

SCHLAGE

High Security Cylinders & Key Control



What is PRIMUS®?

Primus is a patented sidebar cylinder and key designed for key control, pick resistance and attack resistance. Primus is Schlage's highest security cylinder and is available in two families of keyways. Classic and Everest®. Throughout this article, Primus cylinders with Classic keyways will be referred to as Classic Primus; Primus cylinders with Everest keyways will be referred to as Everest Primus.

Schlage's Complete Keyway Families

Schlage now offers two separate groups of keyway families, Classic and Everest. This article covers only Schlage High Security Cylinders, which are Classic Primus and Everest Primus.

Primus Advantages

Schlage Compatibility & Flexibility

Classic Primus cylinders can be incorporated into most existing Classic key systems. Everest Primus cylinders can be incorporated into any Everest key system. Primus systems are more economical than most other high security cylinders because you don't have to install Primus cylinders on every door.

For Existing Systems

You can have *Conventional* cylinders in most locks, *Classic Primus Controlled Access* cylinders in the areas where positive key control and pick resistance are required, and *Classic Primus UL Listed High Security Cylinders* where you need resistance to drilling and other physical attack.

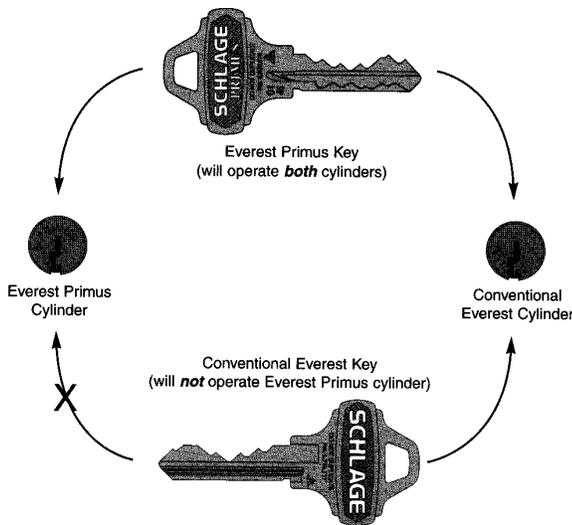
All three types of cylinders can coexist in the same master key system with no adverse effects on the system's expansion.

For New Systems

You can install either *Everest Open* or *Everest Restricted* cylinders in most locks, *Everest Primus Controlled Access* cylinders in the areas where positive key control and pick resistance are required, and *Everest Primus UL Listed High Security Cylinders* where you need the highest key control and resistance to drilling or other physical attack.

All three types of Everest cylinders can coexist in the same master key system with no adverse effects on the system's expansion.

This chart shows the flexibility of the Everest systems.



Conversion Cylinders

Primus cylinders are available to retrofit most popular commercial locks by Corbin/Russwin, Sargent and Yale. This means you don't have to buy all new hardware to convert to a Schlage Classic Primus or Everest Primus key system.

Easy Serviceability

Most servicing is done with a standard Schlage pin kit. The patented side biting is cut into the key blanks at the factory. If you are authorized to have access to key blanks, you don't have to invest in any specialized machinery to cut the, Classic Primus and Everest Primus keys.

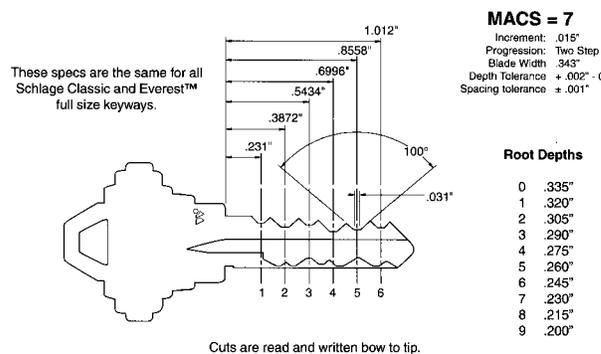
Choose your Security Door by Door

Primus cylinders are available for many different types of locks. All Schlage high security cylinders offer patented key control with geographical exclusivity. They all offer a high degree of pick resistance. Where physical attack is a concern, the UL Listed high security cylinder adds hardened steel pins to protect against drilling.

Install a Schlage key system knowing you can add Classic Primus or Everest Primus cylinders at any time in the future without disturbing the structure of your master key system.

The full line of cylinders is too extensive to list in this technical article. Consult your supplier or the current Schlage *Price Book* for specific product offering.

Key Bitting and Pin Specifications



Classic Primus and Everest Primus Differences

Despite the fact that both Classic Primus and Everest Primus contain the same mechanical parts and operate the same way, there are quite a few differences between the products.

The chart below outlines many of the differences between Classic Primus and Everest Primus.

	Classic Primus	Everest Primus
Keys and Key Bows	 <ul style="list-style-type: none"> The word "Primus" is stamped on the back of the key bow. Standard key is embossed on both sides. Available embossed on only one side. Same shape as Classic keys with limited stamping space. 	 <ul style="list-style-type: none"> The word "Primus" is stamped on the front of the key bow. Standard key is embossed on one side. Plain bow available. Key is 20% bigger than Classic Primus keys with a larger stamping area on key bow.
U.S. Patents	U.S. 4,756,177 and 4,815,307	4,756,177, 4,815,307, 5,715,717, 5,809,816, D428,324 and D426,452
Patent Protected Through	2007	2014
Compatible With	Most existing Classic keyways. Classic Primus cylinders can be integrated into most existing 6-pin Schlage key systems. Classic Primus keys can operate most Classic cylinders.	Everest Open and Everest Restricted full size cylinder keyways. Everest Primus keys can operate other Everest cylinders.
Ideal for	Existing key systems that have Classic keyways.	New key systems where Everest keyways will be used.
ID Numbers	Locksmith ID numbers are stamped on all Level 1+ keys.	ID numbers are stamped on every key for every level.
Key Sections Stamping	Optional	Standard. Key sections stamped on all keys and plugs.
Master Keying	Master keying is available for Level 2, 3, and 4 keying systems.	Master keying is available for all sections and all Levels.
(Nominal) Key Thickness	.092"	.106"

Levels at a Glance

Levels of Key Control

Stopping unauthorized key duplication is the main feature of all Primus cylinders, but what constitutes *Authorized* duplication? There are many different answers to this question.

No single key control policy can satisfy everyone's security needs. End users, locksmiths and contract hardware dealers have different levels of key control for Classic Primus and Everest Primus.

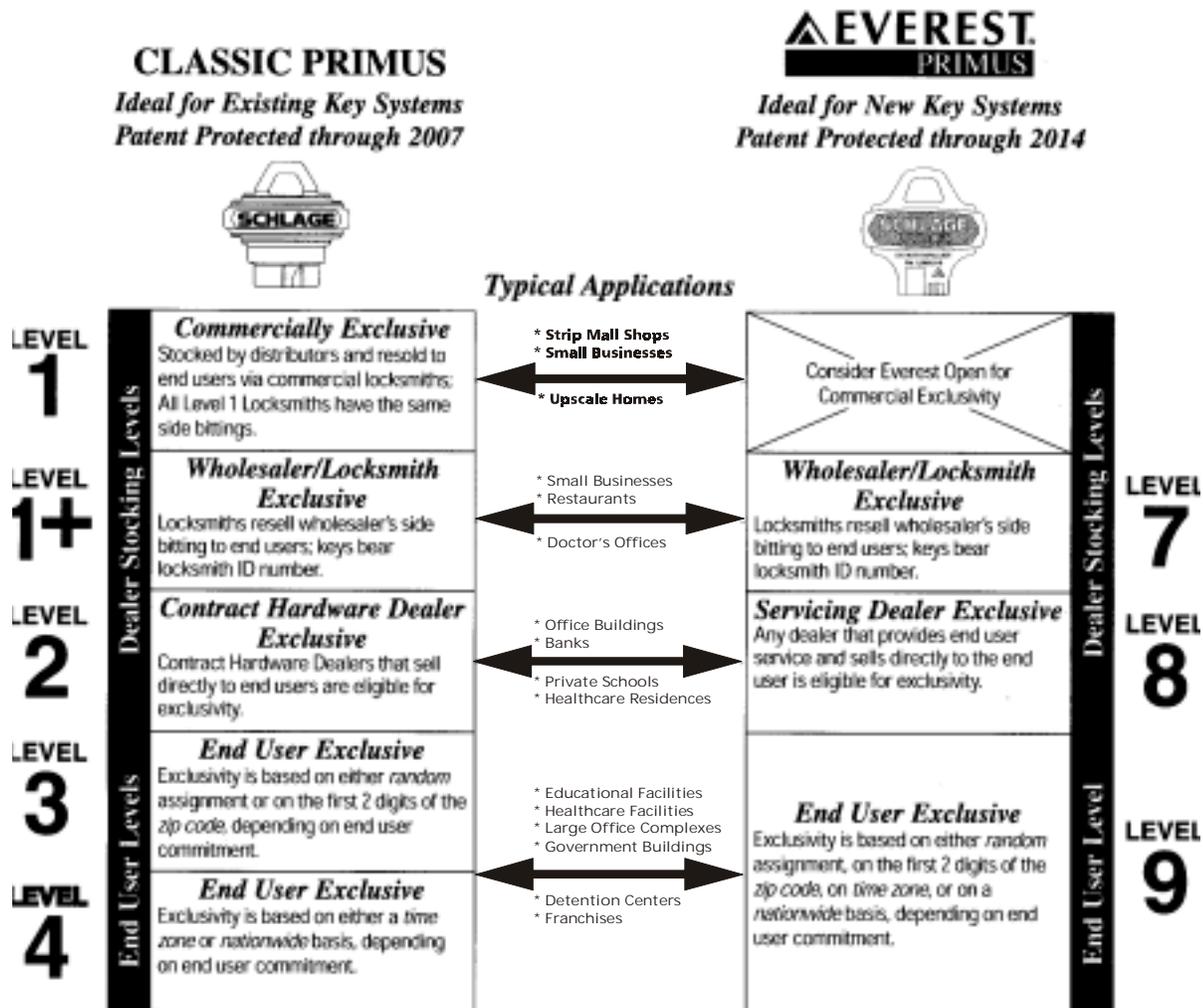
Geographical Exclusivity

Another need filled by Primus cylinders is geographical exclusivity of its key systems. *"I don't want anyone else in my area to have key blanks that could be used to make my keys."*

The patented milling of the side biting on every key blank is done at the Schlage factory. There are 7,776 different side biting possibilities per keyway. In conjunction with its key control levels, Schlage assigns these combinations to provide regional or even nationwide exclusivity to its end users, locksmiths and dealers.

Classic Primus and Everest Primus cylinders have similar Levels and Level

restrictions. The chart below is a quick overview.



Terminology

Classic

Schlage pin tumbler keyways, which existed before Everest keyways. Obverse is the name of the open family of keyways (C, E, etc.) and there are three other families of restricted keyways: Reverse, Numbered, and Quad.

Conventional cylinders

Standard cylinders. Cylinders, which incorporate a series of locking, top pins.

Everest

Cylinders and keys which incorporate all new keyways with the patented undercut groove on the right side of the key section. C Family is the name of the open family of keyways. B Family (for SFIC) and D Family keyways are restricted.

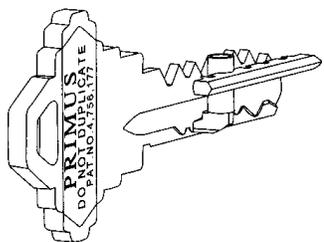
Full Size

Pertaining to cylinders (including interchangeable cores), keys, and keyways based on the industry standard plug diameter of about 1/2". All Schlage cylinders except SFIC are full size.

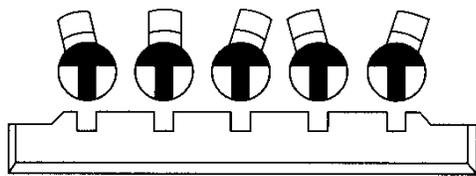
The Primus cylinder begins with a conventional Schlage 6-pin mechanism using the same pin kit and key bitting specifications as all other Schlage full size cylinders. If you're already equipped to cut conventional Schlage keys and pin conventional cylinders, you don't generally need any specialized tools or equipment to service Primus cylinders.

To the basic 6-pin mechanism, Primus adds a sidebar and five special L-shaped pins called *finger pins*, each with its own spring. The cylinder shell has a groove for the side bar to lock into.

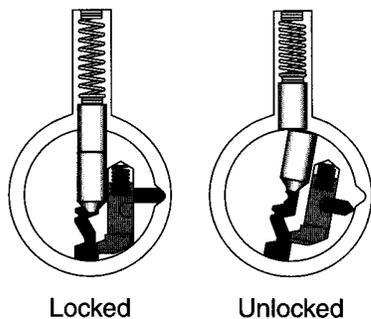
The Primus key has a secondary bitting on the side of the blade. Each of these cuts not only lifts its finger pin, but also swivels it to one of three angles within its pin chamber.



The correct side bitting raises and swivels each pin to a position where its gate or opening aligns with the fence or protrusion within the side bar.

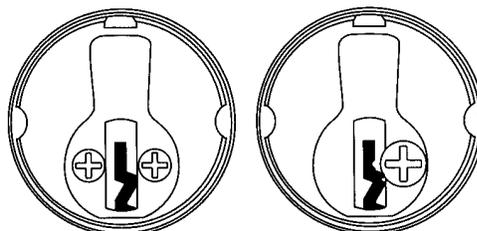


When all gates are aligned with the sidebar and the six regular cuts align the regular pins at the shear line, the plug is free to rotate.



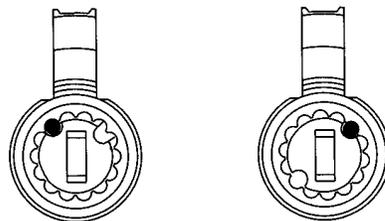
Construction and Operating Principles Cam and Tailpiece differences

The location of the sidebar and finger pins on the right side of the plug is compatible with Schlage's original location for the cap pin and spring, as well as one of the cam screws for mortise cylinders. The cap pin and spring are found in rim cylinders and key-in-knob/lever cylinders, as well as B Series deadbolt cylinders.



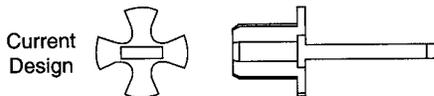
Conventional Classic

Primus & Everest



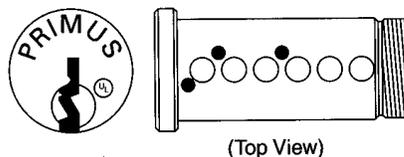
Current Design

Pre-1992



Current Design

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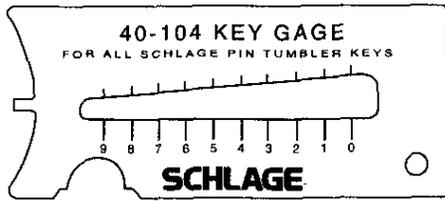


(Top View)

Reading Keys

Standard Cuts

Schlage key gauge 40-104 is used to read the 6-digit conventional combination or bitting of Schlage keys.



The bitting is read from the bow toward the tip of the key, and must always have exactly six digits. Insert the key into wide area of the slot in the gauge. Hold it so the first cut (notch) is in position and slide it toward the narrow end of the slot. The key should stop right on one of the numbers.

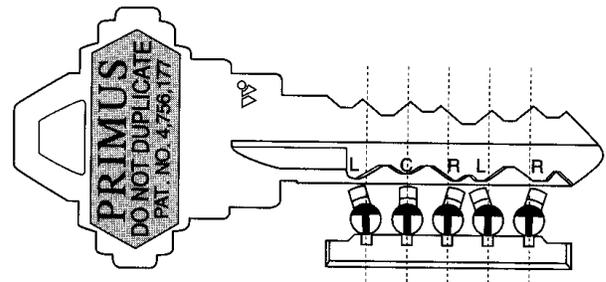
Side Cuts

For most Primus cylinder's servicing you won't have to read keys or change any finger pins in the cylinders because everything you work on will have the same side bitting.

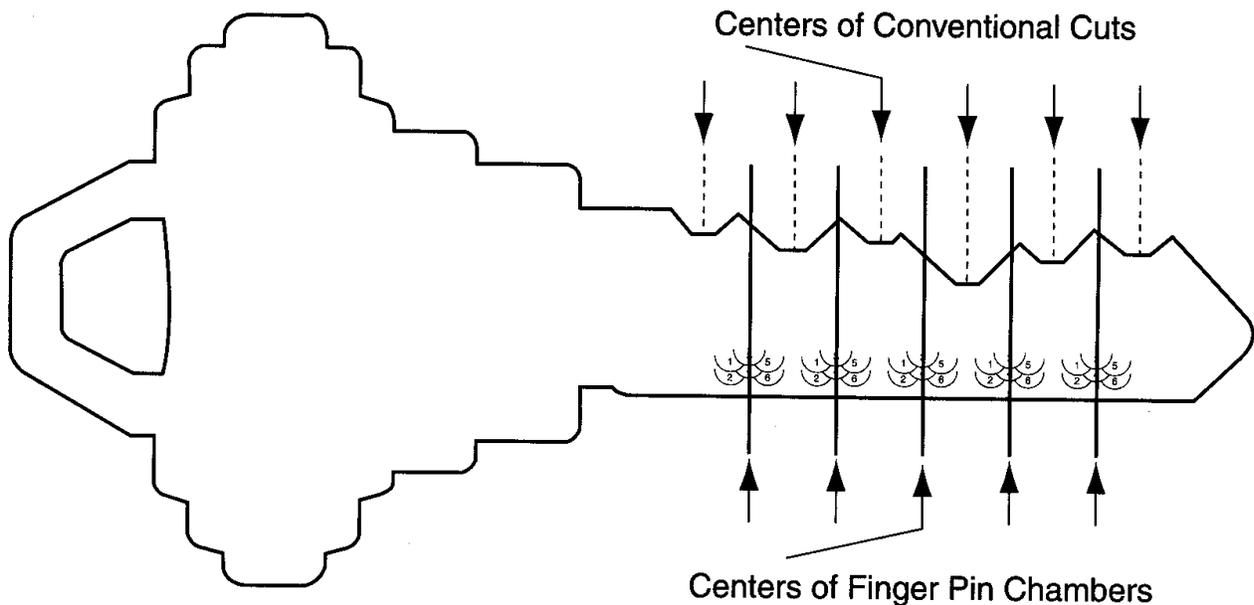
For commercial locksmiths, however, it is helpful to be able to read side bittings in case you need to communicate with the Schlage factory about other key systems you may be called upon to service.

To introduce key readings we will begin with the basic interaction of the key, finger pins and side bar.

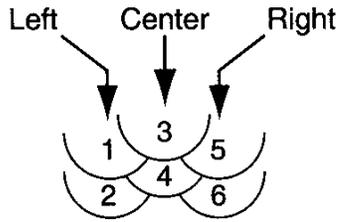
In addition to raising the finger pins to the right height, the root of each side cut swivels the tip of the L-shaped finger pin to one of three angular positions relative to the center line of the finger pin. This aligns the finger pin gates with the side bar.



The first step in reading the side bitting is to visualize the center line reference for each side cut exactly between the conventional cuts. This makes it easier to read a cut key than a key blank.



Here are those six possible cut root positions enlarged for a better view. There are three angles.



LEFT

toward the bow of the key

CENTER

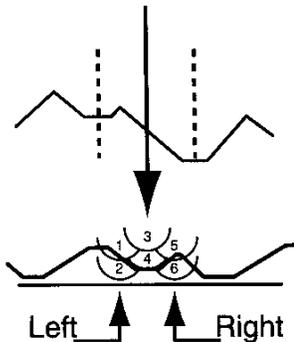
centered *between* conventional cuts

RIGHT

toward the tip of the key

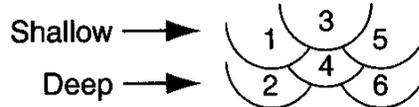
When reading a side biting, be sure you picture an imaginary center line between the *roots* of the conventional cuts. Do not focus on the steeples between cuts because their positions vary with the relative depths of the neighboring cuts.

Centered Between
Conventional Cut Roots



If you have a Primus plug of the right keyway, you can use it as an aid to key reading. With the key inserted into the empty plug, look into the finger pin chambers and you will be able to see very easily whether the cut is left, right or center for each position.

Each of these angles, in turn, has two possible depths: deep or shallow. The increment is a large enough to read by eye.

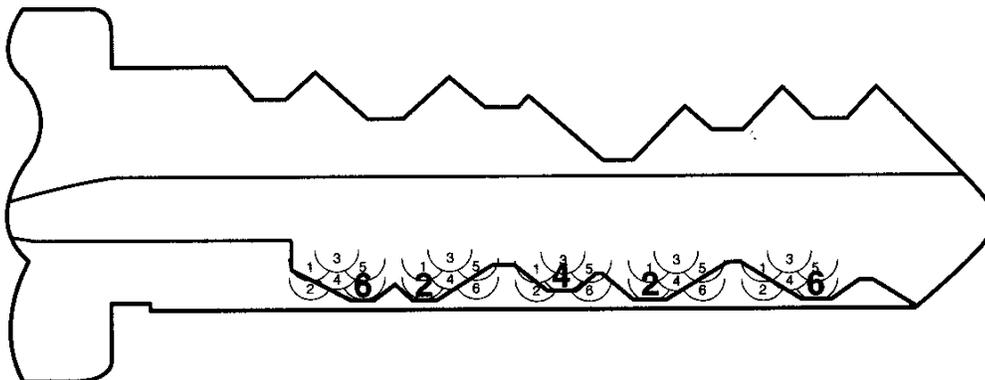


Note that the two center cuts are a half a depth shallower than their left and right counterparts.

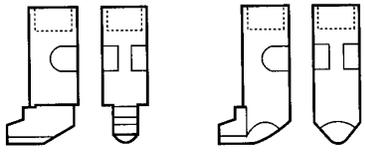
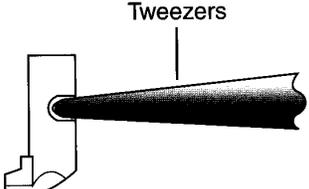
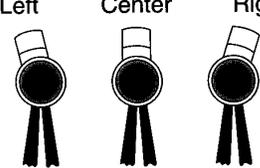
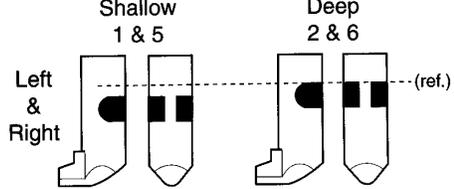
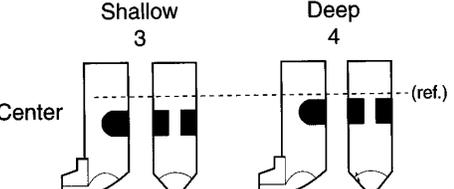
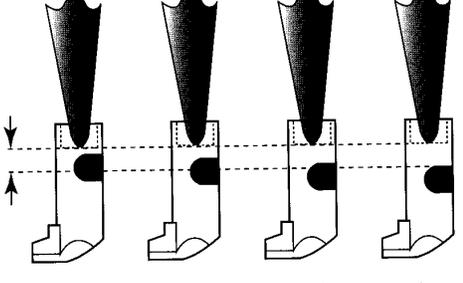
Even numbers designate the deep cuts and odd numbers designate the shallow cuts, as follows:

	Left	Center	Right
Shallow	1	3	5
Deep	2	4	6

Go through this analysis for each cut until you have determined all five digits of the side biting.



Reading Finger Pins

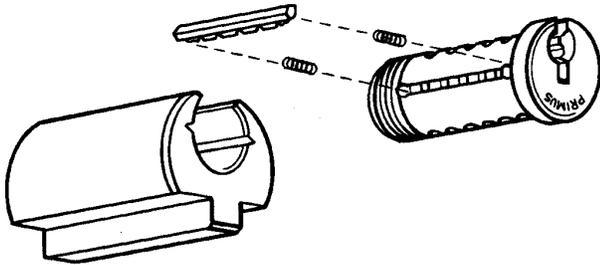
<p>Learning to read pins is useful if you spill your pin kit or you suspect that some of the pins are mixed within a compartment.</p> <p>You may notice a difference in the shape of the bottom of the finger pins. The design was changed in 1998. The difference doesn't affect the functionality or the technique for reading pins.</p>	 <p style="text-align: center;">Old Style New Style</p>												
<p>Step1: Determine the Angle For best results, use tweezers with a point small enough to fit inside the gate and grasp it by the web.</p>	 <p style="text-align: center;">Tweezers</p>												
<p>With the pin held in this way, pretend it is a boot and hold it with the toe pointing away from you, as if you were going to put it on.</p> <p>In this position, you should notice that the direction the toe points is the angle of the pin.</p>	 <p style="text-align: center;">Left Center Right</p>												
<p>Step 2: Determine the Depth For each angle, there are two depths: deep and shallow. The closer the gate is to the top of the pin, the deeper the cut. The closer the gate is to the bottom of the pin, the shallower the cut. The difference is large enough to read by eye.</p> <p>Note: The gates on center pins will be half an increment closer to the bottom of the pin because center cuts are shallower than their left and right angle cousins.</p>	 <p style="text-align: center;">Shallow Deep 1 & 5 2 & 6</p> <p>Left & Right (ref.)</p>												
<p>Step3: Convert Angle and Depth to Numbers Even numbers designate the deep cuts and odd numbers designate the shallow cuts, as follows:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Left</th> <th>Center</th> <th>Right</th> </tr> </thead> <tbody> <tr> <td>Shallow</td> <td>1</td> <td>3</td> <td>5</td> </tr> <tr> <td>Deep</td> <td>2</td> <td>4</td> <td>6</td> </tr> </tbody> </table>		Left	Center	Right	Shallow	1	3	5	Deep	2	4	6	 <p style="text-align: center;">Shallow Deep 3 4</p> <p>Center (ref.)</p>
	Left	Center	Right										
Shallow	1	3	5										
Deep	2	4	6										
<p>Another way to read the pins is to use the spring cup at the top of the pin to stop the point of your tweezers. Notice that the distance between the tip of the tweezers and the top of the gate increases as the cut on the key gets shallower.</p>	 <p style="text-align: center;">2 & 6 4 1 & 5 3</p>												



Keying Procedures

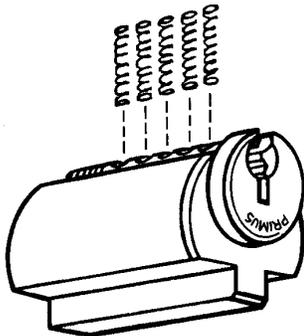
1

- Insert sidebar springs and sidebar into slot.
- Slide plug into Schlage 40-066 plug holder UPSIDE DOWN with sidebar extending into groove in plug holder cavity.



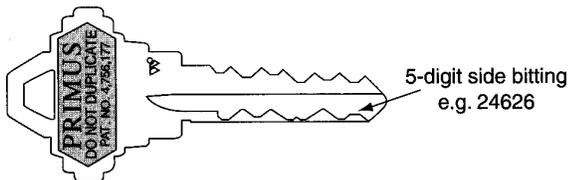
2

Insert a finger pin spring into each of the five pin chambers.



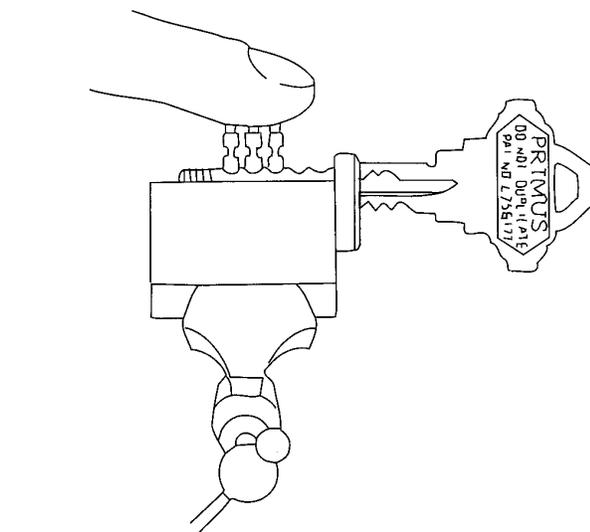
3

Determine correct 5-digit side biting in order to select proper finger pins from kit.



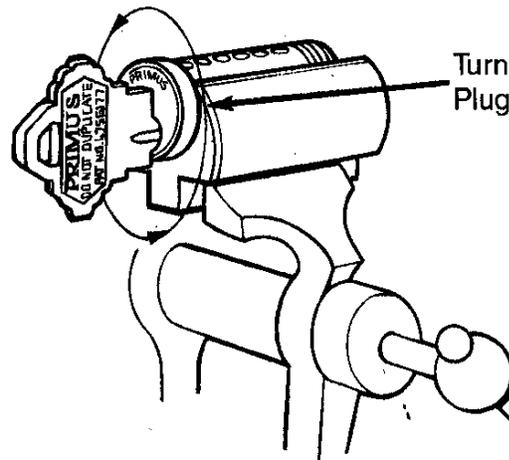
4

- Install finger pins one at a time from front to back.
- Push key into plug to hold the pins in place. (Maintain light pressure on finger pins while inserting key.)

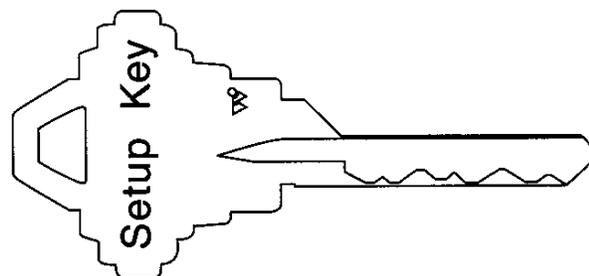


5

With all finger pins installed and key fully inserted, turn plug 180° to expose pin chambers on top. If plug does not turn, one or more finger pins are wrong.

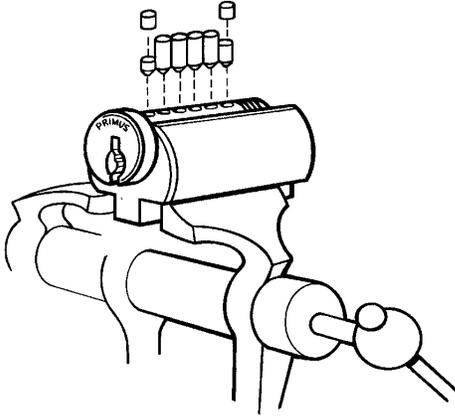


If master keying, use a setup key cut to all #9 depths for this procedure in order to make room for any possible combination of bottom pins and master pins.



6

- a. Install all six bottom pins and any master pins required.
- b. Add a very small pinch of dry graphite to each pin chamber.

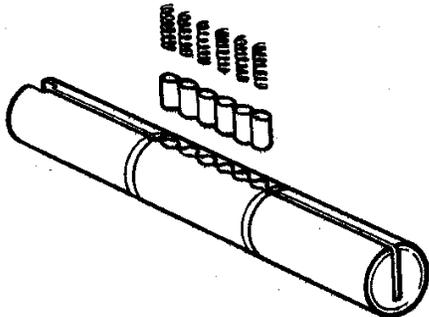


7

Load Cylinder Shell

(Illustrated using Schlage 40116 loading tool and key-in-knob/lever cylinder.)

- a. Select the proper length of the top pin for each chamber.
- b. Load top pins and springs onto cylinder shell.



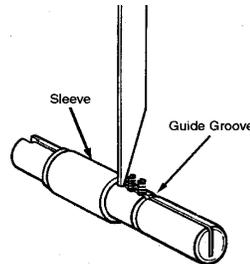
Top Pin Selection

The top pin size is determined by the total of the bottom pin and master pin in its chamber, as illustrated in this table:

	Plug Total	Pin	Length
	0,1,2,3	1	.235
	4,5,6	2	.200
	7,8,9	3	.165

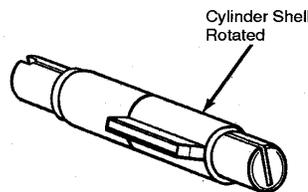
8

Depress springs with knife tip and slide sleeve along tool to hold all springs in place.



9

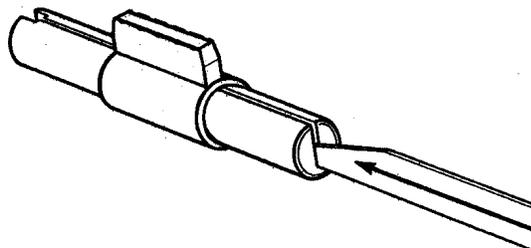
- a. Slide cylinder shell onto loading tool oriented so its pin chambers are turned slightly (about 15") away from chambers in shell.
- b. Keep end of sleeve in contact with end of shell during this process to avoid losing springs through a gap.
- c. Stop when the end of the shell aligns with the guide groove.
- d. Remove sleeve.



10

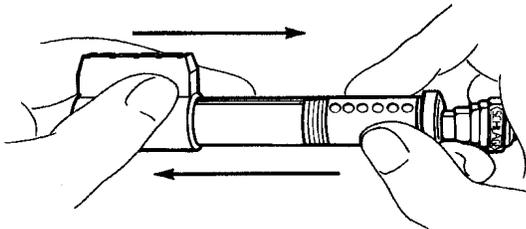
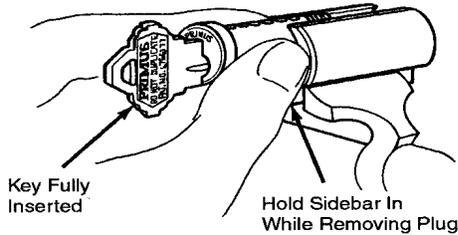
Caution: If knife does not enter smoothly, chambers are not aligned and you may damage springs.

- a. Rotate shell to align chambers in loading tool with chambers in shell. At this point, part of each spring will extend from the tool into the shell.
- b. Gently push pins and springs completely into shell with shove knife.



11

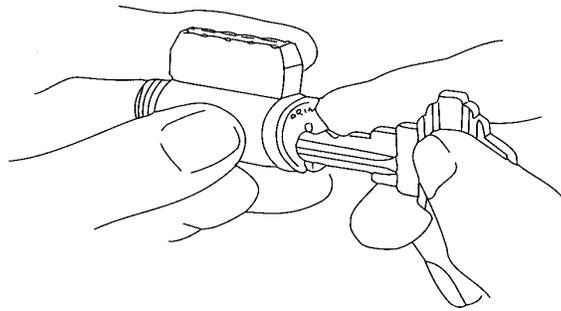
- a. Remove plug from plug holder with key still in place. Maintain pressure on sidebar as plug comes out.
- b. **With plug rotated slightly** with respect to shell, slide it into shell.
- c. When combining mortise cylinders, use opposite end of loading tool.



12

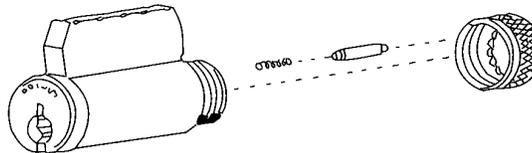
- a. Rotate key and plug to align bottom and top pins.
- b. Maintain finger pressure on plug face and carefully remove key, beginning

with a pinching motion. **Do not allow plug to come out of shell!**



13

- a. Complete cylinder assembly with cap pin spring cap pin, tailpiece and cap.
- b. Test keys for smooth operation.
- c. If key does not come out, cap may need to be tighter, If plug turns tightly, loosen cap slightly.



Key-in-knob/lever cylinder illustrated. For mortise cylinders, install cam and cam screws.