

# CAL-ROYAL

P R O D U C T S, I N C.

## HSK

### HIGH SECURITY KEY SYSTEM

## High Security Cylinder - Service Manual

#### Mortise / Rim / Key in Knob / Lever Cylinders



#### Large Format and Small Format Interchangeable Core Cylinders





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# High Security Cylinder Program Levels

### Level 1

The “A” Standard keying and “1A” Small Format Interchangeable Core are open locksmith Keyway \*\*\* *See Authorization Card Below*

### Level 2

The Locksmith Service Center program assigns specific Keyways by geographical areas with care to not overlap keyways between Service Areas. Key Duplication is controlled at the Service Center by Authorized personnel and Registered Card Program. \*\*\* See Authorization Card Below

### Level 3

- A. The Contract Hardware House Program sells Cylinders and locks under 2 programs
  - 1.) In conjunction with authorized Locksmith Center. Here the Contract Hardware supplier will have a working agreement with a Locksmith Service Center to maintain a specific job and cut keys for the Authorized Point of Contact.
  - 2.) Government Contract Job or Factory Only Systems. On government Contract jobs the keyway will be set by the factory and blanks will be maintained by the end user and only released for cutting or rekey purposes by the Authorized individual to their locksmith or Locksmith Service Center.
  - 3.) Factory ONLY jobs will require that all keys be cut and supplied directly the end user by authorized end user agreement.

- B. Distributor Program

This program is for the Distributor who sells to large institutions who employ their own locksmiths and who need the added level of security of a special key way restriction. The Distributor may sell blanks to their end user for specific jobs or may control the duplication at their facility based on contractual agreement.

### Level 4

Factory ONLY jobs will require that all keys be cut and supplied directly the end user by authorized end user agreement. Any normal Cal-Royal Authorized individual may sell this type of job. However ONLY the Factory will be authorized to supply CUT KEYS and the keys will be sent directly the end user ONLY sent directly to the Authorized agent at the End User Facility.

**Authorization Card** – Each Cylinder Combination comes with an Authorization Card. For Master Key Systems Job Specific Cards will be Issued from the Factory for the Job. For End User Projects the Authorization Cards will be Issued from the Factory and will be required to be validated prior to cutting and transmission of Keys.

## Product Information

### Key Blank Information

#### Standard Full Size Key Blanks

KBL-5 -( Keyway)

KBL-6 -( Keyway)



When Ordering Full Size Key Blanks add Keyway Designator i.e. KBL-6 –A

#### Large Format Interchangeable Core Control Keys

KCK6-(Keyway)




When Ordering Large Format Interchangeable Control Keys order KBLK-6-A

### Key Cutting Technical Key Data

*See APPENDIX A, A-1, B*

#### Pin information

Full Size Cylinders use Schlage standard Pins and Pinning information.

Bottom Pins	Master Pins	Side Pins	SIDEBARSPRING
0-.165	2-.030	SPIN1 	
1-.180	3-.045		
2-.195	4-.060		
3-.210	5-.075	SPIN2 	
4-.225	6-.090		
5-.240	7-.105		
6-.255	8-.120	SPIN3 	SIDEBAR-1
7-.270	9-.135		
8-.285		SPIN4 	
9-.300			

## Side Bars, Side Pins, Stainless Bottom Pin Specifications

### ***Standard Cylinders***

#### Side Bar for Large Format Cylinders

Product Number is Side Bar-1.

The Side Bar is actuated through the movement of the Side Pins along the side pin track on the key blank. When the side pins align with the proper track the side bar will be allowed to retract into the cylinder plug and the cylinder will operate provided the key is cut to the proper combination for the cylinder.

The Side Bar is the same for all Large Format Cylinders. Side Bar springs push the side bar into the cylinder shell when the plug is not rotated.

#### Side Pins

There are five side pins in the large format cylinder. There are four configurations of side pin for the Large Format cylinder numbered SPIN1 through SPIN4. Each Side pin has a Side Bar Groove cut at a specific position on the pin to allow the side bar to retract into the cylinder plug when properly aligned in the side bar track on the key blank.

#### Anti drill features

Each cylinder contains 2 anti-drill pins for those with concerns about a drill out attack.

UL 437 Cylinders contain 9 anti-drill pins.

#### Anti-Pick Features

The cylinder side bar substantially reduces the ability to pick the High Security Cylinder, combined with the cylinder pins aligning 11 separate pins at two different shear points provides what we believe to be one of the finest pick and bump resistant cylinders on the market. (5 side pins must align to the side bar at the same time that the 5 or 6 cylinder pins align at the plug shear line.)

#### Stainless Steel Pins for UL Cylinders



The Stainless Pins for our UL High Security Cylinder consist of 10 Bottom Pins numbered 0 through 9 and our Mushroom Top Pin and our Stainless Allen Set screw for securing each pin chamber.

The Pins are numbered as Follows:

##### UL Bottom Pins

0 - SSBPIN0	5 - SSBPIN5
1 - SSBPIN1	6 - SSBPIN6
2 - SSBPIN2	7 - SSBPIN7
3 - SSBPIN3	8 - SSBPIN8
4 - SSBPIN4	9 - SSBPIN9

##### UL Special Pins

ULMSHRMTPIN (UL-Mushroom top pin)	
ALLNSCRW-SS (SS Allen screw)	

## Standard Cylinder Information

# Standard Cylinder Information

## Technical Design Information

High Security Cylinders are available in 6 pin Mortise / Rim, Key in Knob / Lever, Deadbolt and Large Format Interchangeable Cores. High Security Cylinders are also available in 5 pin Key in Knob / Lever, Deadbolt cylinders.

High Security Cylinders incorporate a Side Bar, Side Pins, and Side Bar springs. The side bar pins ride along the side bar track on the key blank. In each Standard Cylinder there are five side pins of varying lengths. There are four different side bar pin configurations. This allows for 1024 different side bar combinations available for each Keyway in the Standard Size Cylinder Program. Side bar combinations are assigned at Cal-Royal Products. When the side pins align with the correct side track the pins also align with the side bar and allow the plug to rotate freely. The slight click felt when rotating the plug is the side bar moving into the plug from the cylinder housing, this is normal.

Keying and Master Keying of Standard cylinders is done using conventional Schlage style pins and pinning. Pin Spacing, Depths and Cutting is identical to Schlage Cylinders.

*\*\*\*See chart in APPENDIX A-1*

## Components

Each Key in Knob / Lever cylinder comes with all of our tailpieces provided.



Mortise / Rim Cylinders are provided with a Rim Tailpiece, mounting screws and mounting plate for Rim Function they come assembled with an Adams Rite mortise cam.



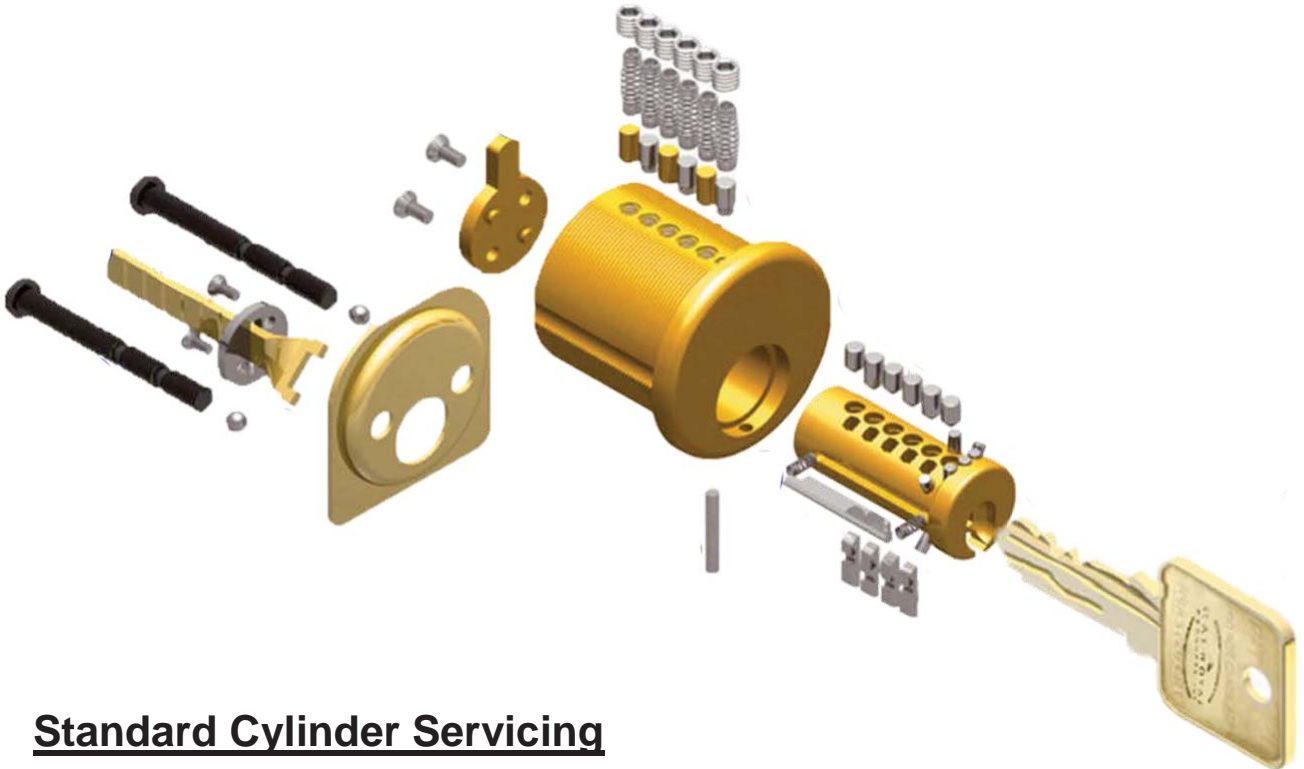


## Standard Cylinder Information

Design requirements necessitate the use of special Cams with Mortise Cylinders. Cams available from Cal-Royal Products are shown below are available by cam or in our cam kits sets. \*\*\* See Tools and Service Kit Section



UL High Security Cylinders are 6 Pin ONLY and require the use of ten anti drill pins and the SSPIN allows us to comply with UL requirements. UL Cylinders include Mortise / Rim, Key in Knob / Lever and Deadbolt Cylinders and Large Format Interchangeable Cores.



## Standard Cylinder Servicing

There are two methods of Keying the High Security Cylinder one is to remove the plug and key using conventional methods.

When removing Plug from Cylinder housing Hold Side Bar in the Plug. Keep pressure on the side bar at all times unless removing the side pins.

Insert plug into pinning block to prevent side bar from releasing the side pins from the plug.

## Standard Cylinder Information

Pin Cylinder and replace in to Cylinder Housing.

Check key / keys for correct function and replace Tail Piece or cam as required.

When replacing the side pins for Side Bar profile change:

1. Remove plug from housing.
2. Remove the key from the plug while holding the side bar loosely.
3. Remove side bar and side bar springs side pins will drop out of the plug at this point
4. Insert new side bar pins
5. Replace side bar springs and side bar.
6. Place plug in pinning block and pin as required.
  - a. Make sure that the top pin is correct length for stack of bottom pin and master pin. Stack equals Bottom Pin plus Master Pin added together.
  - b. The proper stack by top pin follows:  
0-3 Bottom Stack # 1 Top Pin  
4-6 Bottom Stack # 2 Top Pin  
7-9 Bottom Stack # 3 Top Pin
7. Re-install plug in cylinder housing and check keys for correct function.
8. Install tailpiece or cam as required.
9. Lubricate with dry black graphite. (Small Amount)

The Second method is to simply remove the Allen set screw capping each pin chamber. This method removes the need to deal with the side bar and side bar pins. The process is much simpler as follows:

1. Remove each set screw.
2. Remove existing springs and pins.
3. Install new pins and springs.
  - a. Make sure that the top pin is correct length for stack of bottom pin and master pin. Stack equals Bottom Pin plus Master Pin added together.
  - b. The proper stack by top pin follows:  
0-3 Bottom Stack # 1 Top Pin  
4-6 Bottom Stack # 2 Top Pin  
7-9 Bottom Stack # 3 Top Pin
4. Check function.
5. Replace set screws.
6. Check function and Lubricate with dry black graphite. (Small Amount)

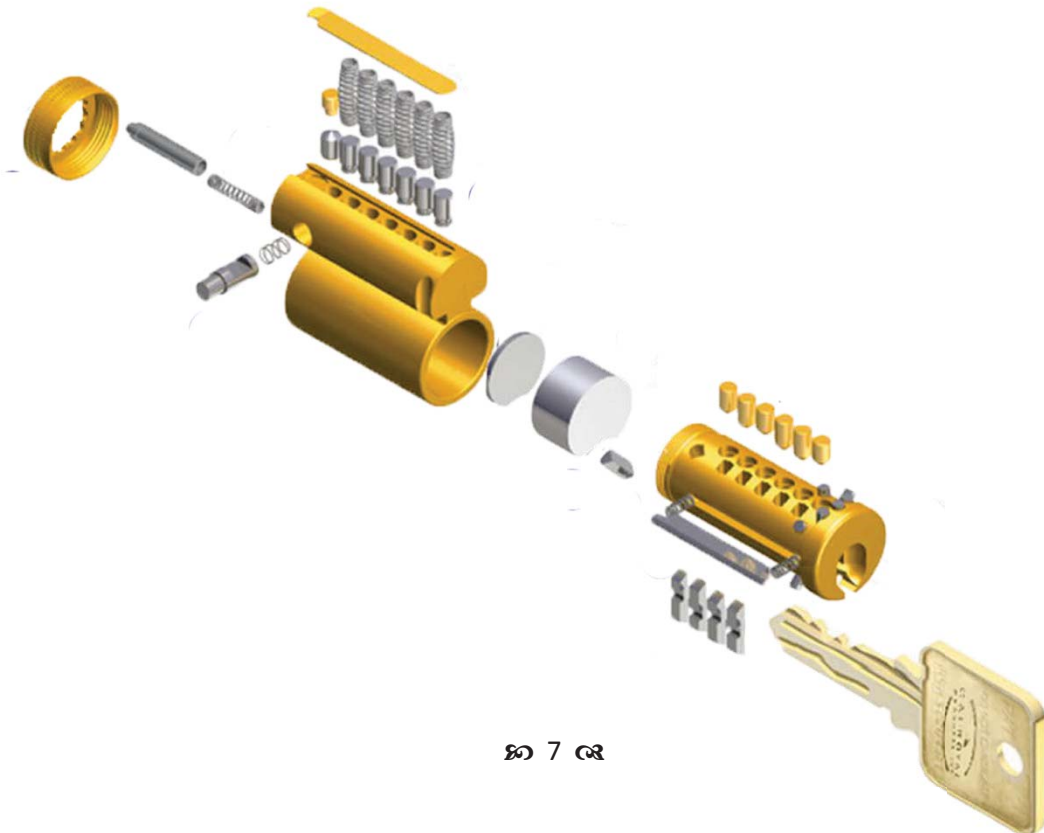
It is recommended that when rekeying cylinders all bottom pins be replaced each time as wear factor is relational to the position of the pin in the cylinder. The first pin wears at six times the rate of the last pin in the cylinder. On cylinders with 1000 key insertions and removals the first pin has 12,000 times the wear of the last pin. Conversely the key wears six to one tip to bow.

## Large Format Cylinder Information

### Large Format Interchangeable Core Cylinder Servicing

When Pinning the Cylinder:

1. Remove Cylinder Cap by depressing the retainer pin and unscrewing the cap.
2. Insert key and remove plug. When removing Plug from Cylinder housing Hold Side Bar in the Plug. Keep pressure on the side bar at all times unless removing the side pins. Insert plug into pinning block to prevent side bar from releasing the side pins from the plug. Pin Cylinder and replace in to Cylinder Housing. If cylinder had been previously pinned make sure the master pin left in the core housing are removed.
3. Remove existing Pins from plug.
4. Remove existing Top Pins and Springs.
5. Pin Plug using appropriate Bottom and Master Pins.
6. Install Top Springs and proper length Top Pins
  - a. Make sure that the top pin is correct length for stack of bottom pin and master pin. Stack equals Bottom Pin plus Master Pin added together.
  - b. The proper stack by top pin follows:
    - 0-3 Bottom Stack # 1 Top Pin
    - 4-6 Bottom Stack # 2 Top Pin
    - 7-9 Bottom Stack # 3 Top Pin
7. Reinstall plug into Cylinder housing.  
(Use caution to hold side bar in place or side pins will drop out of plug)
8. Check function and that all keys work properly.
9. Re-install Cylinder Cap and check for smooth Operation.



## Large Format Cylinder Information

### Keying and Master Keying Full Size Cylinders

HSK Full Size cylinders pin using the same Key cuts and Pins as Standard Schlage Cylinders.

Keying and master Key Systems for practical applications are the same. To facilitate Master Keying systems we will provide some basic rules and reasons for selection of Master and Grand Master Key systems.

For selection of a Master Key (TOP) in any given system take into consideration the following rules.

RULE	REASON
1. Place no cut deeper than ½ the cut range in the first chamber.	1. The Top Key of a Master Key System is used extensively, with a deep cut in the first chamber keys will break often.
2. Make one cut of the Master Key a zero or a one cut.	2. This prevents a change from being altered into a Master key.
3. Make one cut an eight or a nine cut.	3. By having one cut deeper than any other, you prevent someone from making an impression of a Master Key under normal conditions.
4. Where possible place constants between progression numbers.	4. By having constants between Progression numbers, this will allow the most useable keys for the system.
5. Allow room for reasonable expansion, but keep in mind the more pins in the lock cylinder the more keys that will work the lock.	5. Reasonable expansion is the hardest item to judge, a good rule of thumb is four to five times the original job scope. <i>Always keep in mind, you know your customer best and their growth patterns.</i> Sometimes this is way too much and sometimes way too little.

## Large Format Cylinder Information

In setting up systems for Cal-Royal to key, we recommend the following format and use of standard key system nomenclature as specified below.

For a straight **Master Key System** use the following:

MK AA  
1AA  
2AA  
3AA, Etc...

For a **Grand MK System** use the following:

### AMK

AAMK	ABMK	ACMK	ADMK
AA-1 thru AA64	AB-1 thru AB 64	ACMK thru AC 64	AD 1 thru AD 64

For a **Great Grand MK System** use the following:

### GMK

AMK	BMK	CMK	DMK
AAMK AA1 – AA64	BAMK BA1 –BAA64	CAMK CA1 –CA64	DAMK DA1 –DA64
ABMK AB1 – AB64	BBMK BB1 –BB64	CBMK CB1 –CB64	DBMK DB1 –DB64
ACMK AC1-AC64	BCMK BC1 –BC64	CCMK CC1 –CC64	DCMK DC1 –DC64
ADMK AD1 – AD64	BDMK BD1 –BD64	CDMK CD1 –CD64	DDMK DD1 –DD64

See Attached Forms under *Master Keying Cylinders and Keying Systems Applications* section for Assistance in setting up key systems.

### \*\*\* Notes

*Special Note when keying cylinder plug for High – Low Master key you should cut a set-up key cut all “9”s. This will allow you to re-insert the plug back into the housing in the turned position. Pin the cylinder as normal insert the set-up key and insert the plug. (Without the set-up key the side bar will not retract, in order to install plug it would be necessary to place shim over pin chambers and install, then remove shim.*

## Small Format Interchangeable Cores

### Key Blank Information - Small Format Key Blank



When Ordering Small Format Key  
Blanks add I prior to Keyway  
Designator i.e. **KBLSF7-IA**

### Key Cutting Technical Key Data

\*\*\*See APPENDIX B

Small Format Interchangeable Cores offer a unique mix of speed for cylinder change out and with the added features of pick and bump resistance. The patented keyway and side bar in our Small Format Interchangeable Core provide the customer with a secure key control system at a reasonable per unit cost.

Keys are controlled under the High Security Cylinder Service contract program. As with full size high security cylinders our small format Interchangeable cores are sold under contract through authorized dealers.

The features of the small format Interchangeable core are much the same as full size cylinders. The side bar works in conjunction with side pins to provide anti-bump and pick features. There are four side pins each location having 3 side pin configurations giving us 81 possible side bar settings.

\*\*\* *Note* Cal-Royal only has seven pin SFIC.

The six pin core has side pins between 2,3,4,5 pins while the seven pin core has the side pins between the 3,4,5,6 pin locations of the plug. This has special factory authorized Master Key system uses that allow both six & seven pin system to overlap in specifically designed projects.

Cross over Key Control in the six versus seven pin Interchangeable core is achieved due to side pin locations:

The six pin core uses locations	2 3 4 5
The seven pin core uses locations	3 4 5 6

The six pin master key side bar pin cuts could be	1 1 1 2
The seven pin master key would be	1 1 2 3
The Grand master key working both six and seven pin cores would be	1 1 1 2 3

## Small Format Cylinder Information

This is a Factory authorized keying system ONLY. This application might be used where both six and seven cores exist in a multiple site project and one grand master is needed. Extreme caution is needed where this application is used not to cross over in the master key system.

### Side Bar for Small Format Interchangeable Core

Product Number is **SFICSIDEBAR**

The Side Bar is actuated through the movement of the Side Pins along the side pin track on the key blank. When the side pins align with the proper track the side bar will be allowed to retract into the cylinder plug and the cylinder will operate provided the key is cut to the proper combination for the cylinder.

The Side Bar for Small Format Interchangeable cores is different from the Large Format Cylinders, however there is only one side bar for all Small Format Cylinders.

### Side Pins

There are four side pins in the Small Format cylinder. There are three lengths of side pin for the Small Format cylinder numbered **SFICPIN1** through **SFICPIN3**. Each Side pin has a Side Bar Groove cut at a specific position on the pin to allow the side bar to retract into the cylinder plug when properly aligned in the side bar track on the key blank.

### Small Format Interchangeable Core

Small Format Interchangeable Core Cylinders use Best/Falcon Pins and Key Cutting Information.

### Pin Requirements for Keying

Bottom Pins	Master Pins	
0- .110	2- .025	12-.150
1- .1225	3- .0375	13-.1675
2- .135	4- .050	14- .175
3- .1475	5- .0625	15- .1875
4- .160	6- .075	16- .200
5- .1725	7- .0875	17- .2125
6- .185	8- .100	18- .225
7- .1975	9- .1125	19- .2375
8- .210	10- .125	
9- .2225	11- .1375	

Side Pins

SFICPIN1



SFICPIN2



SFICPIN3



SFICSBSPR



SFICSIDEBAR



SFICALLNSCRW

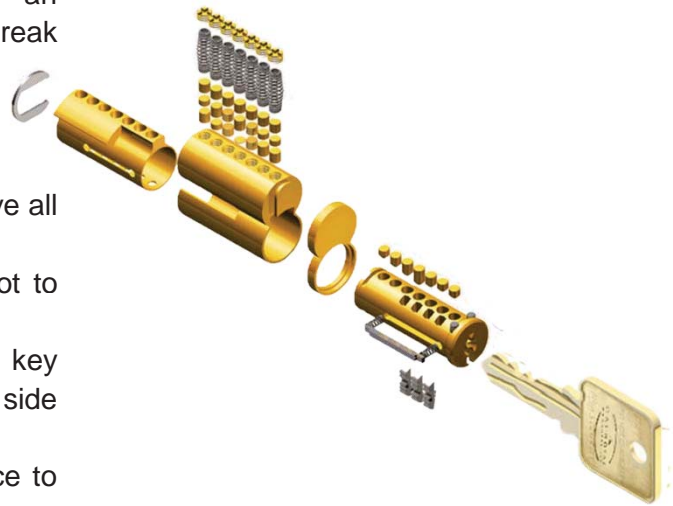




## Small Format Cylinder Information

### Servicing the Core

The core itself only needs to be disassembled when changing the side pins. Below an exploded view of the core shows a part break down.



To disassemble the core:

1. Remove the Allen set screws and remove all pins.
2. Remove Plug Snap Ring (be careful not to distort clip).
3. Remove Plug, as plug is removed the key must be inserted in the plug to hold the side pins in place or pins will fall out of plug.
4. Place Plug in Holding block key in place to keep side bar and side pins in place.
5. To replace side pins Remove side bar and key and side pins should fall out of the core.
  - a. Install new side pins, install side bar springs and side bar.
  - b. When installing side pins position the core with the side bar slot facing up.
  - c. insert the first side pin and check for correct alignment by inserting key.
  - d. repeat this procedure for each side pin.
  - e. install side bar springs and side bar. *\*\*\*\* Note installing the side Bar incorrectly will result in lock up of the core it will be scrap. The Side bar must be installed with the longest side facing away from the plug. This side is tapered to fit into the side bar groove in the core body.*
6. Replace plug into core and install snap ring.
7. Pinning the core is identical to keying Best / Falcon style Small Format Interchangeable cores.
8. Capping the individual pin chambers is different in that we use Allen set screws to secure each pin chamber. This removes the necessity to have a capping block or capping press to service the core.

### Small Format Core installation information

Our Mortise / Rim cylinder has one of the drive pins shorter than the other. This is due to the location of the side bar which requires additional space in the core. When using existing cylinders by others or changing from an existing system to the High Security cores you will have to cut down the left side drive pin in the cylinder housing. (Left side as you face the front of the cylinder) This can be accomplished by using our tool and a drill motor. We also have a *Shear Tool* for this same process. *\*\*\* See "Tools Needed" under Tools and Service Kits section or see APPENDIX C*

For installation of cores in Key-in-Knob / Lever sets we have the Tailpiece for 6 and 7 pin cores with the short drive pin on the left side.



## Small Format Cylinder Information

### **Cutting Keys for the HSK Small Format Interchangeable core**

The high security Small Format Interchangeable Core uses the same pins and cuts as any Best / Falcon Interchangeable Core. However the keys cannot be punched due to the keyway Configuration. Cutting can be accomplished using one of several machines, a Partial list follows

- |                      |                           |
|----------------------|---------------------------|
| 1. ITL 900           | 4. Framon Code Machine 2J |
| 2. Ilco Universal II | 5. HPC Code Max 1200      |
| 3. Ilco EZ code      | Etc.                      |

### **Pinning Requirements for Keying Small Format Interchangeable Cores**

This section is for the individual who has never keyed a small format interchangeable core. Keying Interchangeable cores is not as difficult as many make it out to be. There are however several considerations in the keying process:

1. Keys are cut tip to bow. This means the core pins back pin chamber to the front pin chamber. (The reason for this is simple and makes sense when understood, the shoulder of the key blank is at the tip at the bottom of the key)
2. The pin Stack in each chamber is a total of 23 increments.
  - a. This prevents the springs from being crushed.
  - b. Having a stack of less than 23 gives insufficient spring pressure to properly return all pins to their seated position.
3. The interchangeable works with two shear lines.
  - a. The control Key works at the Control shear line
  - b. Change and Master Keys work at the Plug shear line.
4. The Control Sleeve is ten increments thick.
  - a. This is a key factor in calculating the pins for each chamber.
  - b. Keep in mind that there are two shear lines in an interchangeable core.
5. Keying and Master Keying at the plug shear line is the same as any other cylinder.
6. Selection of a Control Key has two important factors when keying or master keying.
  - a. Where there is a 9 cut in the control key no 0 cut can be in any change key or master key.
  - b. When selecting a control key the process should be where there is an even cut in master key use an odd cut in control.
  - c. Where there is an odd cut use an even.
  - d. Repeat this process in all but one chamber keep that the same.

Example:	Master Key Cuts	5 9 8 1 0 1
	Control Key Cuts	4 3 5 8 3 4
		D S D D D D

D= Different S= Same

This prevents a change key from acting as a control key in large keying systems.

Writing a pinning chart and making the calculations for the control shear line to work the control key. There are two methods of calculating pins for the pinning of a small format

## Small Format Cylinder Information

Interchangeable core and three numbers that control the math. The control sleeve is 10 increments thick, the total stack of the pins in each chamber is 23 and the difference is 13. With this in mind we can start to do the math:

1. Step one enter the bottom pins in the chart.
2. Step two add ten (10) to the cut of the control key and subtract the cut of the bottom pin from this number to get the length of the control pin.

Example:

Pin Chamber 1	$4 + 10 = 14$	$14 - 5 = \underline{9}$
Pin Chamber 2	$8 + 10 = 18$	$18 - 4 = \underline{14}$
Pin Chamber 3	$6 + 10 = 16$	$16 - 9 = \underline{7}$
Pin Chamber 4	$1 + 10 = 11$	$11 - 3 = \underline{8}$
Pin Chamber 5	$3 + 10 = 13$	$13 - 4 = \underline{9}$
Pin Chamber 6	$5 + 10 = 15$	$15 - 2 = \underline{13}$

3. To calculate the top pin add the bottom pin and the control pin together and subtract from 23.

Example:

Pin Chamber 1	$5 + 9 = 14$	$23 - 14 = \underline{9}$
Pin Chamber 2	$4 + 14 = 18$	$23 - 18 = \underline{5}$
Pin Chamber 3	$9 + 7 = 16$	$23 - 16 = \underline{7}$
Pin Chamber 4	$3 + 8 = 11$	$23 - 11 = \underline{12}$
Pin Chamber 5	$4 + 9 = 13$	$23 - 13 = \underline{10}$
Pin Chamber 6	$2 + 13 = 15$	$23 - 15 = \underline{8}$

Using the underlined results we have the pinning chart below and this core is ready to key.

## Understanding the pinning chart and pinning the core

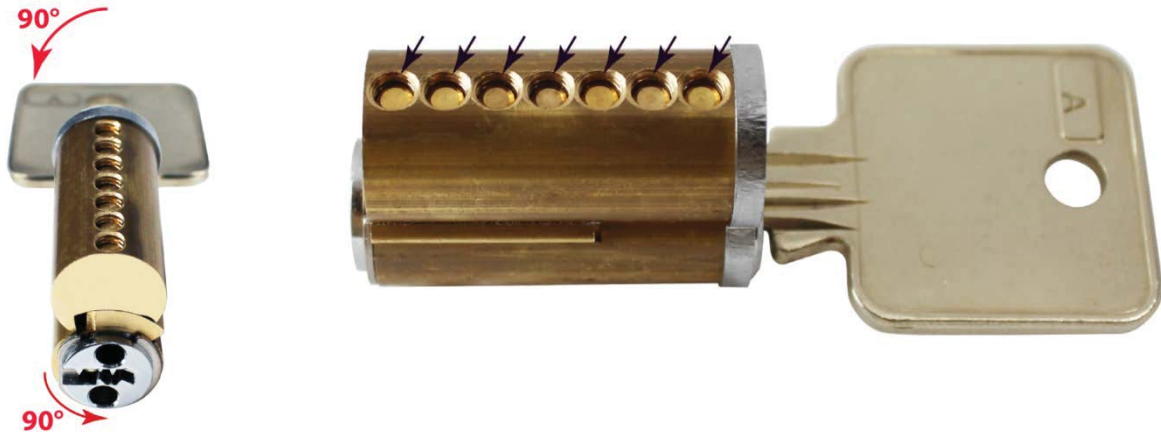
This pinning chart is set up to key a core. The core is pinned from the back to front pin. Prior to pinning the core move the control sleeve to the locked position and turn the plug to the 90 degree position, this will allow you a cross check as you pin the core.

By using this method when the core is fully pinned each chamber should be at the same height in the core. In order to rotate the plug to the ninety degree position a key with the correct key profile must be inserted in the core to lift the side pins into place and allow the plug to turn.

The pin stack will be visible when this method is used. It is good practice to pin each chamber one at a time.



## Small Format Cylinder Information



Pinning Chart for change key only core CK 5 4 9 3 4 2 Control Key 4 8 6 1 3 5

Change Key	5	4	9	3	4	2
MP	5	4	9	3	4	2
CP	9	14	7	8	9	13
TP	9	5	7	12	10	8

When Building a pinning chart it is advisable to keep the control out of the chart as it tends to confuse the pinning issue.

When setting up a pinning chart for a master keyed cylinder the process is the same with the addition of the master pins. The math is the same for achieving the control pins as follow:

1. Step one calculate the bottom and master pins
2. Step two add ten (10) to the cut of the control key and subtract the bottom pin and master pin from this number to achieve the control pin. The cut of the control key plus ten is known as the control number.

MK 5 9 8 1 0 1                      Control Key 4 3 5 8 3 4  
 CK 5 3 4 3 4 5

### Control pin calculations

Example:

Pin Chamber 1	$4 + x + 10 = 14 - 5 = 9$		
	Control number	BP+MP	
Pin Chamber 2	$3 + 10 = 13$	$13 - 9 = 4$	$3 + 6 = 9$
Pin Chamber 3	$5 + 10 = 15$	$15 - 8 = 7$	$4 + 4 = 8$
Pin Chamber 4	$8 + 10 = 18$	$18 - 3 = 15$	$1 + 2 = 3$
Pin Chamber 5	$3 + 10 = 13$	$16 - 4 = 9$	$0 + 4 = 4$
Pin Chamber 6	$4 + 10 = 14$	$14 - 5 = 9$	$1 + 4 = 5$

Top pin calculations BP + CP

Total Stack – Control Number = Top Pin

## Small Format Cylinder Information

Pin Chamber 1	5 + 9 = 14	23 - 14 = 9
	BP + MP + CP	
Pin Chamber 2	3 + 6 + 4 = 13	23 - 13 = 10
Pin Chamber 3	4 + 4 + 7 = 15	23 - 15 = 8
Pin Chamber 4	1 + 2 + 15 = 18	23 - 18 = 5
Pin Chamber 5	0 + 4 + 9 = 13	23 - 13 = 10
Pin Chamber 6	1 + 4 + 9 = 14	23 - 14 = 9

Master Key	5	9	8	1	0	1
Change Key	5	3	4	3	4	5
BP	5	3	4	1	0	1
MP	X	6	4	2	4	4
CP	9	4	7	15	9	9
TP	9	10	8	5	10	9

There is another way to do these calculations that is easier however it important that everyone know the basic math prior to learning the other process. If you note that the cut of the control key and the top pin add up to 13 in every case then it would be easier to calculate the top pin and insert the tops in the chart as they will not change for every core with that control key. The method for calculating the top pin now becomes sub tract the cut of the control key from 13 to obtain the top pin.

$$\begin{array}{r}
 \text{Example:} \quad 13 \quad 13 \quad 13 \quad 13 \quad 13 \quad 13 \\
 \quad \quad \quad \underline{-4} \quad \underline{-3} \quad \underline{-5} \quad \underline{-8} \quad \underline{-3} \quad \underline{-4} \\
 \quad \quad \quad 9 \quad 10 \quad 8 \quad 5 \quad 10 \quad 9
 \end{array}$$

Once the bottom pin, master pin and top pin numbers are known add together and subtract them from 23 to get the control pin.

To pin the core:

1. Place core in front of you with the plug face to your right, the control sleeve in the locked position and the plug turned to 90 degrees.
2. In the chamber to the back of the core (left hand side of the core) place the bottom pin Control pin and then the top pin. Repeat for each pin chamber. When the core has all pin chambers properly pinned the pin stack should be visible and equal in all pin chambers.
3. Rotate the plug to the 0 degree position and insert core in capping block.
4. Insert a spring and cap in each pin chamber and cap.

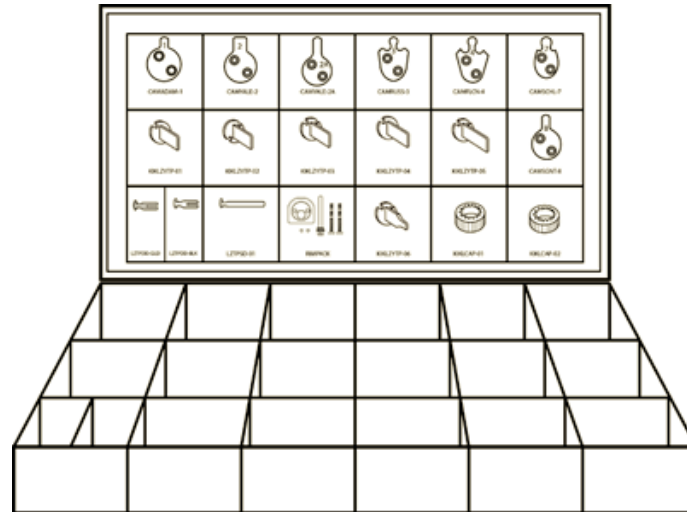
\*\*\* Note when keying this process can be changed to pinning one pin chamber at a time capping with Allen set screw and checking the core function. Simply repeat the process until the entire core is keyed and capped.

## Tools and Service Kits

### Service Kits

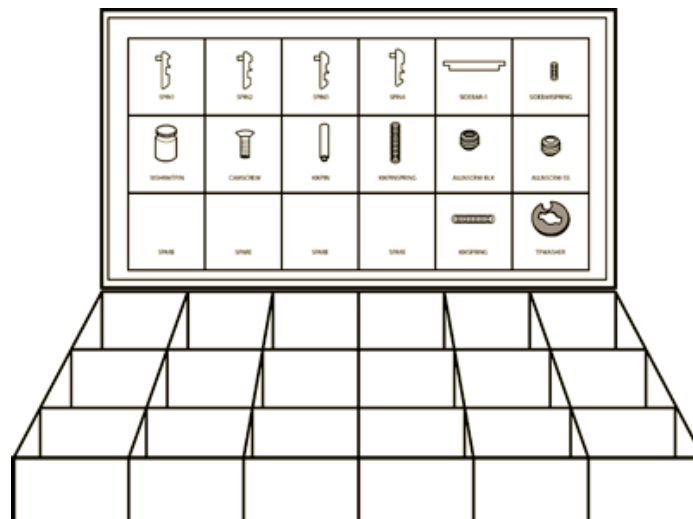
## CRP HSK HIGH SECURITY ACCESSORY KITS

### KITPARTS-1



CAMADAM-1 x 10, CAMYALE-2 x 10, CAMYALE-2A x 10, CAMRUSS-3 x 10 ,  
CAMFLCN-4 x 10, CAMSCHL-7 x 10, CAMSGNT-8 x 10, KIKLCAP-01 x10,  
KIKLCAP-02 x 10, RIMPACK x 2, KIKLZTP-01 x 5, KIKLZTP-02 x 5,  
KIKLZTP-03 x 5, KIKLZTP-04 x 5, KIKLZTP-05 x 5, KIKLZTP-06 x 5,  
LZTPDD-BLK x 20, LZTPDD-GLD x 20, LZTPSD-01 x 10

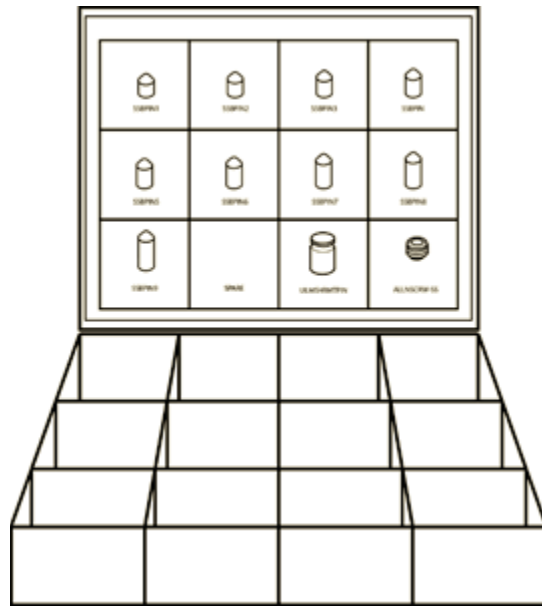
### KITSTDPIN- 2



ALLNSCRW-SS x 25, ALLNSCRW-BLK x 25, KIKPINSRING x 100, KIKSPRING x 25,  
CAMSCREW x 25, SIDEBAR-1 x 10, MSHRMTPIN x 50, KIKPIN x 25,  
SPIN1 x 10, SPIN2 x 10, SPIN3 x10, SPIN4 x 10,  
TPWASHER x 10, SIDEBARSPRING x 20

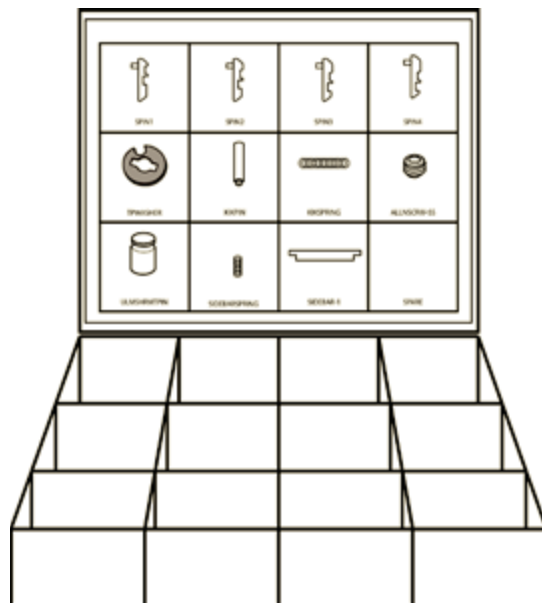
## Tools and Service Kits

### KITULPIN -3



SSBPIN1 x 24, SSBPIN2 x 24, SSBPIN3 x 24, SSBPIN4 x 24, SSBPIN5 x 24,  
SSBPIN6 x 24, SSBPIN7 x 24, SSBPIN8 x 24, SSBPIN9 x 24,  
ULMSHRMTPIN x 50, ALLNSCRW-SS x 25

### KITULPIN -4

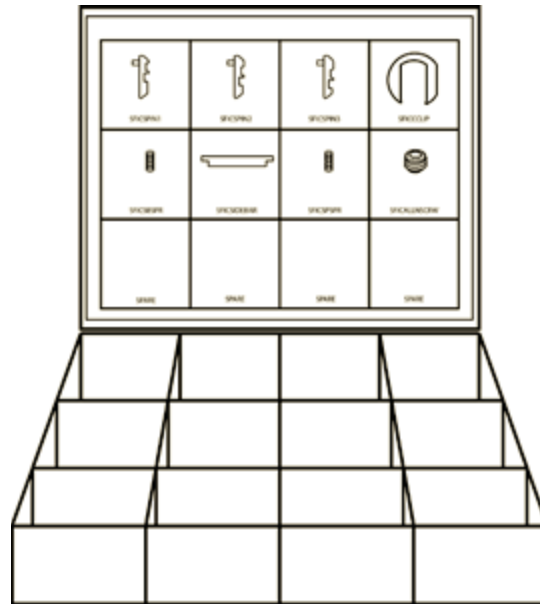


SPIN1 x 20, SPIN2 x 20, SPIN3 x 20, SPIN4 x 20, TPWASHER x 20,

## Tools and Service Kits

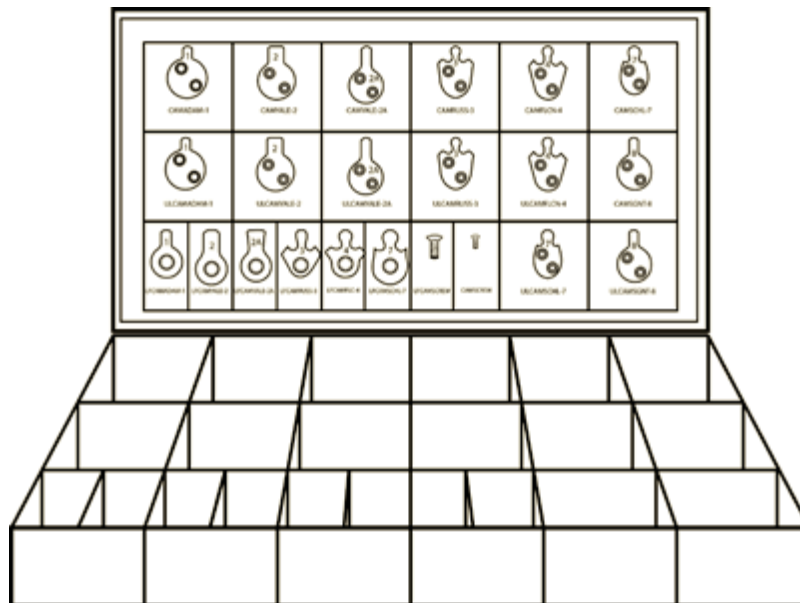
KIKPIN x 25, KIKSPRING x 25, ALLNSCRW-SS x 25, ULMSHRMTPIN x 100,  
 SIDEBARSPRING x 20, SIDEBAR-1 x 10

### KITSFICPARTS-5



SFICSPIN1 x 20, SFICSPIN2 x 20, SFICSPIN3 x 20,  
 SFICCLIP x 25, SFICSPR x 50,  
 SFICSEBAR x 10, SFICSEBAR x 25, SFICALLNSCRW x 25

### KITCAM-6



LFCAMADAM-1 x 5, LFCAMFLCN-4 x 5, LFCAMRUSS-3 x 5, LFCAMSCHL-7 x 5,  
 LFCAMSCRW x 30, LFCAMYALE-2 x 5, LFCAMYALE-2A x 5, MRTPINSPRING x 50,  
 ULCAMADAM-1 x 5, ULCAMFLCN-4 x 5, ULCAMRUSS-3 x 5, ULCAMSCHL-7 x 5,  
 CAMSCREW x 25, ULCAMSGNT-8 x 5, ULCAMYALE-2 x 5, ULCAMYALE-2A x 5,  
 CAMADAM-1 x 5, CAMYALE-2 x 5, CAMYALE-2A x 5,

## Tools and Service Kits

CAMRUSS-3 x 5, CAMFLCN-4 x 5, CAMSCHL-7 x 5, CAMSGNT-8 x 5

### **Tools Needed**

1. Pinning Block
2. Stamping Block for Keys
3. Cut off tool for MC / RC drive pins
4. Shear tool for MC / RC drive pins
5. Key Gages
  - a. Small Format
  - b. Large Format



### **Tool Resources**

1. Engravers
2. Key Machines
3. Stamping Machines
4. Stamp Sets

























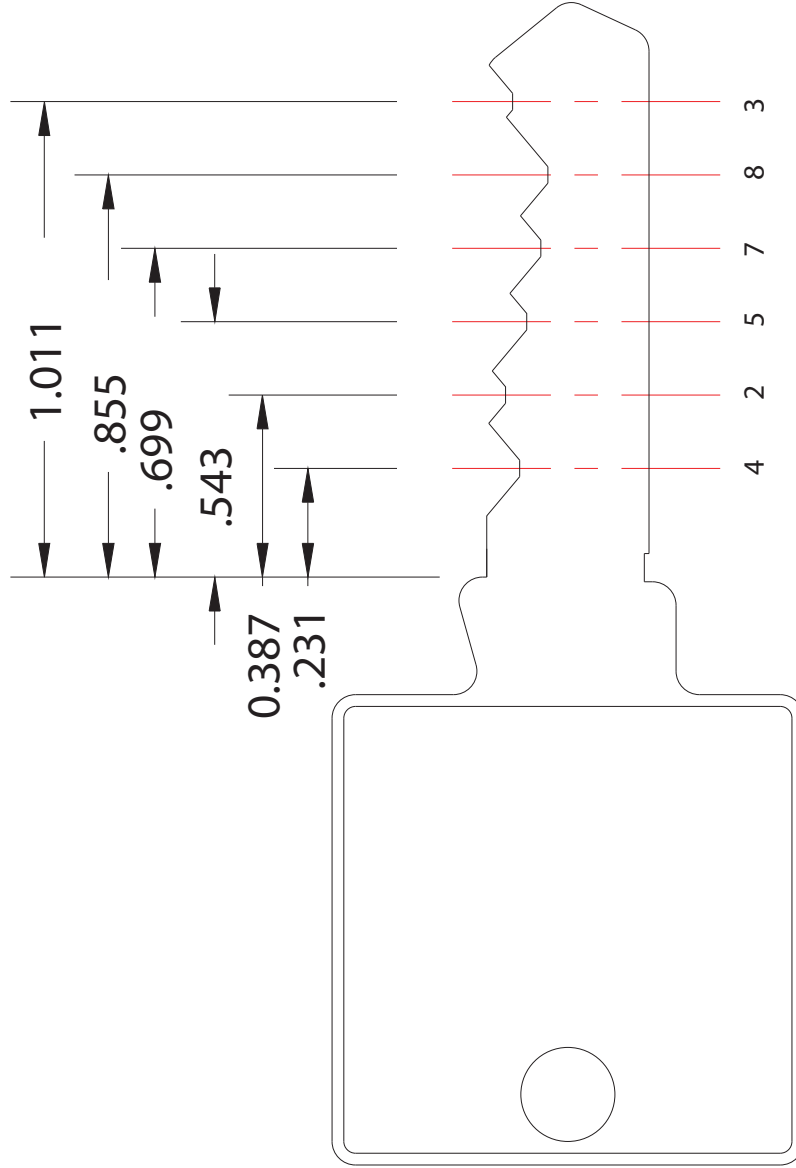
## **APPENDIX**

- APPENDIX A – Key cutting key technical information for LFIC
- APPENDIX A-1 - HSK cut form / Maximum cut range
- APPENDIX B - Key cutting key technical information for SFIC
- APPENDIX C – HSK MC/RC Shell - Tail Piece Shears
- Sample Dealer Agreement
- Tool Resources



# APPENDIX A

KEY CUTTING TECHNICAL KEY DATA  
FOR LARGE FORMAT INTERCHANGEABLE CORE

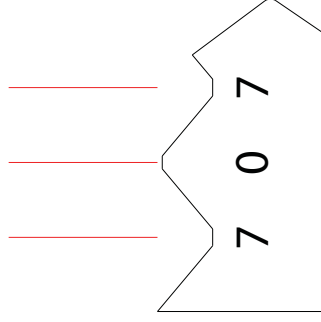
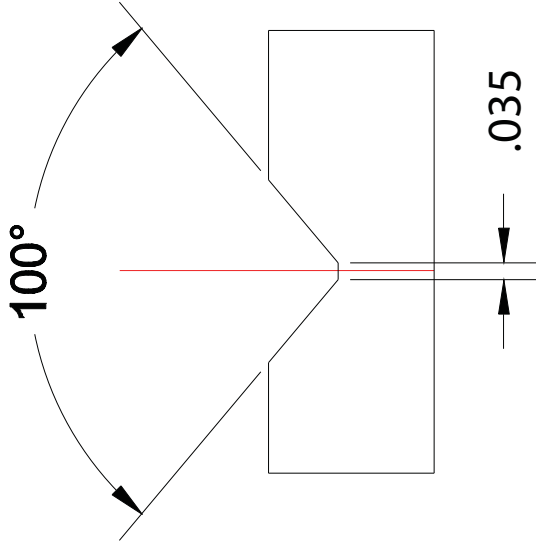


A	Depth of Cut
0	.320
1	.305
2	.290
3	.275
4	.260
5	.245
6	.230
7	.215
8	.200
9	.185

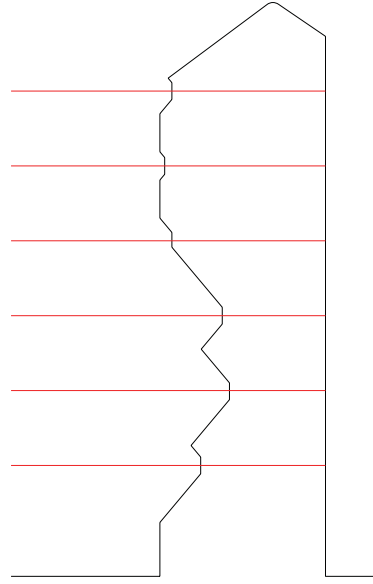
<p><b>Cal-Royal Products</b> 6605 Flotilla Street Commerce, California 90040 1-323-888-6601</p>	<p><b>HSK Full Size Keyblank</b></p>	<p>12 August 2013</p>
	<p>All information enclosed in this drawing is confidential and is not to be reproduced or distributed to other individuals or companies without the written consent of Cal-Royal Products Inc.</p>	
		<p>Revision</p>



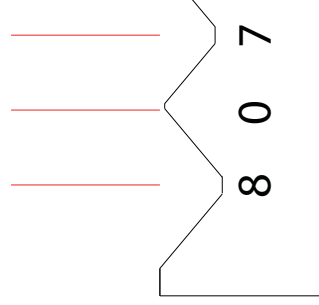
**APPENDIX A-1**



Maximum adjacent cut  
7 Difference



Key Cut 598101



Can not be cut and work  
8 Difference

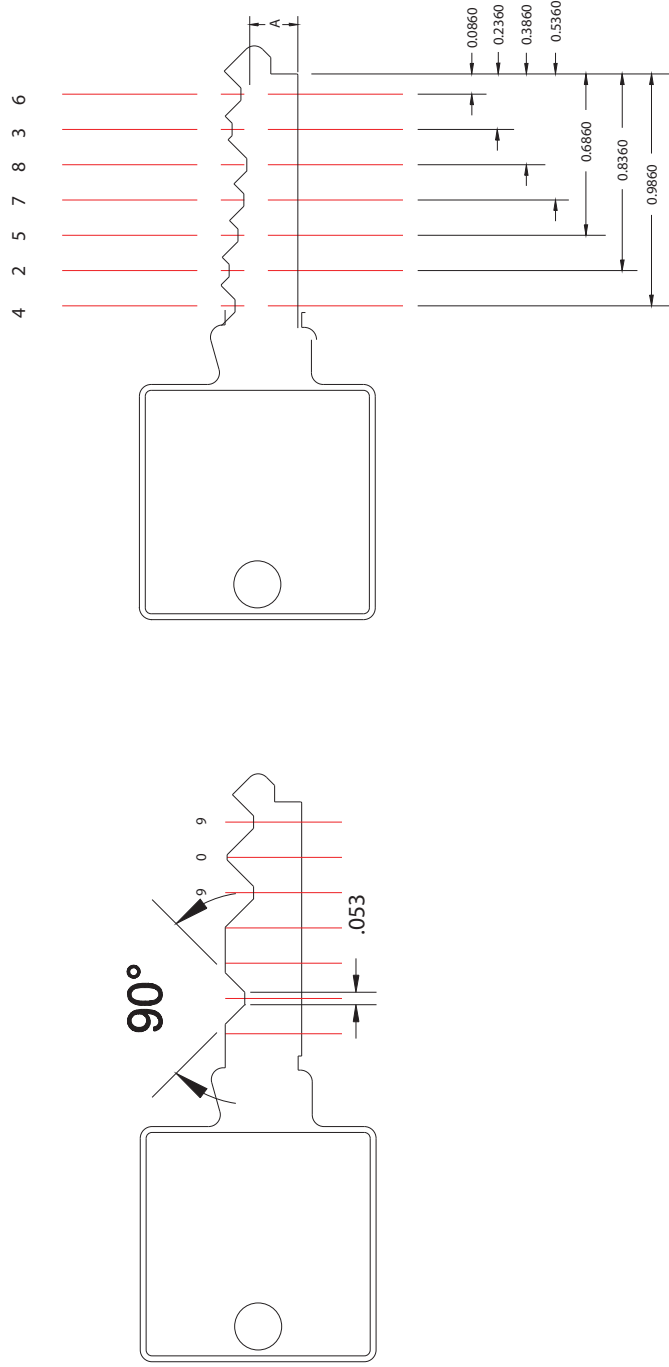
_____	<p><b>Cal-Royal Products</b> 6605 Flotilla Street Commerce, California 90040 1-323-888-6601</p>	<p>HSK Cut Form / Maximum Adjacent Cut Range</p> <p>All information enclosed in this drawing is confidential and is not to be reproduced or distributed to other individuals or companies without the written consent of Cal-Royal Products Inc.</p>	<p><b>Drawn By Bill</b> <b>Date 9 July 2013</b> <b>Scale 2.5 : 1</b></p>
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# APPENDIX B

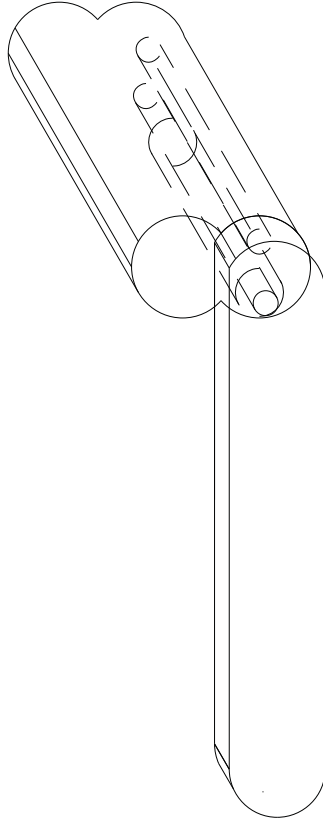
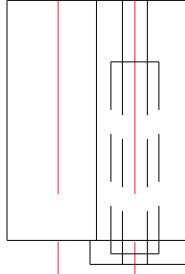
## KEY CUTTING TECHNICAL KEY DATA FOR SMALL FORMAT INTERCHANGEABLE CORE



<b>Cal-Royal Products</b>	HSK Small Format Interchangeable Core Key Data  <small>All information enclosed in this drawing is confidential and is not to be reproduced or distributed to other individuals or companies without the written consent of Cal-Royal Products Inc.</small>	<b>Drawn By Bill</b>  <b>Date 13 May 2013</b>  <b>Revision 1</b>
6605 Flotilla Street Commerce, California 90040 1-323-888-6601		



# APPENDIX C



**Cal-Royal Products**

6605 Flotilla Street Commerce, California 90040  
1-323-888-6601

**HSK MC/RC Shell**

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**Drawn By W.A Deahl**

**Date 10 May 2013**

**Revision**





## CRP SECURITIES DEALER SERVICE CENTER AGREEMENT

This agreement has been reached on this \_\_\_ day of \_\_\_\_\_, 20\_\_ between Cal-Royal Products, Inc. ("CRP Securities") located at 6605 Flotilla Street, City of Commerce, CA 90040 and \_\_\_\_\_ ("Dealer"), located at \_\_\_\_\_.

Whereas, CRP Securities has the exclusive intellectual, marketing and sales rights to several product lines of high security locks, cylinders and keys with restricted duplication, and

Whereas, one such product line is known as CRP High Security System, and

Whereas, Dealer desires to become a non-exclusive source for sales and service center of the CRP HSK High Security Key System. CRP Securities agrees to have Dealer become such a source. Both parties agree as follows:

### 1. Sales and Services

- 1.1 CRP Securities appoints Dealer to operate a non-exclusive restricted key/lock service center from which CRP High Security System products and services are provided, subject to all the terms and conditions set forth herein. Dealer agrees that this appointment does not imply or grant any right of access to any other CRP Securities products or key sections.
- 1.2 Dealer agrees that its appointment as a source of CRP High Security System products does not constitute appointment as a locksmith supply distributor, alarm supply distributor, or supplier of CRP High Security products for resale, and Dealer agrees not to act in such capacity. Dealer shall confine its efforts to sales of CRP High Security System products to customer accounts and its use within the United States.
- 1.3 Dealer will only use approved and properly maintained key cutting and assembly equipment on the CRP High Security System. Dealer will therefore instruct all of its employees and customers as to the proper procedure involved in the use of CRP High Security System and will display only literature or signage about the CRP High Security System with prior approval from CRP Securities.
- 1.4 Dealer agrees not to sell, distribute or lend uncut, 0 bitted, 1 bitted, or 2 bitted CRP High Security key blanks to anyone other than CRP Securities under any circumstances. Dealer also agrees not to alter or modify in any form the CRP High Security System products to operate in cylinders other than those for which they were intended and for which Dealer is authorized.
- 1.5 Dealer agrees to immediately notify CRP Securities of attempted sales of CRP High Security Key blanks by a party other than CRP Securities or its authorized distributor, any attempt to obtain CRP High Security key blanks without proper authorization, and any shortage in the CRP High Security key blank inventory which Dealer discovers at any time.
- 1.6 Dealer agrees to cut additional keys only for Restricted Section keys system supplied by service center or when authorized in writing by CRP Securities to act as field service agent for designated installations.
- 1.7 Dealer agrees to notify all potential customers of CRP High Security System products, prior to purchase, of its proprietary nature, and that the customer may be required to return to the Dealer for any additional future service. Dealer must thereby enable the customer to make an informed decision about the level and nature of key control it is selecting.

SAMPLE AGREEMENT



1.8 The dealer agrees to actively promote the CRP Securities High Security Cylinder Program. The dealer within the confines of this agreement may use advertising material provided and approved by CRP Securities to promote the program.

**2. Financial Policies**

- 2.1 Dealer agrees to purchase CRP Securities products at a minimum value of Two Thousand Five Hundred Dollars (\$2,500) during the first twelve (12) months of the term of this agreement, at a minimum value of Five Thousand Dollars (\$5,000) for each twelve (12) months thereafter. CRP Securities reserves the right to modify this volume requirement as necessary to accommodate inflation, price increases and improved sales opportunities in Dealer's territory; Dealer will be given thirty (30) days written notice of any new purchase volume requirement.
- 2.2 Dealer agrees to abide by the payment terms and financial policies as specified by CRP Securities or its authorized distributor from time to time.
- 2.3 This agreement includes only the provisions stated herein and does not infer or allow a franchise or partnership of a financial nature between the Dealer and CRP Securities . The dealer is responsible for all management and financial actions of the Dealers business and shall hold CRP Securities separate and harmless from its financial interests.

**3. Key Control**

- 3.1 Dealer agrees under no circumstances will he/she cut or duplicate any key that is not originated from his/her facility. Non-compliance can result in immediate cancellation and/or termination of the dealer agreement.
- 3.2 All CRP High Security System key blanks furnished to Dealer by CRP Securities shall have the CRP Securities brand name coined on one side of the bow and the Dealer's name identified on the opposite side of the bow. Dealer agrees to cut and furnish keys for CRP High Security System cylinders on CRP Securities original manufactured blanks only.
- 3.3 Dealer agrees to Provide CRP Securities a duplicate record of all CRP High Security Key Systems using the section created by the Dealer and to update such records as changes become necessary.

Records to be forwarded to:

CRP High Security Systems Manager  
6605 Flotilla  
Commerce, Ca. 90040

- 3.4 Dealer agrees to enforce all appropriate measures to guaranty safety and security of the CRP High Security System key blanks, key records and CRP High Security System cutting machine, which measures shall as a minimum include but not limited to (1) properly securing the CRP High Security System key cutting machine to ensure that its use is restricted to those individuals who are authorized by Dealer; and (2) securing under lock and key or vault the CRP High Security System key blanks and key records to ensure that access to them is limited to those individuals authorized by Dealer.
- 3.5 Dealer assumes full responsibility for protection of the CRP High Security System key blanks and for the cutting of the same. Dealer agrees to be responsible for assuring that each of its employees and representatives comply with the provisions of this Agreement.
- 3.6 Dealer agrees that all proprietary information regarding the CRP High Security Systems is the property of CRP Securities and is not to be disclosed or transmitted in any manner to other organizations, manufacturers or competitors of CRP Securities.

SAMPLE AGREEMENT



**4. Contract Termination**

- 4.1 Either party may terminate this Agreement with or without cause, for any or no reason, upon thirty (30) days written notice to the other party. If one party defaults in the performance of any obligation thence, the other party shall have the right to terminate this agreement effective immediately upon notice of the defaulting party, regardless of the reason therefore.
- 4.2 Upon notice of termination, CRP Securities will discontinue shipment of CRP High Security key blanks to the Dealer. Upon such termination, the parties agree that CRP Securities shall have the option to repurchase from Dealer any CRP Securities key cutting machine, all CRP High Security key blanks, and any CRP High Security System products at the purchase price paid by Dealer. In addition, Dealer shall immediately forward to CRP Securities all copies of records relating to the CRP High Security restricted key sections, including but not limited to key biting lists, key issuance records, authorizations, signature records, customer records, and receipts. If such records and restricted section blanks are not provided within fifteen (15) business days of such termination, CRP Securities may proceed to take all steps necessary to obtain or reconstruct this material and/or information and all costs, including attorneys' fees, shall be borne fully by the Dealer.
- 4.3 The failure of either party to require the performance in whole or in part, of any term of this Agreement, shall not prevent a subsequent enforcement of such term or breach thereof nor be deemed a waiver of any subsequent breach.
- 4.4 The term of this Agreement is for an indefinite period beginning with the effective date in which CRP Securities signs the Agreement, and ending with the termination provided of this Agreement.
- 4.5 This agreement between CRP Securities and the Dealer shall constitute the complete working understanding between both parties. The dealer may not transfer this agreement to another individual, organization or entity. This agreement may not be modified without written authorization of both parties and such written agreement shall be with a minimum of thirty days notice unless otherwise specified in the amendment. If any portion of this agreement is ruled to be violation of a law or code the balance of the agreement shall remain in full force.

**5. General Conditions**

- 5.1 Dealer agrees to indemnify and hold CRP Securities harmless against any losses or damages, including reasonable attorneys' fees and expenses, which CRP Securities may suffer as a result of Dealer's impropriety, negligence, or breach in performing its obligations as stated in the Agreement.
- 5.2 This agreement is binding upon both parties and is subject to the statutory laws of the State of California, City of Los Angeles and state of \_\_\_\_\_.
- 5.3 Both parties confirm that they have read and understood this Agreement and undertake to abide with it. This Agreement may not be modified or amended in any way without the prior written consent of both parties. Dealer shall not have the right to assign this Agreement in whole or in part without CRP Securities' prior written consent.

SAMPLE AGREEMENT



IN WITNESS WHEREOF, the parties have executed this Agreement in duplicate, each of which shall be considered an original as of the date shown next to each signature.

**DEALER**

Date: \_\_\_\_\_

By: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

**CAL-ROYAL PRODUCTS, INC.**

Date: \_\_\_\_\_

By: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

SAMPLE AGREEMENT