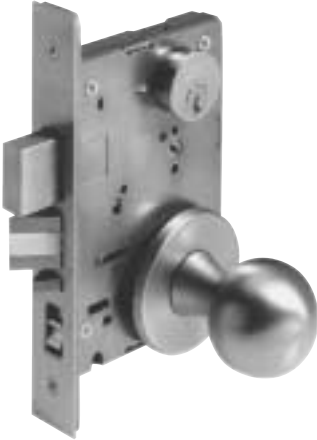
The products that Sargent chose to specialize in - door locks, door closers and exit devices – have made the company a well-recognized supplier of BUILDERS HARDWARE. This term applies to a large group of products used for purposes of protection, security and convenience, as distinguished from heavier and/or simpler materials used in construction such as columns, beams, nails, screws, etc.

Sargent chose to specialize in high-quality BUILDERS HARDWARE, but also has a small line of lower-end, value-priced products designed for residential hardware or small building use.

## Basic Name of Products

### Mortise Lock

- With knob operation

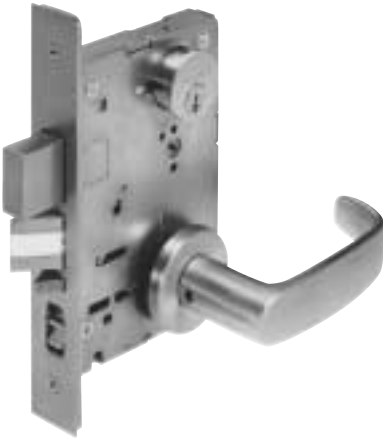


#### Notes:

- The term 'Mortise Lock' describes how the lock case fits into a rectangular shaped cavity in the edge of a door.
- The lock case is larger than a 'Bored Lock' (see next page) allowing more functions and variations of the product.
- When a keyed cylinder is used to provide certain functions, a cylinder is screwed into the lock case.

### Mortise Lock

- With lever handle operation



### Auxiliary Mortise Lock

- No knobs
- No lever handles
- Thumb turn and/or cylinder operation only



## Basic Name of Products

### Bored Lock

- With knob operation



### Bored Lock

- With lever handle operation



### Bored Auxiliary Deadlock



#### Notes:

- Bored locks are sometimes called 'Bored-In' or 'Cylindrical Locks.'
- The term 'Bored' or 'Bored-In' describes how the device fits into round holes which are bored or drilled into the face and edge of a door. Door preparation is simple but the device is limited in some functions when compared to a mortise lock.
- All SARGENT Mortise, Bored and Auxiliary locks are manufactured with various inside/outside operation features, functions, trim designs and finishes. Please consult your SARGENT product catalog for detailed information.

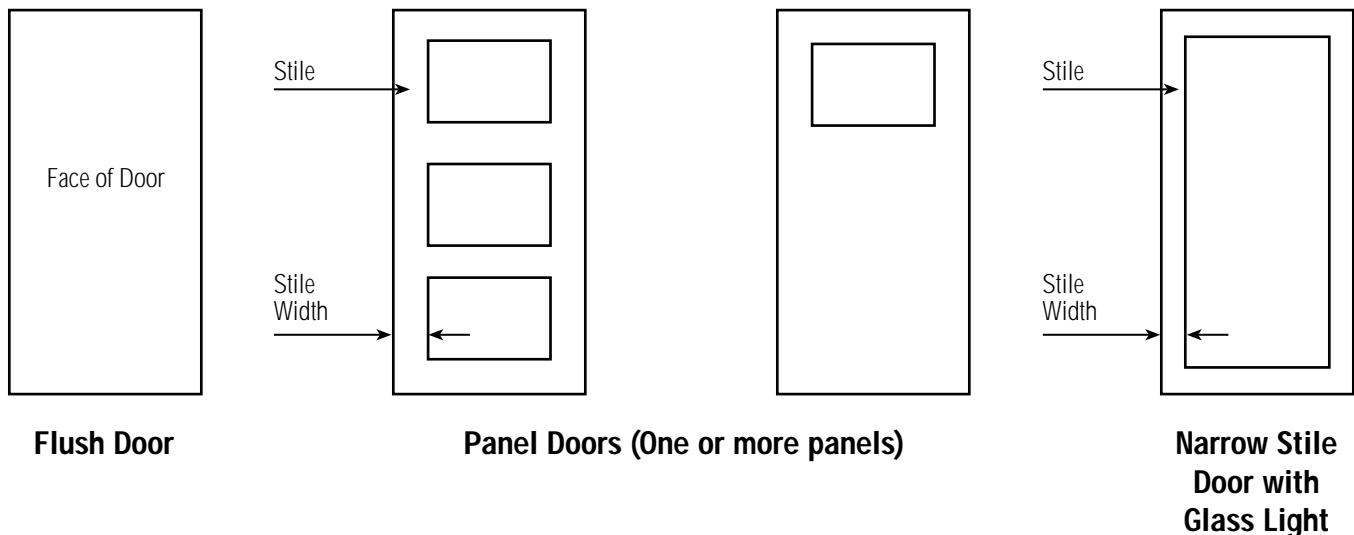
## Doors – (A Brief Review)

Before we start discussing door locks, we would like to share some facts about what they are used on and with – namely, DOORS. Doors may seem simple, but their use and construction is a whole field by itself. Therefore, this booklet will discuss only the fundamentals you need to know.

Most doors are made of wood or steel. (Doors made of aluminum or glass are also available but are not as common). Wood doors may be made of solid wood or laminate. Steel doors are usually made from formed sheet steel and reinforced with steel plates to add strength and allow the attachment of hinges and other hardware.

The most common thickness of a swinging door is 1-3/4" thick and 36" wide. Doors may be flush or constructed with panels made of glass, metal or wood. These panels are usually placed below the face of the door.

*Here are some examples of door variations that you should be aware of ...*



Most doors are used to allow privacy, restrict sound, improve security and control effects of the weather. Another form of door is called a "Fire Door." A fire door is made and constructed of materials that are non-combustible, within limits. A fire door can be a type of wood door treated with a fire-resistant substance that will help contain a low-temperature fire.

Fire doors may also be made of steel. These are constructed to withstand much higher degrees of heat caused by fires. They are sometimes lined with a material to reduce the exchange of heat from one side of the door to the other.

Doors sold as "Fire Doors" have passed certain fire tests conducted by an independent laboratory. This type of door is usually called a "Labeled Fire Door," as the classification listing is shown on the door itself. Hardware used on these doors is also tested and required to meet certain standards.

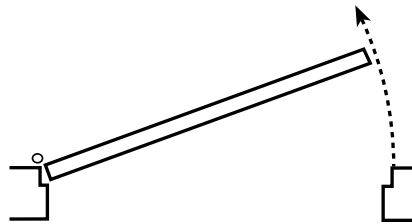
An exit door is sometimes referred to as a fire exit door, which does not necessarily mean it is a labeled fire door. Whether a labeled fire door should be used depends upon where it will go. (This subject is a study in itself and is not covered in this booklet).

## Doors – Single Doors, Pairs of Doors

### Single Door

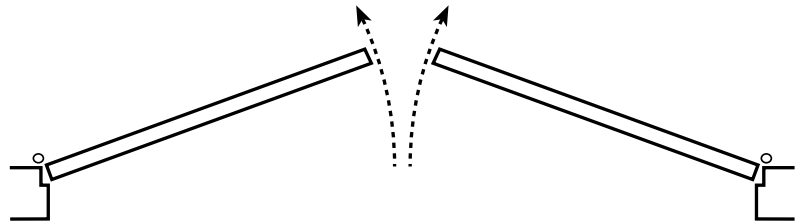
- The most common doors are single swing doors

Mortise or Bored Locks are commonly used on a single swing door. Auxiliary Mortise or Auxiliary Bored Locks can be used alone on a single swing door, but they are commonly used in addition to a Mortise or Bored Lock for extra security.



### Pair of Doors

If a Mortise or Bored Lock is used on a pair of doors, the door containing the locking device will be called the active door. The other door without the device is called the inactive door. The inactive door must lock into the door frame and threshold by using a flush or surface bolt.

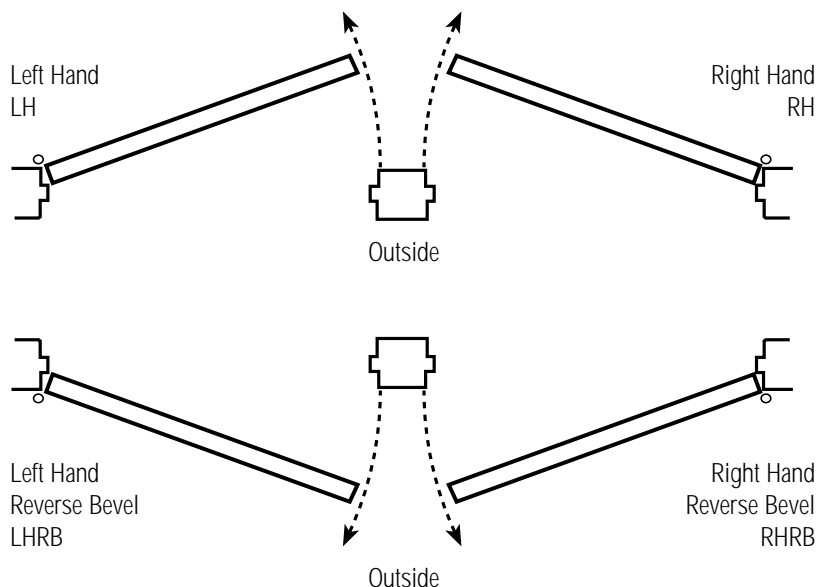


### Hands of Doors

While there are a few exceptions, doors when fabricated are usually handed. The hands of doors are referred to as follows:

1. Left Hand Door – (LH)
2. Right Hand Door – (RH)
3. Left Hand Reverse Bevel Door – (LHRB)
4. Right Hand Reverse Bevel Door – (RHRB)

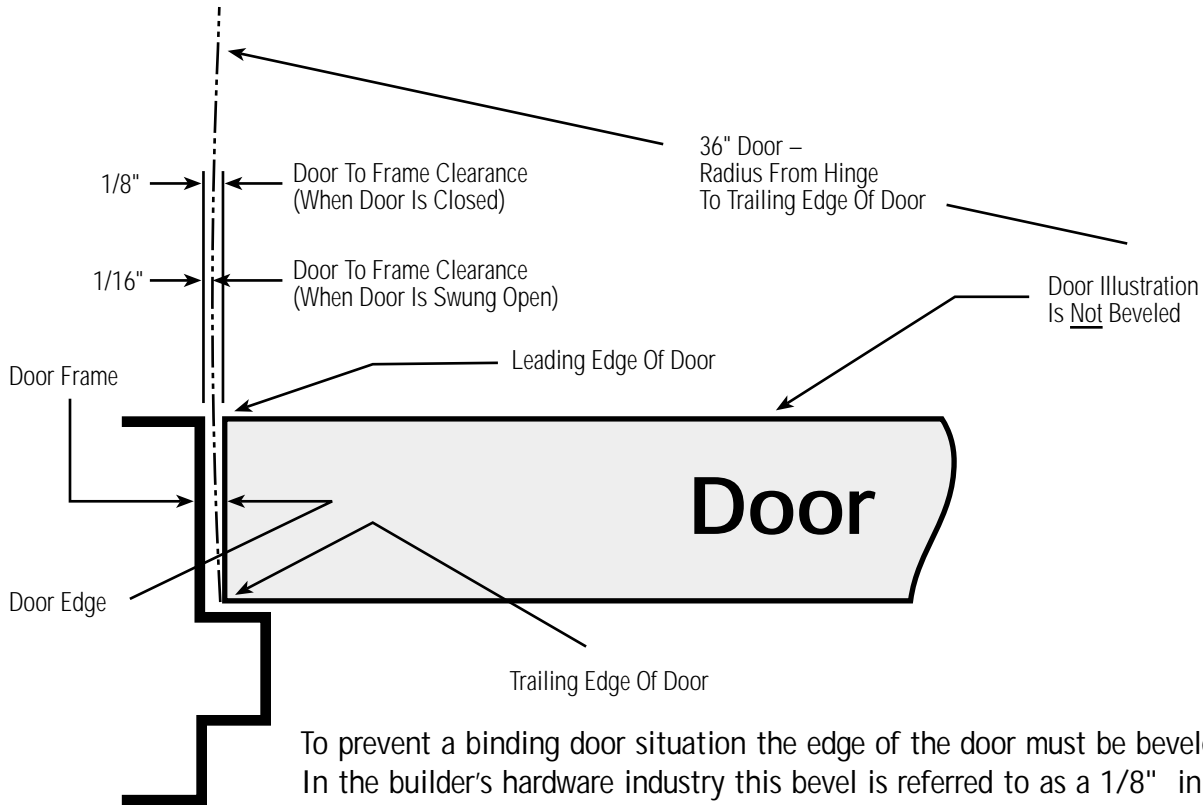
The term 'outside' in the illustration not only is used to indicate the outside of a building, but more important to show the side of a door which can be locked requiring a key or other means to gain entry.



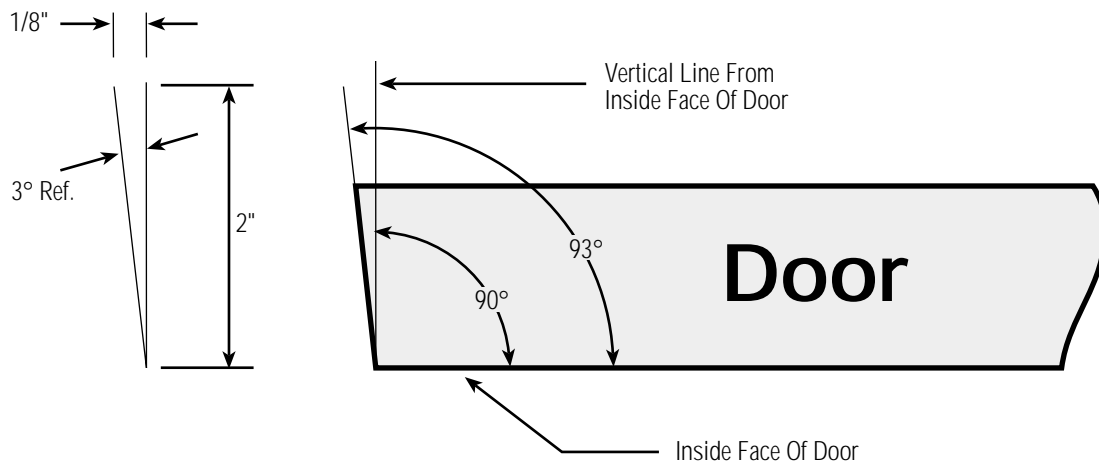


## Doors – (Door Front Bevel 1/8" in 2" Bevel)

The illustration below shows that when a door is closed the trailing edge of the door has 1/8" clearance between the door and the frame. When the door is swung open this clearance is reduced to 1/16". While 1/8" clearance is the standard measurement between door and frame, in certain situations the clearance can be reduced to zero. The end result is a binding door which may be due to improper installation, weather conditions or the settling of the building.



To prevent a binding door situation the edge of the door must be beveled. In the builder's hardware industry this bevel is referred to as a 1/8" in 2" bevel. This bevel is also known as a 93° bevel. Most locks installed on a 1-3/4" thick door or thicker have lock fronts which are beveled to match the door bevel. Locks installed on doors 1-3/8" thick may have flat or unbeveled lock fronts. Door edge with a radius and/or other shapes are not discussed in this booklet.



## History of the Federal Specifications and ANSI/BHMA Standards

### Definition of Terms used in text below

**Federal Specifications** (U.S. Specifications) for builders hardware were developed and issued by the U.S. General Services Administration of the Federal Supply Services.

**ANSI** (American National Standards Institute) – An organization that has a system for setting standards prepared and submitted by a second party.

**BHMA** – An organization of the Builders Hardware Manufacturers.

**ANSI/BHMA** Standards are found in a publication prepared by BHMA and approved and published by ANSI.

Although the Federal Specifications for Builders Hardware, i.e. locks, door closers, exit devices, etc., are no longer published, they are discussed here because a few of the terms and references are still used. A little history on this may prove useful.

The United States Government was and probably still is the largest buyer and user of Builders Hardware. The chief purpose of the Federal Specifications was to standardize purchasing requirements for items that are regularly used by two or more departments of the Federal Government.

The Federal Specification for Locks and Door Trim, including exit devices, was number FF-H00106 and was first published in 1933. Prior to that date, there were no Builders Hardware Standards. As a result, each lock manufacturer had its own door lock cutout dimensions, its own finish description and so forth. (Note: Finish symbol or description, as discussed here, refers to the decorative finish of a doorknob, door plates, etc.) Before the federal government established finish designations, most hardware manufacturers just used their own.

Examples of finish designations used by various hardware manufacturers before the establishment of U.S. standards are as follows:

Hardware Manufacturer	Dull Chrome	Dull Bronze
Yale	DY 10	BY 23
SARGENT	DCM	OP
Corbin	DCR	DB
Russell Erwin	34	11D
McKinney	CD	DE
Stanley	CMD	A5

Ironically, U.S. finish designations had nothing to do with the base material of the finished part. For example, the federal government established US26D for dull chrome and US10 for dull bronze. Even though the federal specifications are obsolete, the use of the designations the government established is still common today. The industry is slowly adopting its own ANSI/BHMA finish numbers, which also defines the base material.

**Example:**

US Finish	Descriptions	ANSI/BHMA
US3	Polished brass, clear coated	605
US4	Satin brass, clear coated	606
U59	Polished bronze, clear coated	611
US10	Satin bronze, clear coated	612
US10B	Oxidized bronze, oil rubbed	613
US10BL	Oxidized satin, bronze, clear coated	—
US20D	Statuary dark bronze, clear coated	—
U526	Polished chrome	625
US26D	Satin chrome	626

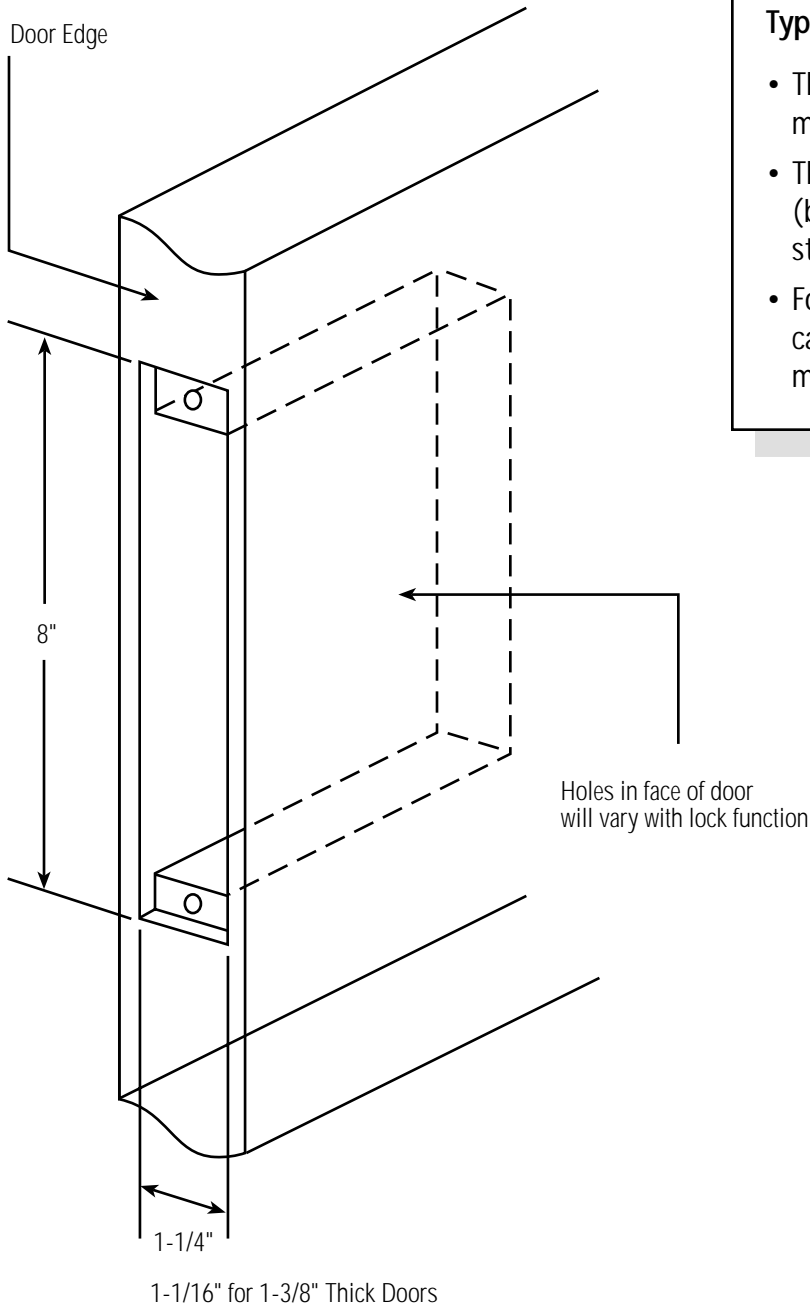
**Note:** Lacking an industry standard prior to the establishment of ANSI/BHMA standards, the industry adopted federal specifications for its own use even when products were not being sold to the U.S. government.

In the current ANSI/BHMA specifications for mortise and bored locks, the Federal Specification numbers for door cutouts are currently used. There is no carry-over from the Federal Specifications for exit devices, with the exception of U.S. finishes such as U.S. 10.

The Federal Specification program for Builders Hardware first started to come to an end in 1963. In the fall of that year, BHMA members met with an executive of Federal Supply Services, which was in charge of preparing Federal Specifications for Builders Hardware. A Federal Supply Service Department official pointed out that his department had no one trained in the Builders Hardware field. He suggested that BHMA should consider writing its own standards. He further pointed out that if a known standards organization was used which canvassed for approval of various individuals and agencies, the Federal Government would accept the standards prepared by BHMA. The American National Standards Institute (ANSI) met these requirements, and so BHMA picked ANSI as the canvasser and publisher of BHMA standards, known today as the ANSI/BHMA standards.

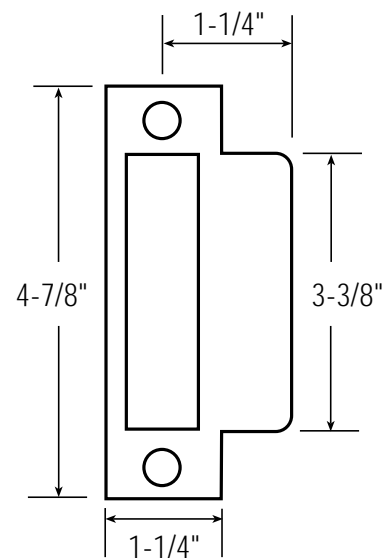
The Federal Specifications for Builders Hardware and Door Trim defined the dimensions of door cutouts for various locks. This Federal Government Specification Number FF-H-00106 listed a lock as “Series 86 Cylinder Lock and Latchsets” is now obsolete. The door cutout requirements for this mortise lock became known as an 86 cutout. In the same specification it also defined along with others a 160 and 161 Series Bored Lock and Latch Series. The door preparation for these lock series became known as a 160 and 161 cutout. Although the Federal Standard is obsolete the cutouts are still used today. ANSI standard cutout numbers have replaced these federal cutout numbers. The Federal and ANSI cutouts will be discussed in detail later in this book.

## Door Cutout for Mortise Locks (Basic Mortise Shown)



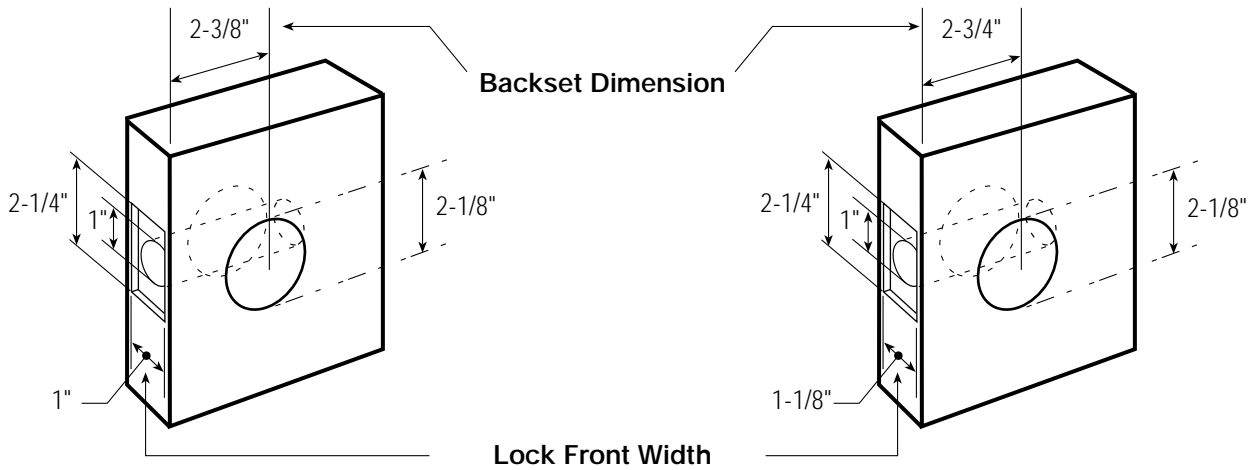
### Type 86 Cutout

- The most common mortise cutout for mortise locks
- The mortise cutout and strike plate (below) are also part of an ANSI standard, ANSI A 115.1
- For additional information refer to the catalog or templates for wood and metal doors



Standard strike shown, other strikes are available. Please refer to the product catalog for more information.

## Door Cutout for Bored Locks (Standard and Most Common Mortise Cutouts Shown)

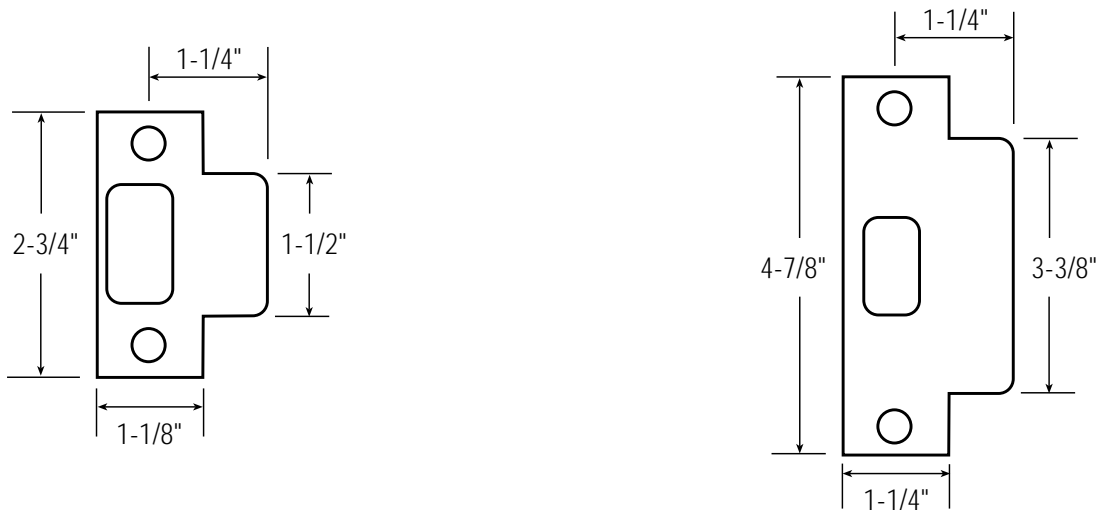


**Type 160 Cutout**

- 1" width front desired for use with 1-3/8" thick doors
- 2-3/4" backset may be used with 1" width front
- Strike (shown below) is the ANSI standard, ANSI A115.2 for a 1-3/8" thick door

**Type 161 Cutout**

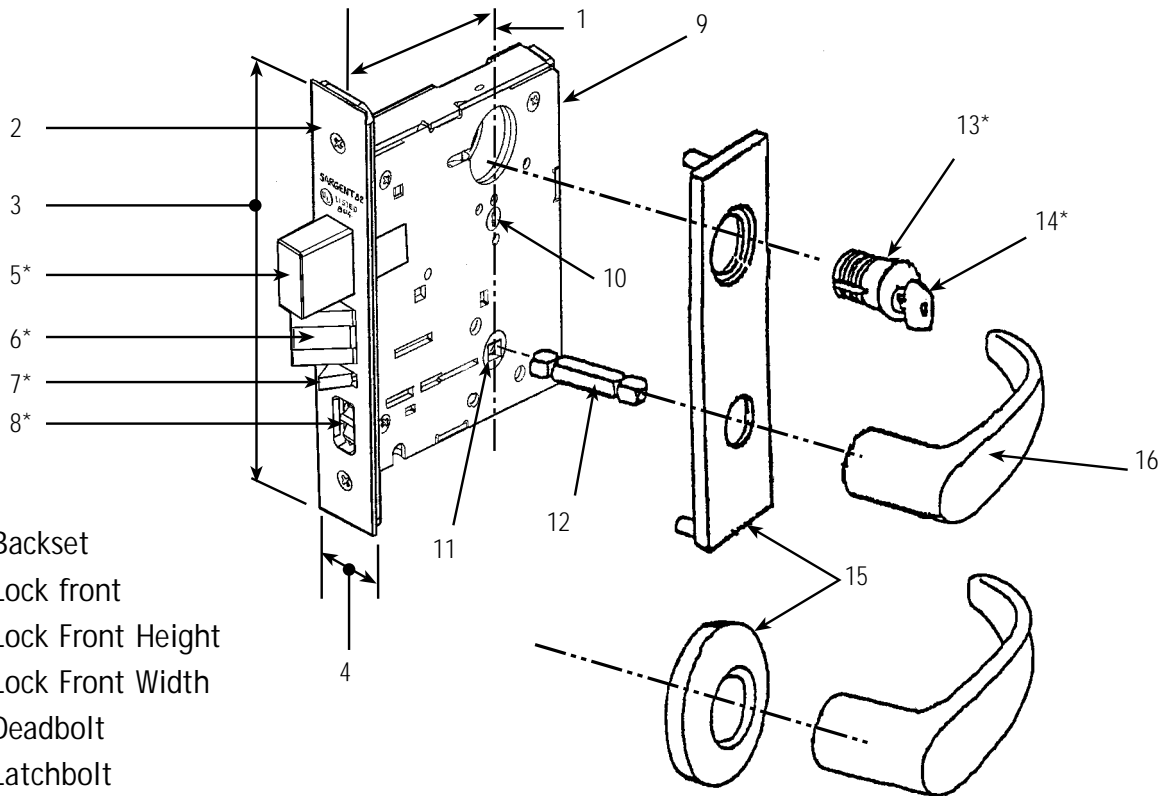
- Common cutout for for bored locksets
- Strike (shown below) is the ANSI standard, ANSI A115.2 for a 1-3/4" thick door
- The 2-1/8" hole through the side of the door may have extra cuts when the door is prepared for lever handled bored locks.



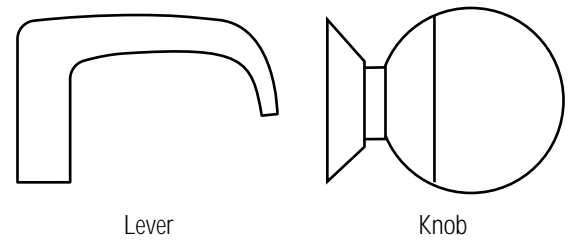
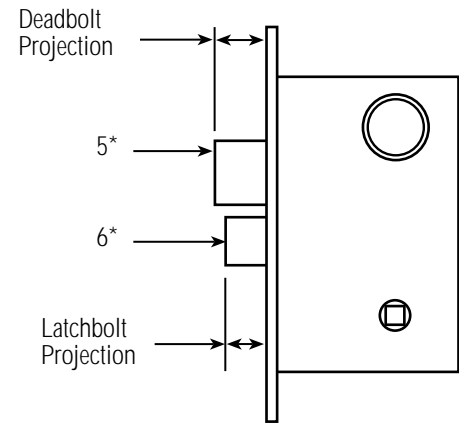
Standard strikes are shown, other strikes are available. Please refer to the product catalog for more information.

## Mortise Lock Case and Outside Trim

### Basic Terms



1. Backset
2. Lock front
3. Lock Front Height
4. Lock Front Width
5. Deadbolt
6. Latchbolt
7. Guardbolt (Auxiliary Latchbolt)
8. Toggle
9. Lock Case
10. Thumbturn Hub
11. Knob or Lever Spindle Hub
12. Knob or Lever Spindle
13. Key Cylinder Body
14. Key
15. Outside of Door Trim  
 – Plate or Escutcheon if Square or Rectangular  
 – Rose if its Round
16. Lever or Knob



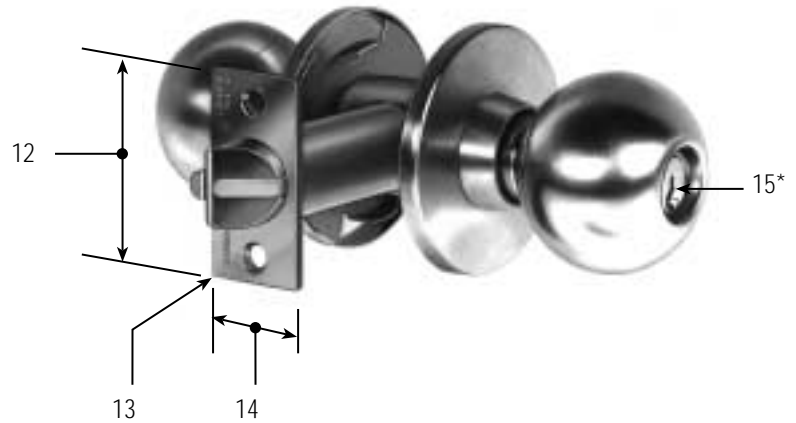
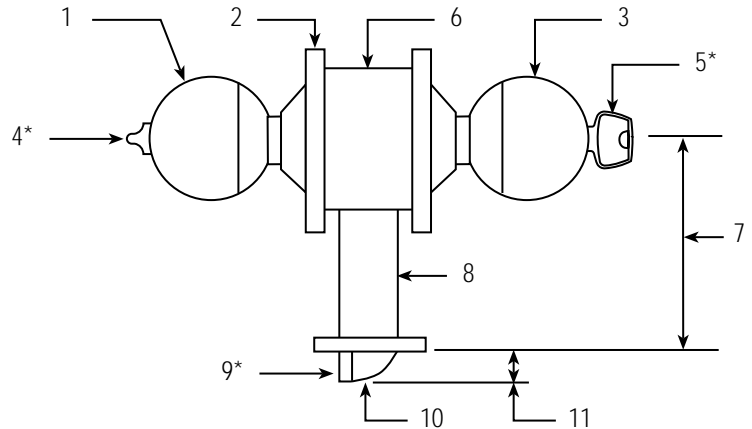
\*Note: Certain features may or may not be present with all mortise locks. Some features depend upon the mortise lock function. For more information refer to the product catalog.

## Bored or Cylindrical Locks

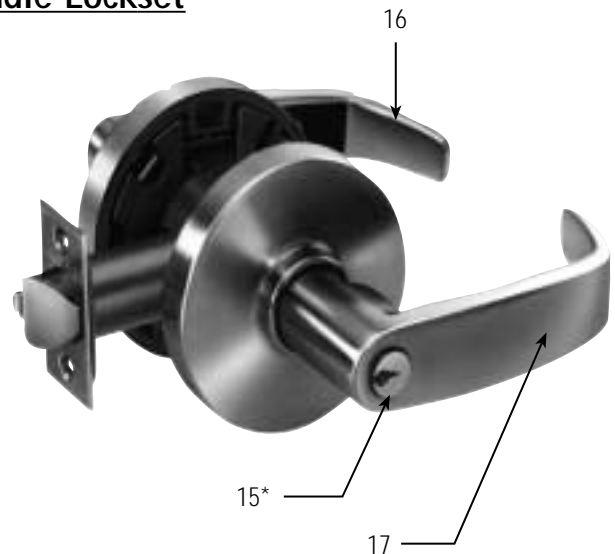
### Basic Terms

1. Knob (Inside)
2. Outside of Door Trim
3. Knob (Outside)
4. Turn or Push Button
5. Key
6. Center Case Housing
7. Backset
8. Latch or Lock Tube
9. Guardbolt
10. Latchbolt
11. Latchbolt Projection
12. Lock Front Height
13. Lock Front
14. Lock Front Width
15. Cylinder
16. Inside Lever
17. Outside Lever

### Knob Lockset



### Lever Handle Lockset



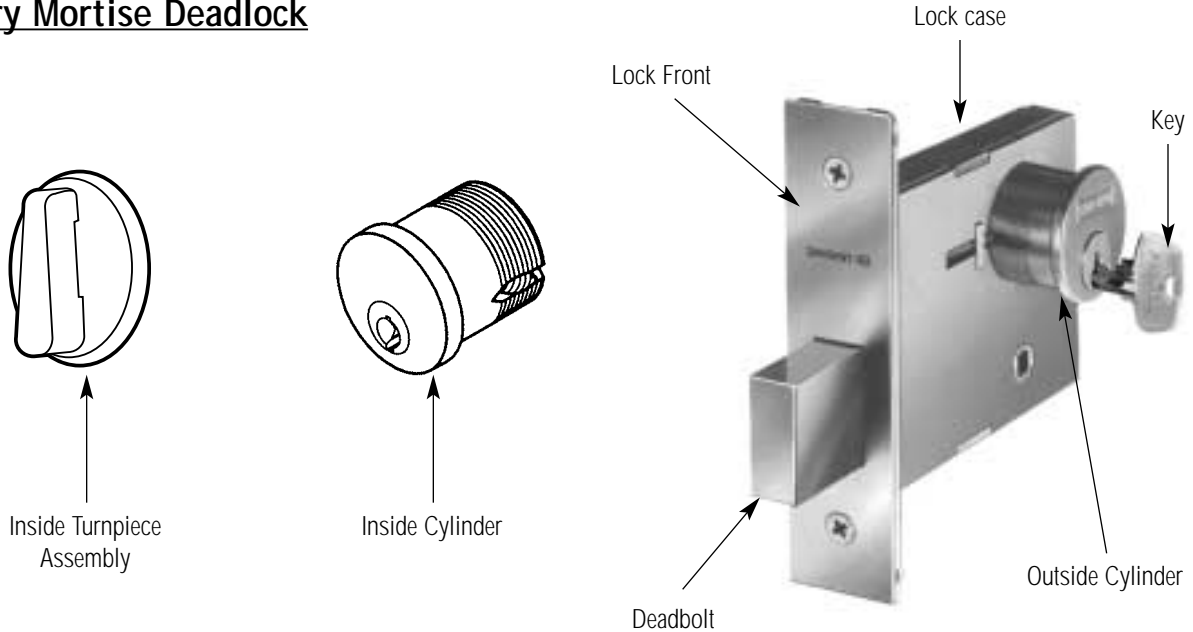
#### \*Notes:

- Certain features may or may not be present with all bored or cylindrical locks. Some features depend upon the bored lock function.
- For more information refer to the product catalog.

## Mortise and Bored Auxiliary Deadlocks

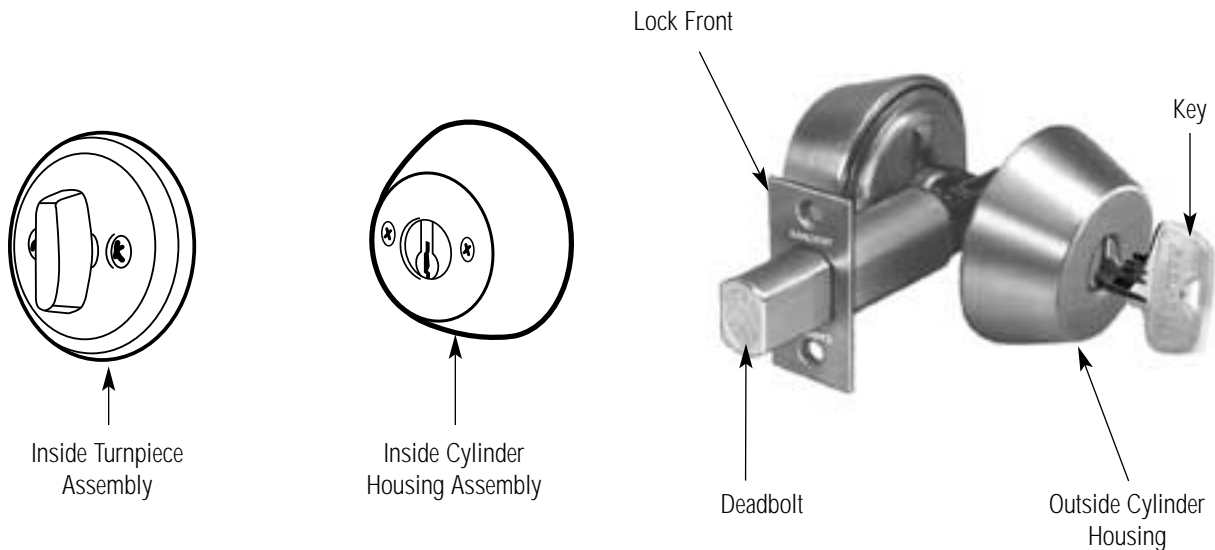
### Basic Terms

#### Auxiliary Mortise Deadlock



To determine whether to use the inside turnpiece assembly or or inside cylinder depends on which function is desired. No outside cylinder function is available.

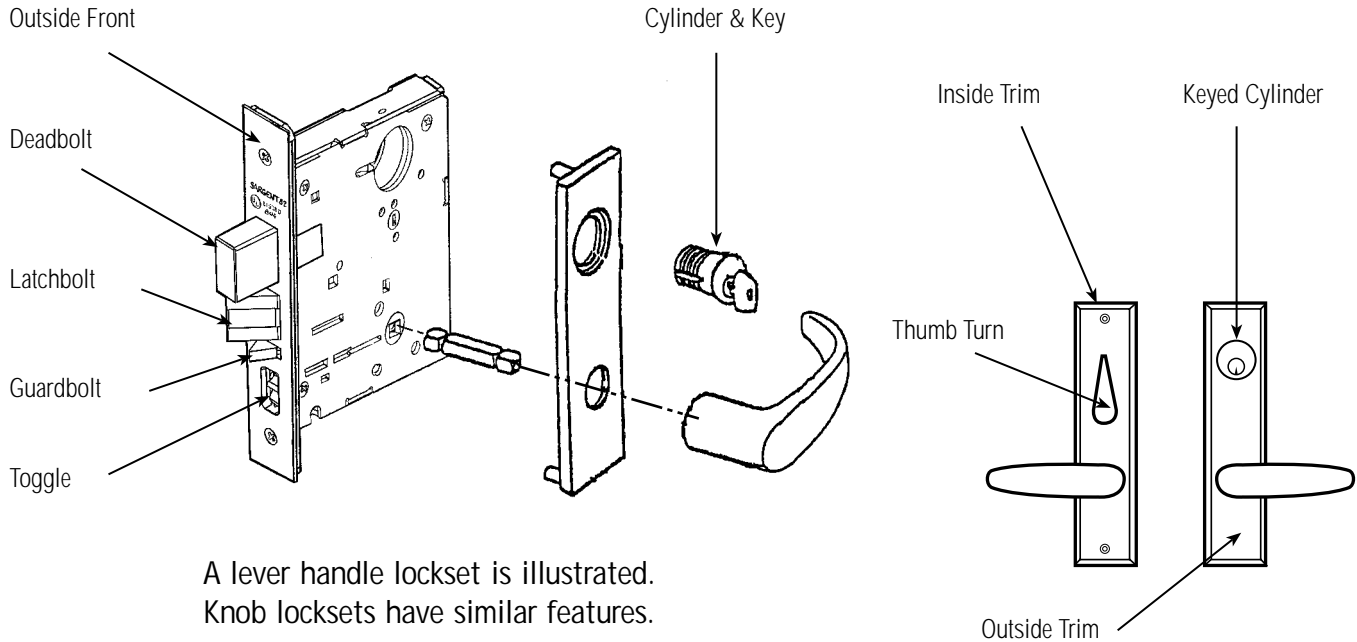
#### Auxiliary Bored Deadlock



To determine whether to use the inside turnpiece assembly or or inside cylinder housing assembly depends on which function is desired. A blank outside plate is used where no outside operation is desired.



## Basic Security Features (Mortise Lock)



The **Outside Front** covers the access to the screw holding the keyed cylinder in place.

The **Deadbolt**, when projected by the keyed cylinder or thumb turn, projects into strike for security purposes.

The **Deadbolt** projects 1 inch.

Hardened steel inserts prevent the **Deadbolt** from being sawed off to gain entry.

The **Latchbolt** is spring-loaded – allowing the latch to depress when the door is being closed – then enters the strike, holding the door in the closed position.

The **Guardbolt** is also depressed when the door is closed. However, when the latch bolt enters the strike, the guardbolt does not. The guardbolt lies against the strike face. This action causes the latchbolt to become fixed in the projected position, preventing the latchbolt from being depressed through the use of a credit card or some other tool which would lead to unauthorized entry.

The **Toggle** locks or unlocks the lever (or knob).

The **Cylinder Key** allows entry or sets the mode of function of the lever (or knob).

The **Thumb Turn** projects and retracts the **Deadbolt**.

In any given lockset, all of these features, only some or none of these features may be used. (Consult the product catalog.)

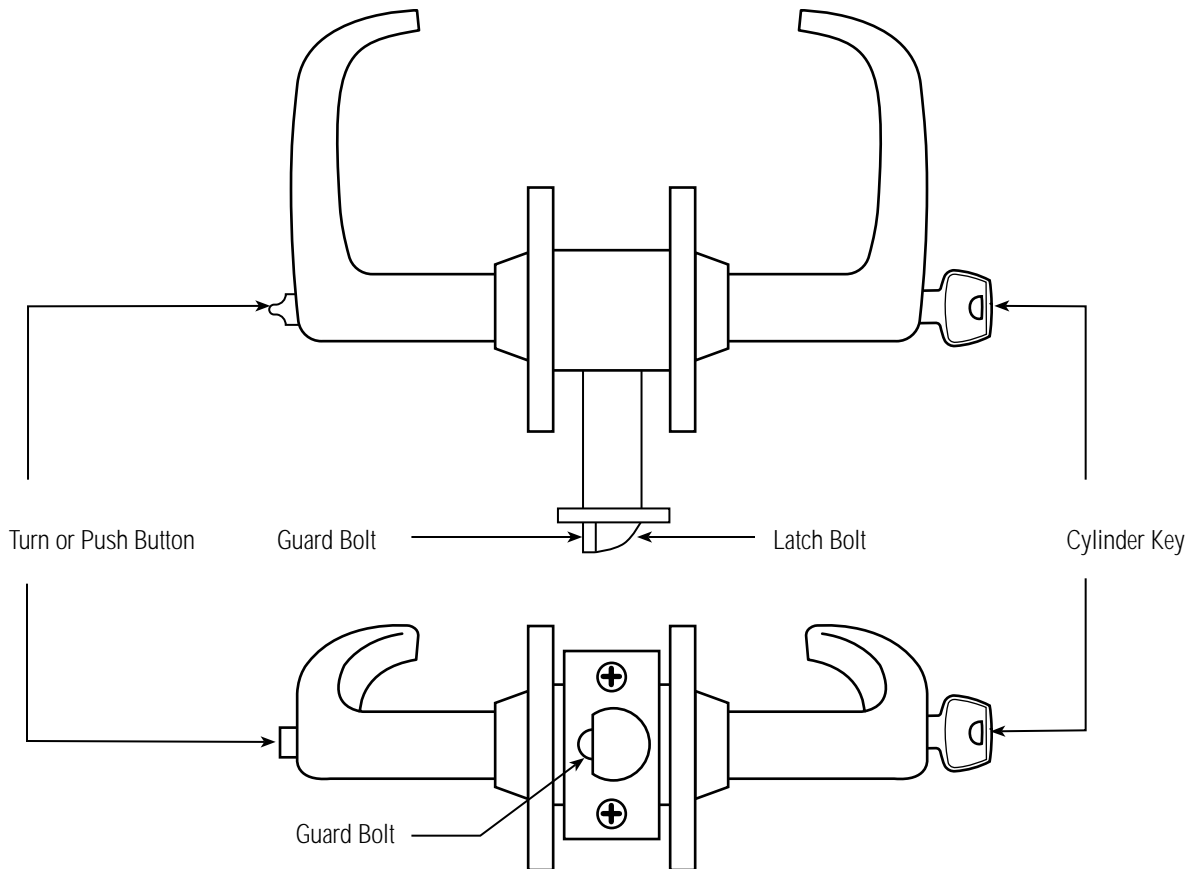
The function of a lockset defines the operation of a lockset.

### Notes:

- In mortise locks, a Guard Bolt is also known as an Auxiliary Dead Latch, which is the term adopted by BHMA.
- The above features can perform other functions, but the above descriptions are the most common.

## Basic Security Features

(Bored Lock)



The **Turn or Push Button** can make the lever (or knob) either operative or inoperative.

The **Cylinder Key** allows entry or sets the mode of function of the lever (or knob).

The **Latchbolt** is spring-loaded - allowing the latch to depress when the door is being closed - then enters the strike, holding the door in the closed position.

The **Guardbolt** is also depressed when the door is closed. However, when the latchbolt enters the strike, the guardbolt does not. The guardbolt lies against the strike face. This action causes the latchbolt to become fixed in the projected position, preventing the latch bolt from being depressed through the use of a credit card or some other tool which would lead to unauthorized entry.

The function of a lockset defines the operation of a lockset.

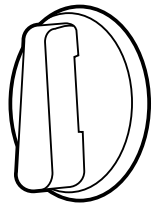
In any given lockset, all of these features, only some, or none of these features may be used. (Consult the product catalog.)

### Notes:

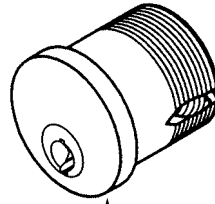
- In bored locks, a Guardbolt is also known as a Deadlocking Latchbolt or Deadlatch, referring to the whole latchbolt assembly, which is the term adopted by BHMA.
- The above features can perform other functions depending on lockset, but the above descriptions are the most common.

## Basic Security Features (Mortise and Bored Auxiliary Deadlocks)

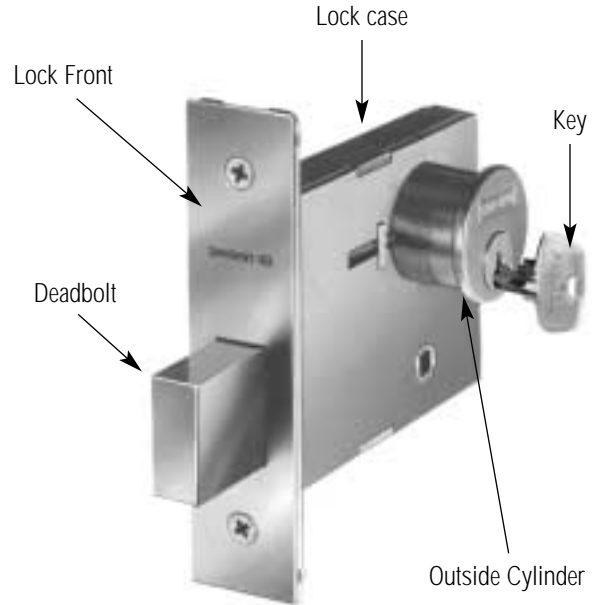
### Auxiliary Mortise Deadlock



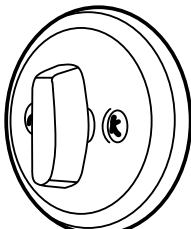
Inside Turnpiece Assembly



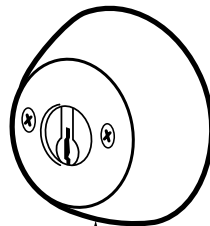
Inside Cylinder



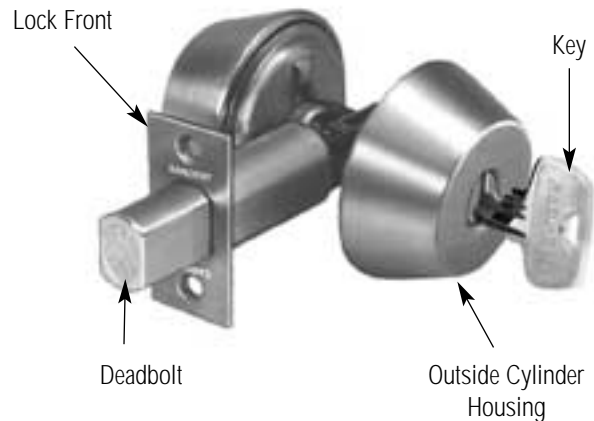
### Auxiliary Bored Deadlock



Inside Turnpiece Assembly



Inside Cylinder Housing Assembly



An **Auxiliary Mortise** or **Bored Deadlock** may be the only lock installed in a door, but is usually used on a door in which the primary lock has only a spring-loaded latch bolt and more security is desired.

The **Deadbolts** in the above locks project 1 inch.

Hardened steel inserts prevent deadbolts from being sawed off to gain entry.

**Cylinders** may be used on both sides of the door when security on both sides is desired.

To remove the cylinder or cylinders from an auxiliary mortise deadlock, the outside front must first be removed in order to gain access to the screws retaining the keyed cylinder. This, of course, requires the door to be opened first.

In the double cylinder auxiliary bored deadlock, the screws retaining the keyed cylinders cannot be removed until the inside cylinder key is inserted and partly rotated.

## Door Lock Trim

Door lock trim is a term used with reference to the part of the lockset that is applied to the surface of the door.

### Notes:

- There are many designs available and will vary depending on lock type and lock series.

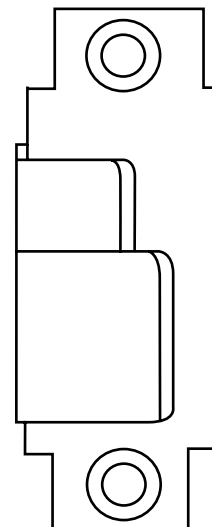
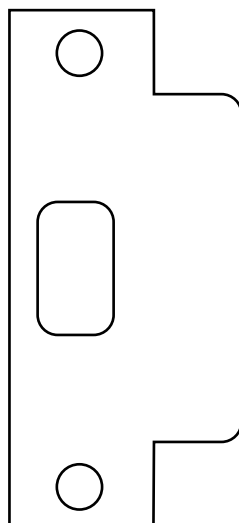
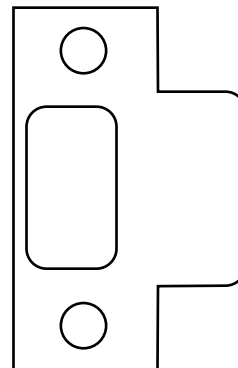
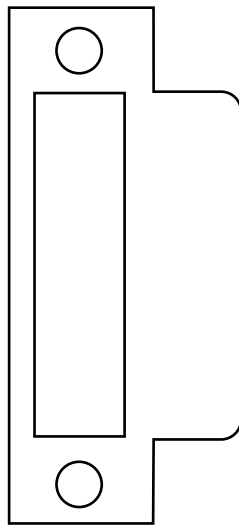
## Typical Door Lock Trim



## Strikes

A door strike is mounted to the door frame or to the inactive leaf of a pair of doors. The latchbolt slides into the strike hole locking the door. There are various shapes and sizes of strikes depending on application requirements.

### Typical Strikes



## Some Abbreviations Used in the Builders Hardware Field

### 1. Associations Involved in Building Codes

NFPA - National Fire Protection Association

UBC - Uniform Building Code

BOCA - Building Officials and Code Administrators

SBCC - Southern Building Code Conference

### 2. Testing Laboratories – (Door and Hardware field)

UL - Underwriters Laboratories

ULC - Underwriters Laboratories of Canada

WHI - Wernock Hersey, Inc.

### 3. Doors and Hardware Association

DHI - Door and Hardware Institute

AHC - Architectural Hardware Consultant

### 4. Miscellaneous

ADA - Americans with Disabilities Act

# **SARGENT®**

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SARGENT® Manufacturing Company is an ASSA ABLOY Group company. Founded in 1864, SARGENT® is a market leader in locksets, cylinders, door closers, exit devices, electro-mechanical products, and access control systems for new construction, renovation, and replacement applications. The company's customer base includes commercial construction, institutional and industrial markets.

The ASSA ABLOY Group is the world's leading manufacturer and supplier of locks and associated products, dedicated to satisfying end-user needs for security, safety and convenience.