

Master Key System Design Guide

ASSA ABLOY

Guidance and worksheets for use with ASSA ABLOY Group brands:

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The global leader in
door opening solutions



Introduction

To ensure a facility has the desired level of security, it is necessary to have a properly designed and maintained master key system. ASSA ABLOY Door Security Solutions offers all of the products and services to help you implement a new master key system, or expand an existing one.

Key System Products

Product solutions include:

- Cylinders for various security requirements levels
- Cylinders that exceed the stringent standards set forth by industry testing and listing agencies
- Cylinders that work with electrified stand-alone and networked access control systems

Professional Support

Our team of trained and certified Key System Specialists will help you design a secure master key system, develop and implement key control policies, select the right cylinder for each doorway, and understand the latest trends in physical security. As the leader in security and life-safety solutions, ASSA ABLOY has developed and implemented the industry's only Key System Specialist Certification Program.

Design Guides

Master Key System Design Guide: In addition to the support provided by our team, this design guide can help you plan and apply a master key system. It takes you through the entire process and includes a glossary of master key system terms and worksheets to assist in the layout phase.

Key Control Guide: To extend the life and value of a key system, proper key control policies must be in place. ASSA ABLOY offers a comprehensive key control guide that will help you design policies and procedures for your facility.

Learn More

Contact the Key System Specialist of your local ASSA ABLOY Door Security Solutions team to learn more about our products, services and certification programs, and to get a copy of the Key Control Guide.

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Glossary and Keying Levels

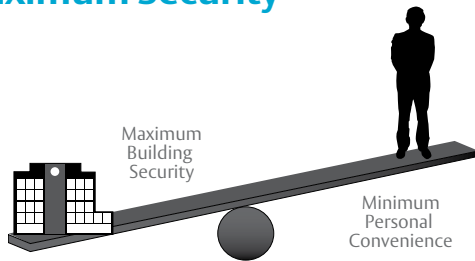
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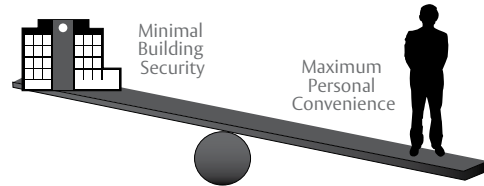
Careful planning is key to the long-term success of a master key system. Planning starts with understanding the opposing forces of security and convenience, and creating the proper balance. From there, it's easy to move onto developing the key system structure.

Maximum Security



Some facilities will be heavily security-oriented. Lack of convenience may make it hard to operate the building on a day to day basis

Maximum Convenience



Some facilities will require great personal convenience. This takes away from building security.

Opposing Forces

The cylinder mechanism and the keying system must strike the right balance between two archrivals—security and convenience.

The type and amount of cross key, the use of keyed alike groups and the number of levels of keying all play critical roles in this delicate balance. They also directly affect the amount of expansion available in the system.

“Security”

- SKD sets
- Small, unrelated systems
- Patented keyways
- Security cylinders
- High security cylinders
- Key control

“Convenience”

- Extensive cross keying
- One huge, complicated system
- Stock keyway
- Interchangeable core (IC) cylinders
- Many selective master keys
- No key control

Proper Balance

The simplest keying systems are often the most secure and will last longer than complicated ones. Cross keying and complicated systems reduce security and expansion potential.



NOTE: See glossary on pages 13–16 for terms and definitions. For assistance, contact your local ASSA ABLOY Door Security Solutions team. Ask about Key Wizard® key control software.

Planning

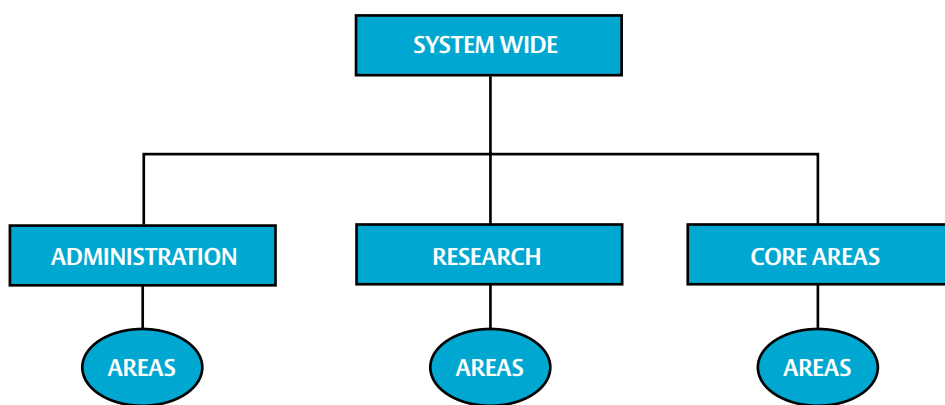
System Structure

Begin sketching out a key system schematic using descriptive terms appropriate for the job at hand. Typically these would be departments, buildings or geographic areas. It is not necessary to account for every change key at this early stage. The schematic often looks like an organizational chart.

When planning the system, don't forget the building core. Core areas are generally maintenance areas: stairwells, mechanical rooms, electrical, phone and HVAC areas.

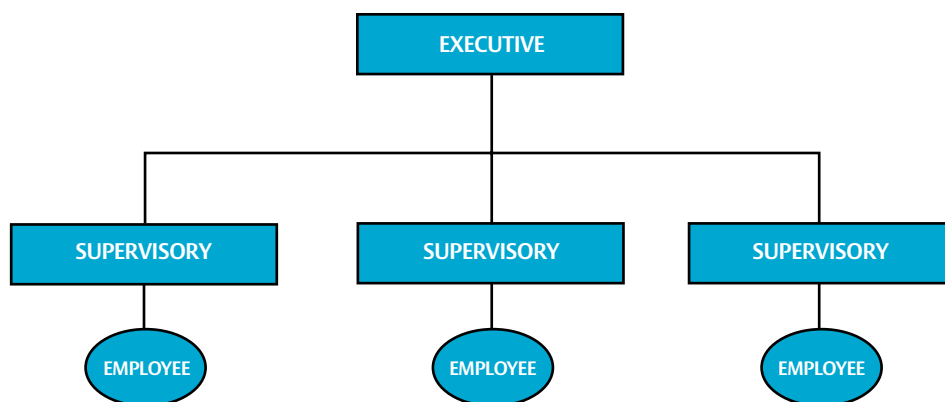
Normally, individual floor or department masters DO NOT operate these areas. Group them all under their own MK (or use changes under the grand, etc.).

Key all similar core areas alike: one key symbol for all electrical areas; a second one for all pipe chases; a third for all mechanical rooms, etc. This reduces the need to issue master keys to maintenance personnel. Once the structure is determined, the next step is to determine the level of keying.



Levels of Keying

First, we must understand the concept of levels of keying. Think of it as levels of authority in an organization. All systems should have a structure like that of a corporate organizational chart.

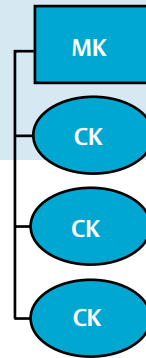


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2-Level System

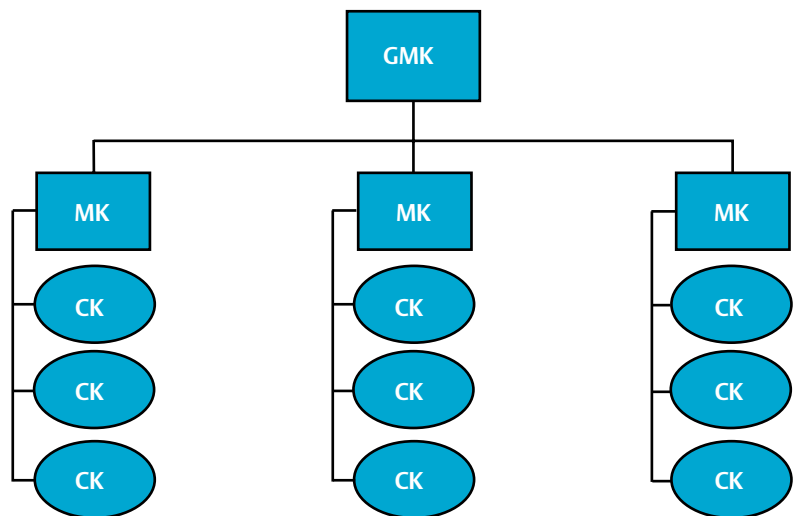
The simplest master key system has two levels of keying and is considered the lowest level of master keying. The less powerful keys at the bottom are called change keys. Each one operates only one lock, or one group of keyed alike locks. The more powerful key at the top is called the master key.

Even the largest, most complicated keying systems for hospitals and universities can be broken down into pieces that fit this simple model.



3-Level System

A 3-level system is nothing more than two or more 2-level systems tied together under a higher level key called a grand master key.

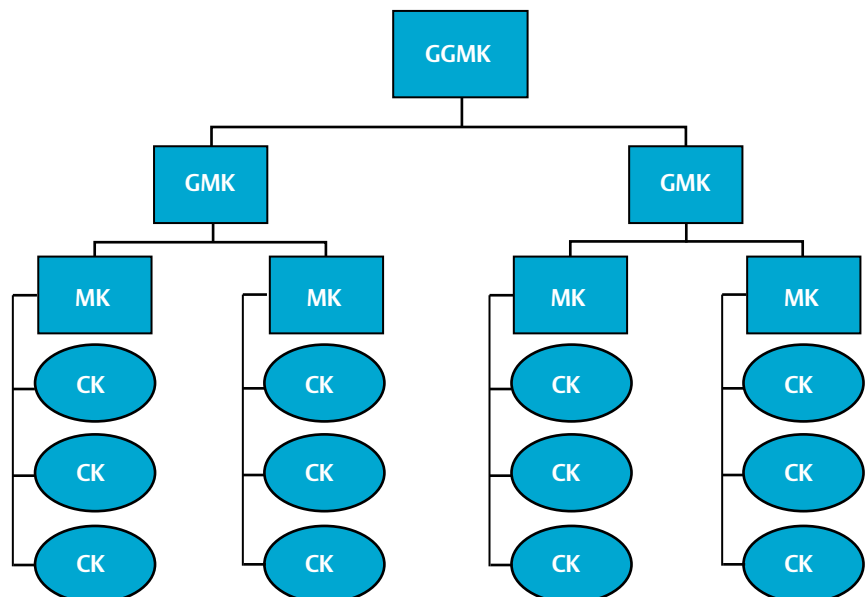


4-Level System

A 4-level system ties two or more 3-level systems together under a higher level key called a great grand master key.

Even though large jobs tend to require more levels of keying than small jobs, most systems do not need more than 4 levels of keying.

In a 4-level master key system, it is especially important to consider the traffic flow throughout the building.



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Key Symbols

Standard Key Symbols

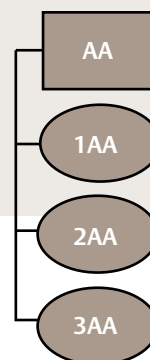
A key symbol is an alpha and/or numeric (A, AA, 1AA) designation that is used to properly identify the correct key combination for a door or group of doors.

2-Level System

Here are a few rules to consider when designing a 2-level system:

Rule #1: Master keys get 2 letters and usually start at the beginning of the alphabet. The master key shown below is AA.

Rule #2: Change keys have numbers added to the letters of the master key they're under. In 2-level systems, the numbers come first.



3-Level System

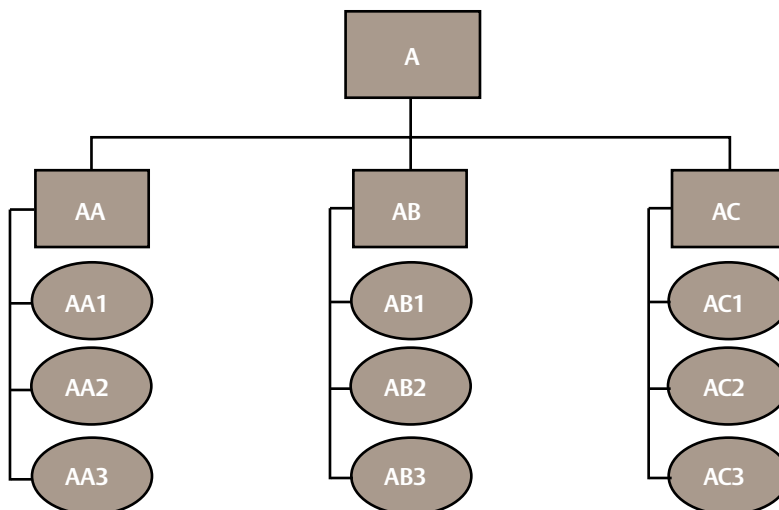
In systems with more than 2 levels, the change key numbers come last. Here we have a 3-level system, a grand master key system.

The change key numbers come last and the master keys have 2 letters. The new item here is the grand master key.

Rule #3: GMKs have only one letter.

Rule #4: Masters under the grand must start with the letter of that grand. All masters under grand A must begin with the letter A. Avoid the use of the letters I, O and Q, as they are too easily confused with the numbers 1 and 0.

When more than 23 masters are needed under a grand master, insert the rotation number between the letters of the master key symbol. Example: AA through AZ for the first 23 masters, A2A through A2Z for the 24th through the 46th master, etc.



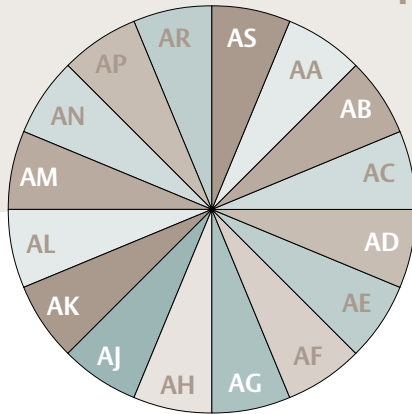
Key Symbols

Grand Master Pie “A”

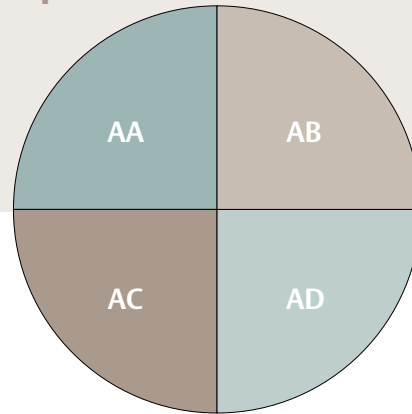
A keying system is like a pie. You can cut it into many pieces, but the more pieces, the smaller each piece and the more there is to manage.

The larger you make one piece, the less remaining pie available.

Keep It Simple

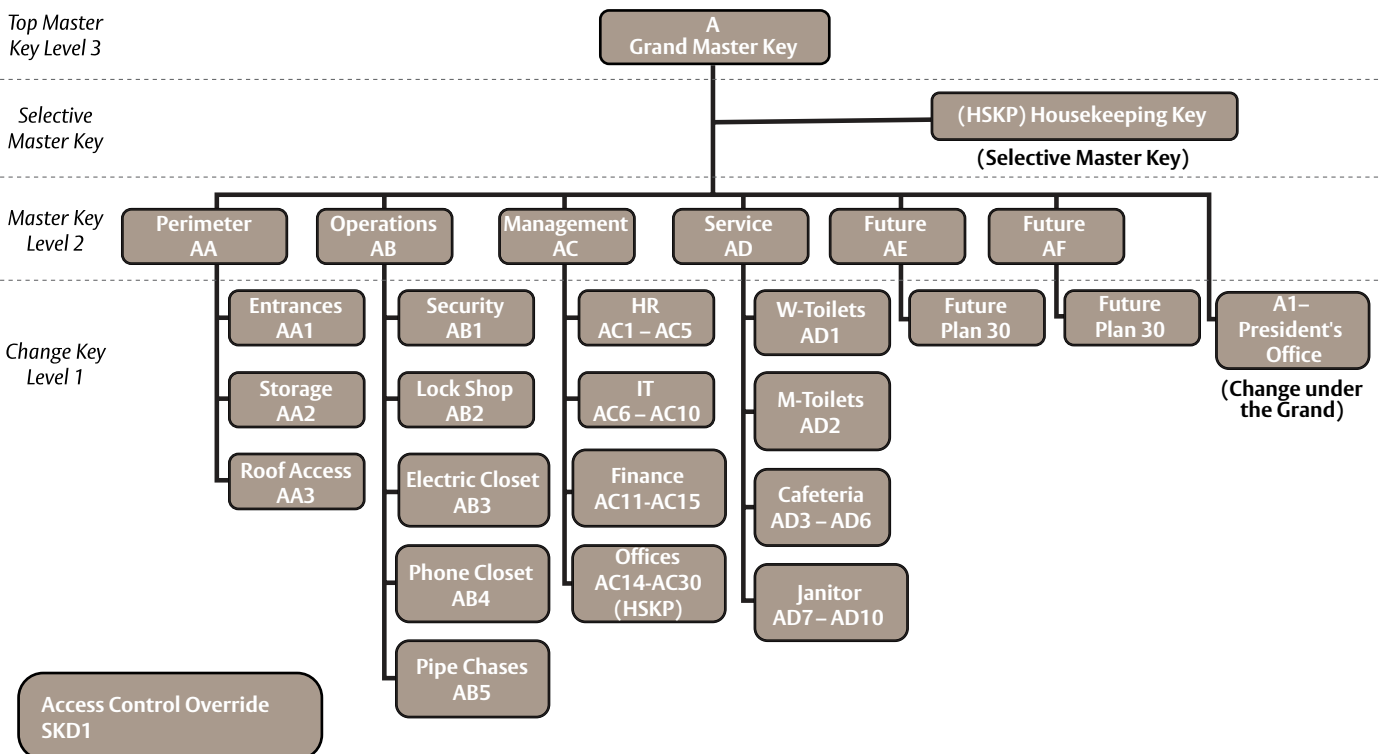


Many masters: “Top heavy” system with limited room for expansion



Fewer masters: preferable due to more expansion opportunities

The following represents a schematic of a level three (GMK) system. Your system may vary somewhat from this.



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Key Symbols

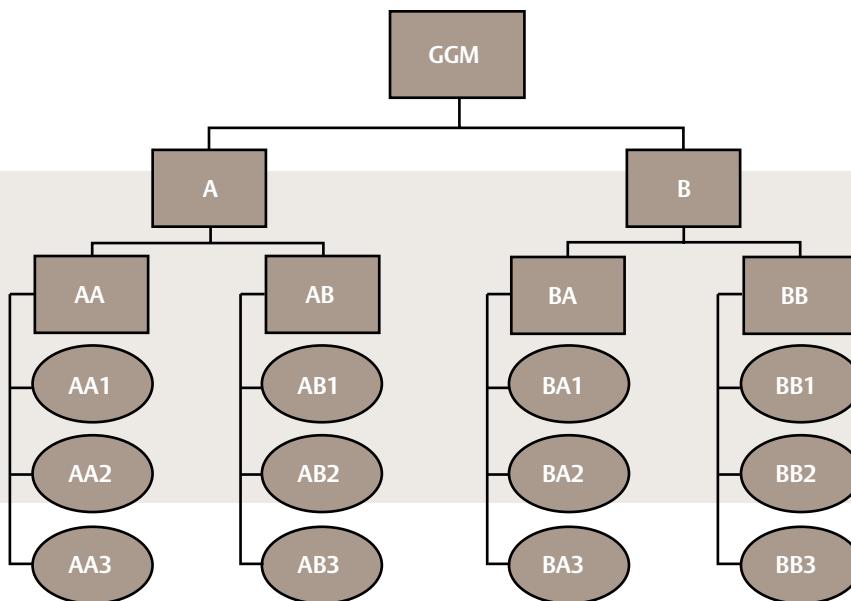
4-Level System

In a 4-level system (great grand master key system) the first 4 rules still apply:

- It's a system of more than 2 levels, so the change key numbers come last
- Masters have 2 letters
- The first letter matches the grand
- Grands have a single letter

The new information here is the great grand.

Rule #5: The symbol for a great grand master key is GGM.



Special Keying Requirements

There are many other symbols for special keying requirements.

Selective Master Keys

- (ENG) Engineering key
- (HSKP) Housekeeping key
- (JAN) Janitor's key
- (SEC) Security key
- (GRND) Grounds key

Change Keys Under the Great Grand Master (GGM)

- GGM1 - The first change key directly under the GGM
- GGM2 - The second change key directly under the GGM
- and so on

Change Keys Under the Grand Master (GM)

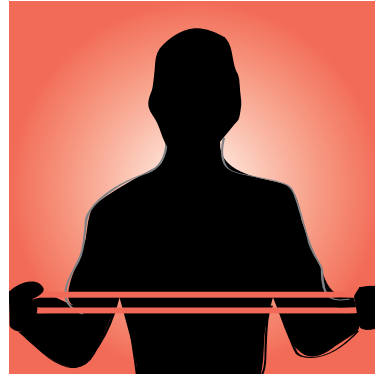
- A1 - The first change key directly under the GM
- A2 - The second change key directly under the GM
- and so on

Larger Systems

Multiplex keyways may be used to accommodate larger systems and expansion requirements necessary for future development. Plan your largest systems wisely from the start; with the use of multiplex keyways the bittings are repeated on other key sections. Let the manufacturer decide how to apply keyways to best suit the job at hand based on the numerical expansion parameters.

System Expansion

Always consider the expansion when designing master key systems. A master key system is like a rubber band. When stretched vertically (more levels of keying) it contracts horizontally (fewer combinations at each level). When stretched horizontally (more combinations at each level) it contracts vertically (fewer levels of keying are available). Keep this in mind when designing keying systems and submitting expansion parameters to the manufacturer. Supply actual numbers for expansion under every master level key, avoid using percentages.



Define Expansion Parameters

- Levels of keying
- Realistic numbers at each level
- All branches of system
- Mixtures of cylinder mechanisms

It's absolutely critical for the health and longevity of the system to establish realistic expansion parameters. See sample expansion specification section below and note that actual numbers are shown for each level.

Define realistic expansion for the number of masters under each grand, and changes under each master for all parts of the system. If different cylinder mechanisms will be mixed on the project, define where each will be used.

Sample Expansion Specification

Planning should include future building additions or partitions, and rekeying individual door or groups of doors if change keys or master keys are lost or stolen.

Look as far into the future as possible, but don't "go wild." Stay realistic, and stay away from percentages.

Here is an example of clear expansion parameters.

- Establish a new grand master key system
- Plan 20 changes directly under the grand
- Plan 10 master keys
- Plan 50 changes each for each master

What You Must Know

In many cases, expansion is a guess, but it must be the best possible guess. Ask questions like these:

- How many more buildings in this system?
- How do future buildings fit into the structure?
- What is the maximum number of keyed openings per floor/department/areas that are keyed differently?
- Where does this job fit into the total final system?
- Are future buildings planned?
- How do they fit into the overall system?
- What is the maximum conceivable number of keyed openings on a floor after maximum partitioning?
- Will all cylinder mechanisms be under the same system?

Theoretical Numbers Reduced

The master key system's overall capacity is affected by the following factors:

- Mechanical factors of cutting the key
- Theoretical numbers are first reduced by a mechanical factor, called the MACS (Maximum Adjacent Cut Specification)
- Use of multiple selective keys
- Cross keying

System Expansion

Cross Keying

Cross keying a cylinder allows additional keys other than its own key set to operate it. There are two types of cross keying: controlled and uncontrolled. See the glossary beginning on page 13 for additional information.

Cross keying is always designated by the letter “X”: prefix X to the key symbol, then list each key symbol that is required to also operate the cylinder. Example: XAA1, OB (operated by) AA2, AA3, AA4, AA, A.

Cross keying:

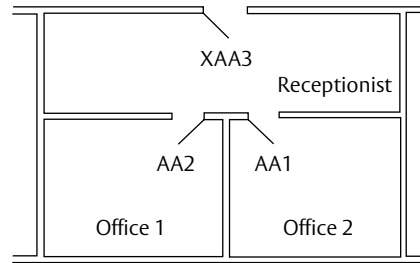
- Should be avoided
- Does not fit in a system that has been designed for security
- Normally results in unplanned key interchange
- Reduces the overall system capabilities
- Increases the risk of unauthorized key interchange

Convenience May Reduce Cylinder Security and Hinder System Expansion

Cross keying not only reduces security, it reduces expansion possibilities. Uncontrolled cross keying (between different masters or grands) reduces it even more. If one master is lost, so are all of its changes. If one grand is lost, so are all of its masters and all of their changes. This can add up to thousands of combinations lost. Therefore, supplying extra keys is recommended rather than jeopardizing the integrity of the master key system by allowing this convenience.

An example of cross keying is when two or more different keys such as AA1 and AA2 are both required to operate the same cylinder. This reduces the cylinder’s security. When the cross keying occurs under all the same higher level keys, such as AA1 and AA2, it is known as controlled cross keying. When it combines keys under different higher level keys, such as AA1 and AB1, it is known as uncontrolled cross keying.

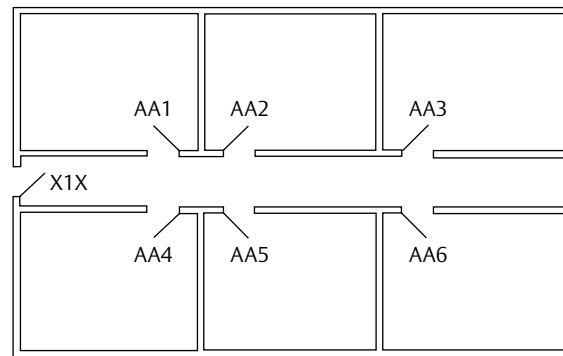
In addition to reducing the security of the cylinder, cross keying usually imposes limits on the flexibility and expansion of the overall keying system. This is especially true of uncontrolled cross keying. For these reasons, it is strongly recommended to allow personnel to carry more than one key. Cross keying should be discouraged whenever possible. However, when cross keying is required, it is specified below, and should be summarized at the beginning of each order.



XAA3 operated by AA1, AA2, AA and A.

Case #1: Cylinder requires its own change key. The illustration depicts part of a small medical building where two doctors share a common receptionist. The receptionist gets the AA3 key. Each doctor carries a key that operates only one office, but is also cross keyed into the entrance from the corridor.

Determine the symbol of the change key (example: AA3). Then prefix the letter X (example: XAA3). Then list all keys that are to operate in an “operated by...” phrase. Example: “XAA3 operated by AA1, AA2, AA and A”. Note that X is a cylinder specification only. The keys for cylinder XAA3 are designated AA3.



X1X operated by AA1 through AA6, AA and A.

Case #2: Cylinder does NOT require its own change key. This illustration depicts a section of a floor in a dormitory. Each student’s bedroom key operates the hall door lock. There is no need to construct a key that operates only the hall door.

In this case, place an X at both the beginning and end of the symbol and a number between them. Example: X1X, X2X, etc. Again, always include the “operated by...” phrase with a complete listing of key symbols to operate.

Designing Master Key Systems

Step 1: Meeting Security Objectives

Determine the level of access for each opening requiring a cylinder.

Here are the different types of cylinder mechanisms.

- Conventional “open & restricted keyways”
 - Not contract controlled
 - Key blanks are readily available
- Patented locking system
 - Administrative documents will be required between the lock manufacturer and owner
 - Key blank distribution restrictions are in place
- Security (secondary locking mechanisms)
 - Provides resistance against picking
- High security (same as security plus UL437)
 - Provides resistance against picking and drilling

When access control devices are furnished with a key override feature special consideration should be given regarding its keying.

- Stand-alone access control locking devices (at door wiring)
 - To facilitate multiple users through common doors
- Integrated locking systems (hardwired into access control systems)

Step 2: Planning

Establish the level of the master key system. The higher the level, the less secure.

Before determining the level ask these very important questions:

- Who, if anyone, is authorized to carry the top master key?
- Who carries master keys and change keys?
- Does every employee receive a key?

Select the level:

- Level two – “Simple Master Key System”
 - Change key and master key only
- Level three – “Grand Master Key System”
 - Change key, master key, and grand master key

- Level four – “Great Grand Master Key System”
 - Change key, master key, grand master key, and great grand master key
- Levels higher than four are not recommended for security reasons
 - With more levels, additional master pins in each chamber of the cylinder would be required, and with the additional master pins the possibility of unauthorized key interchanges could occur

Separate internal departments in the building(s) into departments, buildings or geographic areas.

- Perimeter
 - Including all exterior doors, roof surfaces, gates and fences, and adjacent buildings
- Core Areas (Operations)
 - Sensitive areas crucial to daily operations, such as plant engineering, security and mechanical operations
- Management
 - Areas that are vital for daily business activities, including human resources, administration, executive offices, IT, and accounting
- Services
 - Areas that provide employees and visitors with services, such as restrooms, medical treatment areas, housekeeping, food service, retail (unless it's a leased outside source)
- Unique Applications
 - Door openings requiring access control hardware where key override is required, or any other special application
- Tenants
 - Any tenants that are not part of the building
- It is recommended to establish a separate system for those areas requiring security type cylinder mechanisms

Continued on next page

Step by Step

Step 3: Assigning Key Symbols

Use an alpha and/or numeric designation to properly identify the correct key combination for a door or group of doors. Here are some helpful hints:

- KISS “Keep It Simple System”
- Lowest level possible
- Key to the building security objectives NOT to the convenience of the keyholders
 - Determine if the system is to be designed for security or convenience (see page 1)
- Key alike within master key groups as much as possible
 - Avoid “top heavy” systems (example: few change keys used under numerous masters)
- Avoid cross keying, especially with patented locking systems and higher
- Do not use the term sub-master (unless it’s a level 6 system or higher, see glossary for additional information and correct use of terminology)

- With whom or where will the key blanks be kept?
- Who is authorized to cut keys?
 - What form of work order will be used to authorize cutting of keys?
 - Who will sign the work order?
 - What records will be kept, and where?
- What type of reports will be required?
 - Overdue keys
 - Mis-cut keys
 - Who receives the reports?
- Once a key has been cut, what instructions are given to the recipient?
 - Key receipt recommended
- Ensure that all transactions are recorded by the key control authority
- ENFORCEMENT FROM THE START!
Support and back those who are responsible for maintaining and servicing the system

Step 4: Key Control and Key Management

Establish key hierarchy, key issuing policies and procedures, and administrative disciplines.

- What disciplinary action(s) will be put into place for violations?
 - Fines or deposits
 - Lost keys
 - Keys not returned
 - Will there be a key receipt required? Where will that be kept?
- What is the role of the key control authority?
 - Authorized to purchase
 - Responsible for key control administration
 - Maintains key control software and all transactions
- Provide adequate quantity of keys
 - Top master keys - limit the number of these to only a few
 - Master keys - also limit the number of these
 - Change keys per key set and/or per keyed alike sets
 - Special purpose keys; Control keys - limit the number of these

Step 5: Service and Maintenance

Follow proper service schedules and procedures. Recommendations include the following:

- Utilize an in-house or outside locksmith
 - Ensure proper training
 - Establish key cutting log
 - Establish service request procedures
- Have service equipment available
 - Key kit
 - Code cutter that complies with system’s depths and spacing specifications
 - Locksmithing tools, fixtures and accessories
- Establish stock levels and requirements to avoid misuse of multi-section key blanks
 - Additional cylinders ready for emergencies
 - Additional key blanks (of all keyways)

This glossary relates to ASSA ABLOY Door Security Solutions key systems education and should not be considered universal. For a listing of all cylinder, key and master keying terms, refer to ALOA's (Associated Locksmiths of America) sponsored publication *The Professional Glossary of Terms Relating To Cylinders, Keys, and Master Keying*. Permission is hereby granted to reprint terms and definitions from the 1991 copyrighted Glossary by the Lock Industry Standards and Training (LIST) Council with the following stipulations:

1. Terms and definitions are to be reprinted in their entirety.
2. Credit is to be given to the LIST Council and to the Master keying Study Group of the ALOA Sponsored National Task Group for Certified Training Programs. Definitions below that have been added to ALOA's publication are noted with an asterisk (*).

ALL – SECTION KEY BLANK*

- n. The key section that enters all keyways of a multiplex system.

BITTING

- n.
 1. The number(s) that represent(s) the dimensions of the key.
 2. The actual cut(s) or combination of a key.

BITTING LIST

- n. A listing of all the key combinations used within a system. The combinations are usually arranged in order of the blind code, direct code, and/or key symbol.

BOW

- n. The portion of the key that serves as a grip or handle.

BUMPING*

- n. One of many methods used to open locks with the use of "bump keys" that leave no sign of physical attack.

CAM

- n.
 1. A lock or cylinder component that transfers the rotational motion of a key or cylinder plug to the bolt works of a lock.
 2. The bolt of a cam lock.

CHANGE KEY*

- n.
 1. A key that operates only one cylinder or one group of keyed alike cylinders in a keying system.
 2. Any device that is used to mechanically or electronically allow resetting of certain key or combination locks.

COMBINATE

- v. To set a combination in a lock, cylinder, or key.

COMPOSITE KEYWAY

- n. A keyway that has been enlarged to accept more than one key section, often key sections of more than one manufacturer.

CONSTRUCTION CORE

- n. An interchangeable or removable core designed for use during the construction phase of a building. The cores are normally keyed alike and, upon completion of construction, they are to be replaced by the permanent system's cores.

CONSTRUCTION MASTER KEY (CMK)

- n. A key normally used by construction personnel for a temporary period during building construction. It may be rendered permanently inoperative without disassembling the cylinder.

CONTROL KEY

- n.
 1. A key whose only purpose is to remove and/or install an interchangeable or removable core.
 2. A bypass key used to operate and/or reset some combination type locks.
 3. A key that allows disassembly of some removable cylinder locks.

CONTROLLED CROSS KEYING

- n. A condition in which two or more different keys of the same level of keying and under the same higher level key(s) operate one cylinder by design: e.g., XAA1 operated by AA2. *Note: This condition could severely limit the security of the cylinder and the maximum expansion of the system when (1) more than a few of these different keys operate a cylinder, or (2) more than a few differently cross keyed cylinders per system are required.*

CORE

- n. A complete unit, often with a "figure eight" shape, which usually consists of the plug, shell, tumblers, springs, plug retainer and spring cover(s). It is primarily used in removable and interchangeable core cylinders and locks.

CREDENTIAL*

- n. See Change Key

CROSS KEYING

- n. The deliberate process of combining a cylinder (usually in a master key system) to two or more different keys which would not normally be expected to operate it together. See also "controlled cross keying" and "uncontrolled cross keying."

Glossary

CUT KEY

n. A key that has been bitted or combined.

DAY KEY*

- n. 1. The key for a day gate or day operation of a safe or vault lock.
2. A cash register key that does not allow audit or reset functions.
3. See 'change key'.

DISPOSABLE CONSTRUCTION CORE*

n. Used with interchangeable core keying, where non-essential locking doors are used within a construction project. Locks are supplied with disposable plastic cores.

DUMMY CYLINDER

n. A non-functional facsimile of a rim or mortise cylinder used for appearance only, usually to conceal a cylinder hole.

HIGH SECURITY CYLINDER

n. A cylinder that offers a greater degree of resistance to any two or more of the following: picking, impressioning, key duplication, drilling or other forms of forcible entry.

HOUSING

n. The part of a locking device that is designated to hold a core.

INTERCHANGEABLE CORE (IC)

n. A key removable core that can be used in all or most of the core manufacturer's product line. No tools (other than the control key) are required for removal of the core.

KEY BITTING ARRAY (KBA)

n. A matrix (graphic) display of all possible bittings for change keys and master keys as related to the top master key.

KEY CABINET*

n. A cabinet with hooks, Velcro, or other means designed to store keys systematically.

KEY CHANGES*

n. The total possible number of different keys available for a given type of tumbler mechanism.

KEY CONTROL

- n. 1. Any method or procedure that limits unauthorized acquisition of a key and/or controls distribution of authorized keys.
2. A systematic organization of keys and key records.

KEY INTERCHANGE

n. An undesirable condition, usually in a master key system, whereby a key unintentionally operates a cylinder or lock.

KEY SECTION

n. The exact cross sectional configuration of a key blade as viewed from the bow toward the tip.

KEY SYMBOL

n. A designation used for a key combination in the standard key coding system, e.g., A, AA, AA1, etc.

KEY SYSTEM SCHEMATIC

n. A drawing with blocks utilizing keying symbols, usually illustrating the hierarchy of all keys within a master key system. It indicates the structure and total expansion of the system.

KEYED ALIKE (KA)

adj. Of or pertaining to two or more locks or cylinders which have or are to have the same combination. They may or may not be part of a keying system.

KEYED DIFFERENT (KD)

adj. Of or pertaining to a group of locks or cylinders, each of which is or is to be combined differently from the others. They may or may not be part of a keying system.

KEYING

n. Any specification for how a cylinder or group of cylinders are or are to be combined in order to control access.

KEYING CONFERENCE

n. A meeting of the end-user and the keying system supplier at which the keying and levels of keying, including future expansion, are determined and specified.

KEYING SCHEDULE

n. A detailed specification of the keying system listing how all cylinders are to be keyed and the quantities, markings, and shipping instructions of all keys and/or cylinders to be provided.

KEYWAY

- n. 1. The opening in a lock or cylinder that is shaped to accept the key bit or blade of a proper configuration.
2. The exact cross sectional configuration of a keyway as viewed from the front. It is not necessarily the same as the key section.

LARGE FORMAT INTERCHANGEABLE CORE (LFIC)*

- n. 1. A key removable core that can be used in all or most of the core manufacturer's product line. No tools (other than the control key) are required for removal of the core.
- 2. Recognized as a core having a universal figure 8 shape, and is generally unique in size to a specific manufacturer.
- 3. An interchangeable core that is too large to fit into a small format interchangeable core housing.

LEVELS OF KEYING

- n. The divisions of a master key system into hierarchies of access, as shown on page 15.

MASTER KEY

- n. 1. A key that operates all the master keyed locks or cylinders in a group, each lock or cylinder usually operated by its own change key.
- v. 2. To combine a group of locks or cylinders such that each is operated by its own change key as well as by a master key for the entire group.

MASTER KEY SYSTEM

- n. 1. Any keying arrangement that has two or more levels of keying.
- 2. A keying arrangement that has exactly two levels of keying.

MASTER KEYED

- adj. Of or pertaining to a cylinder or group of cylinders that are or are to be combined so that all may be operated by their own change key(s) and by additional key(s) known as master key(s).

MULTIPLEX KEY SYSTEM

- n. 1. A series of different key sections that may be used to expand a master key system by repeating bittings on additional key sections. The keys of one key section will not enter the keyway of another key section. This type of system always includes another key section that will enter more than one, or all of the keyways.
- 2. A keying system that uses such keyways and key sections.

NMK

- abb. A notation used to indicate "not master keyed" and is suffixed in parentheses to a regular keying symbol. It indicates that the cylinder is not to be operated by the master key(s) specified in the regular keying symbol, e.g., AB6(NMK).

PATTERN KEY

- n. 1. An original key kept on file to use in a key duplicating machine when additional keys are required.
- 2. Any key that is used in a key duplicating machine to create a duplicate key.

PIN TUMBLER

- n. Usually a cylindrical shaped tumbler. Three types are normally used: bottom pin, master pin and top pin.

PLUG

- n. The part of a cylinder that contains the keyway, with tumbler chambers usually corresponding to those in the cylinder shell.

REMOVABLE CORE

- n. A key removable core that can only be installed in one type of cylinder housing, e.g., rim cylinder or mortise cylinder or key-in-knob lock.

SELECTIVE MASTER KEY

- n. An unassociated master key that can be made to operate any specific lock(s) in the entire system in addition to the regular master key(s) and/or change key(s) for the cylinder without creating key interchange. Examples include:*
- (ENG) Engineering key
- (HSKP) Housekeeping key
- (JAN) Janitor's key
- (SEC) Security key
- (GRND) Grounds key

SHEAR LINE

- n. A location in a cylinder at which specific tumbler surfaces must be aligned, removing obstruction(s) that prevent the plug from moving.

SHELL

- n. The part of the cylinder that surrounds the plug and usually contains tumbler chambers corresponding to those in the plug.

SIMPLEX KEY SECTION

- n. A single independent key section which cannot be used in a multiplex key system.

SINGLE KEY SECTION

- n. An individual key section which can be used in a multiplex key system.

Glossary

SKD

abb. Abbreviation for “single keyed”, normally followed by a numerical designation in the standard key coding system, e.g., SKD1, SKD2, etc. It indicates that a cylinder or lock is not master keyed but is part of the keying system.

SMALL FORMAT INTERCHANGEABLE CORE (SFIC)*

- n. 1. A key removable core that can be used in all or most of the core manufacturer’s product line. No tools (other than the control key) are required for removal of the core.
- 2. Recognized as a core having a universal figure 8 shape, and is small in size.
- 3. An interchangeable core that is too small to fit into a large format interchangeable core housing.

STANDARD KEY CODING SYSTEM

n. An industry standard and uniform method of designating all keys and/or cylinders in a master key system. The designation automatically indicates the exact function and keying level of each key and/or cylinder in the system, usually without further explanation.

SURREPTITIOUS ENTRY*

n. The use of entry or bypass techniques that cannot be detected via disassembly and detailed inspection of lock components.

TAILPIECE

n. An actuator attached to the rear of the cylinder, parallel to the plug, typically used on rim, key-in-knob or special application cylinders.

TOP MASTER KEY (TMK)

n. The highest level master key in a master key system.

UNCONTROLLED CROSS KEYING

n. A condition in which two or more different change keys under different higher level keys operate one cylinder: e.g., XAA1, OB (operated by) AB, AB1. * *Note: This condition severely limits the security of the cylinder and the maximum expansion of the system, and often leads to key interchange.*

VISUAL KEY CONTROL (VKC)

n. A specification that all keys and the visible portion of the front of all lock cylinders be stamped with standard keying symbols.

X

sym. Symbol used in hardware schedules to indicate a cross-keyed condition for a particular cylinder, e.g., XAA2, OB (operated by) AA3, AA4, AA, A.

ZERO BITTED

adj. Of or pertaining to a cylinder which is or is to be combined to keys cut to the manufacturer’s reference number “0” bitting.

Levels of Keying

This chart shows the divisions of a master key system into hierarchies of access. The standard key coding system has been expanded to include key symbols for systems of more than four levels of keying. For security reasons, systems higher than four levels are not recommended.

Two Level System

Level of Keying	Key Name	Abbreviation	Key Symbol
Level II	Master Key	MK	AA
Level I	Change Key	CK	1AA, 2AA, etc.

Three Level System

Level of Keying	Key Name	Abbreviation	Key Symbol
Level III	Grand Master Key	GMK	A
Level II	Master Key	MK	AA, AB, etc.
Level I	Change Key	CK	AA1, AA2, etc.

Four Level System

Level of Keying	Key Name	Abbreviation	Key Symbol
Level IV	Great Grand Master Key	GGMK	GGMK
Level III	Grand Master Key	GMK	A, B, etc.
Level II	Master Key	MK	AA, AB, etc.
Level I	Change Key	CK	AA1, AA2, etc.

Five Level System*

Level of Keying	Key Name	Abbreviation	Key Symbol
Level V	Great Great Grand Master Key	GGGMK	GGGMK
Level IV	Great Grand Master Key	GGMK	A, B, etc.
Level III	Grand Master Key	GMK	AA, AB, etc.
Level II	Master Key	MK	AAA, AAB, etc.
Level I	Change Key	CK	AAA1, AAA2, etc.

Six Level System*

Level of Keying	Key Name	Abbreviation	Key Symbol
Level VI	Great Great Grand Master Key	GGGMK	GGGMK
Level V	Great Grand Master Key	GGMK	A, B, etc.
Level IV	Grand Master Key	GMK	AA, AB, etc.
Level III	Master Key	MK	AAA, AAB, etc.
Level II	Sub-Master Key	SMK	AAAA, AAAB, etc.
Level I	Change Key	CK	AAAA1, AAAA2, etc.

* Shown for example only, this level is not recommended for secured master key systems.

KS.3 System Schematic Worksheet (Level 3)

System Design Worksheet

KS.3 System Schematic Worksheet (Level 3)

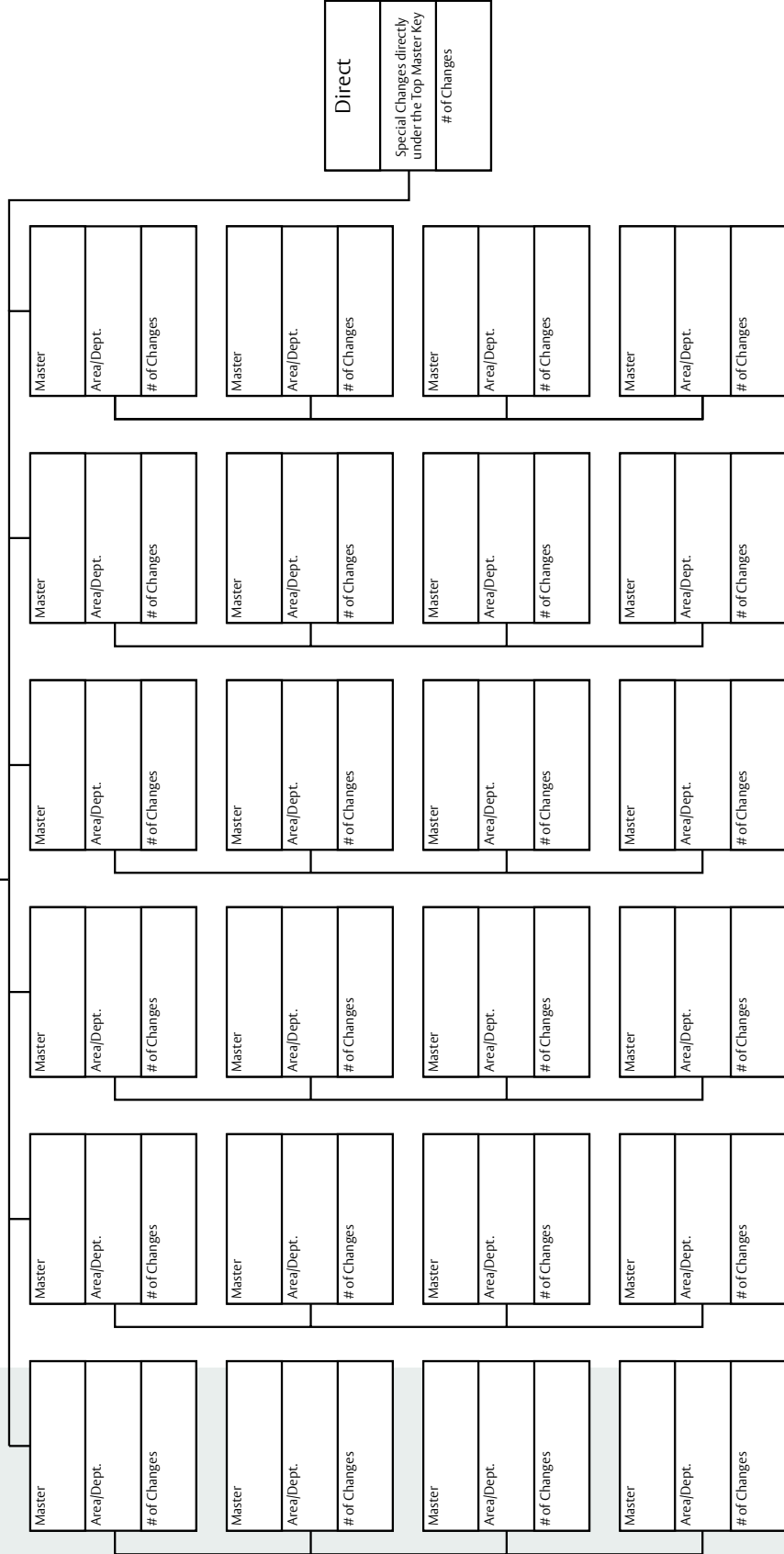
Job Reference _____
 Information _____
 Date _____ By _____
 Approved By _____
 Date _____

Grand Master Key	
Area/Dept.	

Instructions: Indicate the highest level master key symbol in the top line of each box. Identify the area or department, indicate the total number of key changes, including future expansion. Do not use letters I, O, or Q in key symbols.

Page of

Selective Master Key _____
 Control Key Used with IC cores only
 CMK Construction Master Keying



Special Instructions

SKD	Door# or Area
-----	---------------

Single Keyed Changes

SKD	Door# or Area
-----	---------------

SKD	Door# or Area
-----	---------------

Change key only, will not be operated by any other key within the system

KS.3 System Schematic Worksheet (Level 3)

KS.4 System Schematic Worksheet (Level 4)

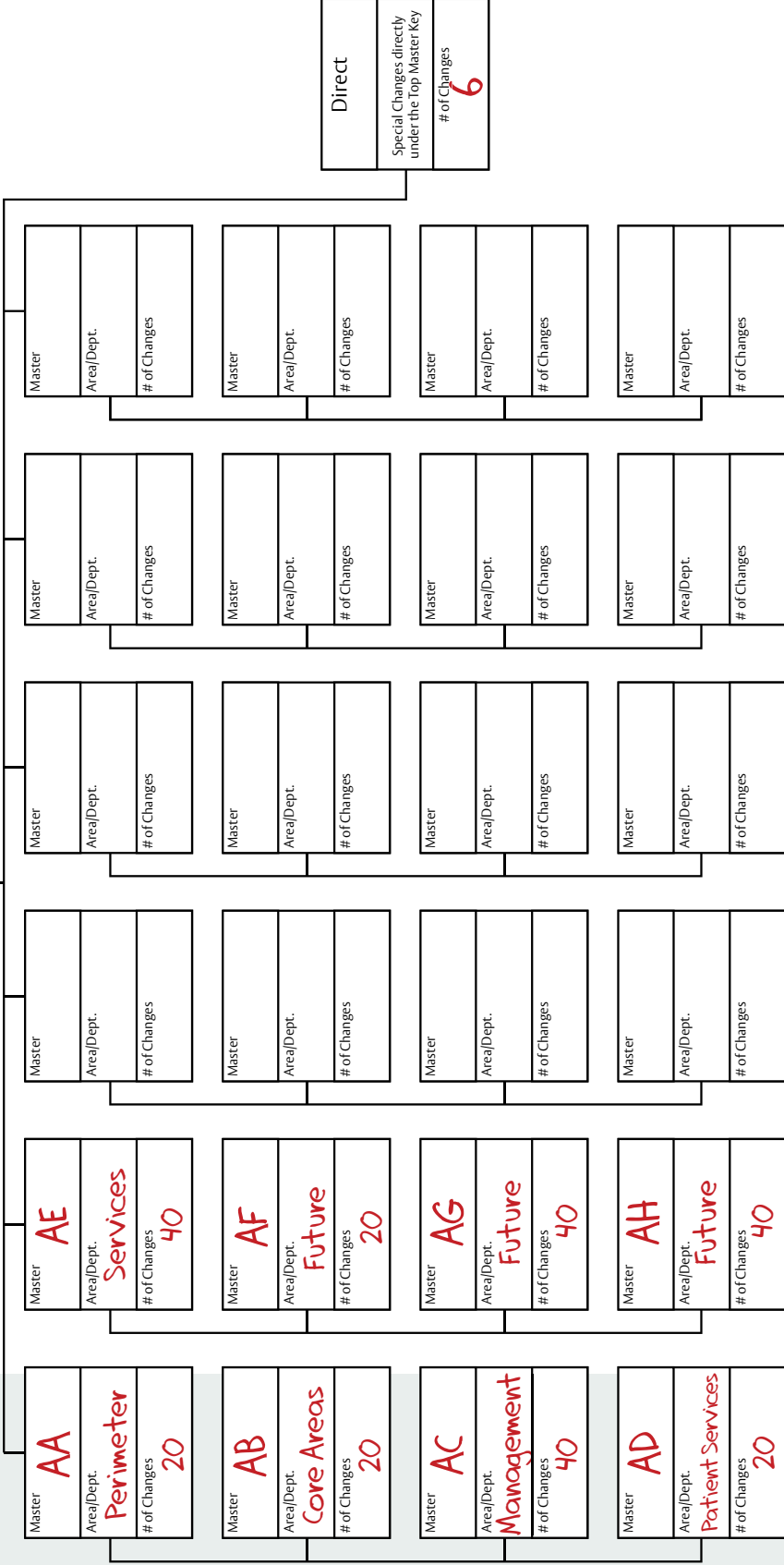
Job Reference Springfield General Hospital
 Information New Wing
 Date 5/12/08 By R. Smith
 Approved By J. Sawyer
 Date 5/14/08

Grand Master Key A	Area/Dept.
Top Master Key	

Instructions: Indicate the highest level master key symbol in the top line of each box. Identify the area or department, indicate the total number of key changes, including future expansion. Do not use letters I, O, or Q in key symbols.

Page 1 of 1

Selective (HSKP) _____ Control Key Used with IC cores only
 Master Key (Housekeeping) _____ CMK Construction Master Keying



Special Instructions

SKD 3	Door# or Area
	Pharmacy

Single Keyed Changes

SKD 2	Door# or Area
	Drug Carts

SKD 1	Door# or Area
	Access Control

Change key only, will not be operated by any other key within the system

NOTE: See glossary on pages 13-16 for terms and definitions. For assistance, contact your local ASSA ABLOY Door Security Solutions team. Ask about Key Wizard® key control software.

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Key Control Design Guide

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Introduction

This “Key Control Design Guide” is brought to you by ASSA ABLOY, the world’s leading group of manufacturers and suppliers of locking solutions, dedicated to satisfying end-users’ needs for security and safety.

Providing key systems and associated hardware is only the beginning. For end-users to successfully enjoy the benefits of the products we furnish, and to extend the life and value of a key system, proper policies must be in place. The policies and procedures suggested in this manual can play an essential part in increasing the safety and security of any facility. This manual should be used as a model or guide only. End-users are encouraged to adopt all or part of the recommendations as appropriate to meet their individual needs.

Disclaimer: ASSA ABLOY encourages the use in whole or part of this document but does not imply or warrant fitness for any purpose other than for reference only. Its use in whole or part is solely the decision and responsibility of the adopting facility.

Recommended Companion Document

Master Key System Design Guide and Worksheets

In addition to establishing strong key control policies that govern the distribution and management of keys, building an effective physical master key system is crucial to achieving the desired level of security. To that end, ASSA ABLOY offers the “Master Key System Design Guide”, a comprehensive guidebook on setting up a master key system. Worksheets make it easy for the user to begin to lay out a system.

Once the process begins, it’s important to rely upon an expert who can help design a secure master key system and select the right cylinder for each opening. ASSA ABLOY’s team of trained and certified Key System Specialists will help you develop and implement an effective master key system and the appropriate key control policies. Contact your local ASSA ABLOY Door Security Solutions sales team to speak with a Key System Specialist.

Comprehensive Key Control Policy

a. Purpose

1. The purpose of this Key Management Policy is to help protect the life, property, and security of this facility and all its occupants.
2. It shall serve as the framework by which all keys and access credentials will be managed, issued, duplicated, stored, controlled, returned, replaced, and accounted for by the Key Control Authority (“KCA”).
 - 2.1. The KCA comprises the person, persons, department, or committee that has authority to adopt, administer, and enforce this facility’s Key Management Policy.
 - 2.2. This policy shall apply to all keys including those to all space, office equipment, vehicles, padlocks, lockers, safes, etc. owned, operated, or controlled by the facility.
3. This Policy seeks to establish a recorded chain of accountability and access for all credentials, keyholders, and locations.
 - 3.1. Establish a key issuance authority.
 - 3.2. Issue appropriate level keys to individuals.
 - 3.3. Establish authority on all key control policies.
4. This policy seeks to implement a proper key control process and then preserve it by restoring security in a timely manner whenever key control has been threatened or compromised.

b. Specification

1. This facility shall use a key control system and adopt administrative policies that facilitate the enforcement of Key Management Procedures as outlined in this **Key Control Design Guide**.
2. The following represent the basic and most critical elements of key control and shall be included, **as a minimum**, in the key control specification.
 - 2.1. Facility shall appoint a Key Control Authority and/or Key Control Manager to implement, execute, and enforce key control policies and procedures.
 - 2.2. A policy and method for the issuing and collecting of all keys shall be implemented.
 - 2.3. Keys and key blanks shall be stored in a locked cabinet or container, in a secured area.
 - 2.4. A key control management program shall be utilized. A dedicated computer software application is preferred—Key Wizard® or equivalent.
 - 2.5. All keys shall remain the property of the issuing facility.
 - 2.6. A key should be issued only to individuals who have a legitimate and official requirement for the key.
 - 2.6.1. A requirement for access alone, when access can be accomplished by other means (such as unlocked doors, request for entry, intercoms, timers, etc.), shall not convey automatic entitlement to a key.
 - 2.7. All keys shall be returned and accounted for.
 - 2.8. Employees must ensure that keys are safeguarded and properly used.

c. Enforcement

1. This policy shall be adopted by universal consent and administrative mandate from the highest levels to allow full and complete implementation and enforcement.
2. All keys remain the property of facility.
3. Keys that are no longer required for authorized purposes shall be returned to the Key Control Authority (KCA).
4. No person or department shall knowingly receive, borrow, or possess any key for any space without receiving permission from a person duly authorized to give permission to possess such key.
5. No person shall knowingly alter, duplicate, copy, or make a facsimile of any key to a lock of a facility building or property without receiving permission from the KCA.
6. To enforce effective key control, administrators may choose to impose a deposit for each key issued.
7. Keyholders shall use assigned keys for access to authorized locks only.
8. Keyholders shall take measures to protect and safeguard any facility keys issued to them or in their name.
9. Keyholders shall not loan their facility key(s).
10. Keyholders shall not use their key(s) to grant access to non-authorized individuals.
11. Keyholders shall not attempt in any manner to duplicate or alter facility keys in their possession.
12. Keyholders shall immediately report any lost, missing, stolen or damaged keys.
13. Persons entering locked buildings or spaces are responsible for re-securing all doors and shall not prop open any doors.
14. Individuals shall not store keys in desk drawers or other unsecured areas.
15. Violations of any of these enforcement policies may result in disciplinary action up to and including dismissal.

d. Elements of a Key Control Policy

Key Control Authority—"KCA"

1. Facility shall appoint a Key Control Authority with power and authority to:
 - 1.1. Develop all the policies and procedures related to the facility's key management system.
 - 1.2. Appoint or become a Key Control Manager to:
 - 1.2.1. Implement, execute and enforce the key control policies and procedures.
 - 1.2.2. Issue and return keys with proper documentation, authorization, and transaction receipts.
 - 1.2.3. Supervise, authorize, and control the security of key and key blank storage and the key cutting process.

Storage

1. Keys, credentials, and key records shall be stored in a secure condition (data) or location (physical items) protected by lock and key or vault.
 - 1.1. Keys shall be stored in a locked cabinet or container, in a secured area.
 - 1.2. Key rings issued for temporary use shall be of a tamper resistant design so that keys cannot be removed from the ring prior to return.
 - 1.3. Keys stored in a non-centralized location:
 - 1.3.1. Sequence locks release one key upon the insertion and trapping of another.
 - 1.3.1.1. Allows remote issuance of master keys.
 - 1.3.1.2. Permits fewer master keys to be issued on a permanent basis.
 - 1.3.2. Emergency key storage boxes (Knox, Supra type).
 - 1.3.2.1. Subject to local regulations and to protect against theft or duplication, no master keys should be stored in these types of containers.
 - 1.3.3. Computerized key cabinets with access control and audit capability may be used in remote locations for temporary key issuance.
 - 1.4. Key records shall be stored in a secure location that is protected against both fire and theft:
 - 1.4.1. Bitting lists.
 - 1.4.2. Authorization forms.
 - 1.4.3. Key issuance and return records.
 - 1.4.4. Data files shall be password protected and encrypted.

Key Management Formats

The key management system shall be maintained in either a manual or computerized format.

1. The manual format shall use card and index files to easily access, maintain, and cross-reference information on:
 - 1.1. Keys:
 - 1.1.1. Blind code numbers.
 - 1.1.2. Standard Key Coding Symbols (“SKCS”).
 - 1.1.3. Key identity: serial, inventory, or sequence number.
 - 1.1.4. Individuals with authority to issue for each key.
 - 1.1.5. Temporary issue keys and key rings.
 - 1.2. Keyholders:
 - 1.2.1. Name, address, ID #, telephone, key deposit.
 - 1.2.2. Authorized individual’s signature.
 - 1.2.3. Optionally: signature, photo, PIN.
 - 1.2.4. Key deposit (if any).
 - 1.3. Locations:
 - 1.3.1. Room number.
 - 1.3.2. Door number.
 - 1.3.3. Description or usage.
 - 1.3.4. Departmental control.
 - 1.3.5. Security level or access restrictions.
 - 1.4. Hardware:
 - 1.4.1. Lockset, exit devices, deadbolt.
 - 1.4.2. Cylinder type.
 - 1.4.3. Door closer.
 - 1.4.4. Hinges.
 - 1.4.5. Finish.
 - 1.4.6. Protection plates.

2. The computerized format shall use password protected and data encrypted software to easily access, maintain, and cross-reference information on:
 - 2.1. Keys:
 - 2.1.1. Blind code numbers.
 - 2.1.2. Standard Key Coding Symbols (“SKCS”).
 - 2.1.3. Key identity: serial, inventory, or sequence number.
 - 2.1.4. Individuals with authority to issue for each key.
 - 2.1.5. Temporary issue keys and key rings.
 - 2.2. Keyholders:
 - 2.2.1. Name, address, ID #, telephone, key deposit.
 - 2.2.2. Authorized individual’s signature.
 - 2.2.3. Optionally: signature, photo, PIN.
 - 2.2.4. Key deposit (if any).
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 - 2.3.2. Door number.
 - 2.3.3. Description or usage.
 - 2.3.4. Departmental control.
 - 2.3.5. Security level or access restrictions.
 - 2.4. Hardware:
 - 2.4.1. Lockset, exit devices, deadbolt.
 - 2.4.2. Cylinder type.
 - 2.4.3. Door closer.
 - 2.4.4. Hinges.
 - 2.4.5. Finish.
 - 2.4.6. Protection plates.
3. Either format used shall allow a fully searchable cross-reference:
 - 3.1. Keys x location(s).
 - 3.2. Keys x keyholder(s).
 - 3.3. Keyholder x keys.
 - 3.4. Keyholder x location(s).
 - 3.5. Location x key(s).
 - 3.6. Location x keyholder(s).

Record Keeping

1. All key records shall be kept current at all times and are to be considered high security and confidential.
2. Records shall be securely stored (see “Storage”).
3. All transactions shall be recorded in a timely manner.
4. Standardized forms shall be used (see “Forms”).

Policies and Procedures

1. Identifying Keys and Keying
 - 1.1. All keys should only be marked with a blind code number that does not in any way reflect its usage or level.
 - 1.2. The use of standard key coding to mark cylinders or keys is not recommended.
 - 1.3. Keys should not be marked M, MK, GMK, or GGMK to indicate level of keying.
 - 1.4. All issued keys should contain an inventory or serial number that reflects the total number of keys issued and provides a unique identifier for every copy.
 - 1.5. Keys should not be stamped with bittings.
2. Issuing Keys
 - 2.1. All key orders should be properly authorized by an authorized signer, in addition to the keyholder, before issuing.
 - 2.1.1. Each key can have its own appropriate level of authorization.
 - 2.1.1.1. Higher level keys may require higher levels of authorization.
 - 2.2. Issue the proper level key to each individual granting only the appropriate level of access.
 - 2.3. Issue keys by need, not desire.
 - 2.4. Require signature(s) on keyholder agreement:
 - 2.4.1. Signature of keyholder.
 - 2.4.2. Signature of authorizer.
 - 2.5. Require photo ID.
 - 2.6. Keys shall be issued by duration of need, not by term of employment.
 - 2.7. Signature required by keyholder and authorizer.
 - 2.8. Keys must be personally picked up, not mailed.
 - 2.8.1. If necessary, keys may be delivered by courier or other return-receipt-required certified carrier.

- 2.9. Keys shall be individually serialized or numbered.
 - 2.9.1. Keys shall be identified by blind code numbers and serialized number.
- 2.10. Individuals may be issued only one copy of each keyset.
 - 2.10.1. Exception for approved multiple key holders.
- 2.11. The KCA shall establish key issuance authorization levels determined by the type of key. The general rule shall be that an authorizer may only approve keys for spaces directly under his/her control. In some cases more than one authorizer may be required.
 - 2.11.1. Types of keys:
 - 2.11.1.1. Change keys.
 - 2.11.1.2. Master keys.
 - 2.11.1.3. Grand master keys.
 - 2.11.1.4. Top master key.
 - 2.11.1.5. Entrance key.
 - 2.11.1.6. Control keys.
 - 2.11.1.7. Mechanical/Maintenance keys.
 - 2.11.1.8. SKD/Security keys.
- 2.12. Facility shall use standardized key deposits varying by keyholder type and by level of key. For example, the deposit for a master key should be greater than that of a change key.
- 2.13. Keys may not be duplicated or issued except through the KCA or authorized facility locksmith.
- 2.14. Keys shall only be issued by a designated individual.
 - 2.14.1. Exception: electronic key cabinets with audit control or sequence locks.
- 2.15. All keys should be tracked with a return due date and time, especially temporary issue keys.
- 2.16. Shift keys or rings shall be returned at the end of every work shift.
- 2.17. Shift key rings shall be sealed and tamper evident.

3. Returning Keys

- 3.1. All keys shall be returned to the issuing department by the authorized keyholder.
 - 3.1.1. When keys are returned, any key deposit will be refunded and a key return receipt shall be issued to the keyholder.
- 3.2. Found keys must be turned into the KCA.
- 3.3. Final paychecks, records, and/or transcripts may be held pending return of key(s).

4. Non-returned key policy

4.1. A fee for lost or stolen keys shall be established.

4.1.1. In the event that facility keys are lost or stolen, it shall be policy to recombine immediately any cylinders accessible by the lost key(s).

4.1.2. All re-keying charges must be paid by department, individual, or company responsible for losing the key.

4.1.3. Rekeying charges shall be determined by the number of locks operated by the lost or stolen key(s).

4.1.4. If any individual has two or more separate incidents of lost, stolen, or non-returned key violations within a one-year period, key privileges may be revoked.

5. Administration of the Master Key System

5.1. Update the key schedule and bitting lists as new codes and bittings are issued and used.

5.1.1. Send periodic updates to the cylinder manufacturer if factory control over the key system will continue.

5.2. Cross keyed conditions should be minimized or avoided.

5.2.1. When cross keying is unavoidable, all cross keyed conditions should be fully recorded.

6. Audits

6.1. Keyholder:

6.1.1. On at least an annual basis, the responsible department will determine that the proper accountability of keys is being maintained by conducting random key checks that sample the keys being carried by at least 25% of all departmental keyholders.

6.2. Key System:

6.2.1. It is recommended that, under normal circumstances, all keys and cylinders should be changed, or at least evaluated for change, at intervals not exceeding five years.

6.2.2. Perform periodic audits of key cutters to determine if unauthorized duplicate keys can be obtained.

6.3. Reports shall be periodically generated and distributed by department with a written response required to confirm the accuracy of the information being held.

7. Transfer/Temporary use

7.1. Keys shall not be transferred from one individual to another without proper authorization and record keeping from the KCA.

Forms

It is highly recommended that forms be developed to document all key transactions. The following represents basic elements that should be included in one or more of each type of form — **See example next page.**

1. Key Request Form
 - 1.1. Key request:
 - 1.1.1. One form for one key.
 - 1.1.2. Issue multiple forms for multiple keys.
 - 1.2. Key issue agreement.
 - 1.3. Keyholder signature.
 - 1.4. Authorization signature.
 - 1.5. Work order.
 - 1.6. Key issue and deposit receipt.
 - 1.7. Multiple keyholder request.
2. Key Return Form
 - 2.1. Key return receipt.
 - 2.2. Deposit return receipt.
3. Lost or Stolen Key Report Form
 - 3.1. Description of circumstances of loss.
 - 3.2. Rekey fee if any.
4. Service Form
 - 4.1. Cylinder recombination form.
 - 4.2. Request for SKD or NMK keying.
 - 4.3. Lock opening request form.

The following basic information should be included on each form.

1. Key holder name, address, ID and/or department.
2. Signature of key holder and date.
3. Key identification (key set symbol and/or blind code).
4. Location where key(s) are needed.
5. Type of transaction; issue, return, lost or stolen, cylinder recombination, or lock opening request.
6. Authorization signature(s).
7. Date of specific transaction(s).

Key Request Form

(Use one form for each key only)

Name _____

Employee ID# _____ Phone _____

Key# _____ Key Symbol _____ Copy# _____ Mfgr _____

Key Location(s) _____

Key Issue Agreement: In return for the loan of this key, I agree: **1)** not to give or loan the key to others; **2)** not to make any attempts to copy, alter, duplicate, or reproduce the key; **3)** to use the key for authorized purposes only; **4)** to safeguard and store the key securely; **5)** to immediately report any lost or stolen keys; **6)** produce or surrender the key upon official request. I also agree that if the key is lost, stolen, or not surrendered when requested a charge that reflects the cost of changing any and all locks affected may be assessed.

Signature _____ Date _____

Deposit _____

Issue Type: Standard

Temporary

Reissue

Due Date _____

Reason _____

Authorizer's Signature _____ Date _____

Print Name _____

Title _____

Phone _____

OFFICIAL USE ONLY

DATE ISSUED _____

BY _____

CONTROL # _____

ENTERED BY _____

KEY RETURN:

RETURN DATE _____ BY _____

RETURN REASON

DEPOSIT RETURN _____

KEY NOT RETURNED:

LOST STOLEN BROKEN OTHER

EXPLAIN CIRCUMSTANCES: _____

SIGNATURE RECEIPT _____

BY _____

Servicing

1. Cutting keys:
 - 1.1. Only a facility-approved locksmith shall be permitted to cut keys.
 - 1.2. All facility keys shall be cut on factory approved code cutting machines, not on duplicating machines that trace from one key to another. Duplicating machines are less accurate and can transfer wear or inaccuracy that worsens through generations of keys.
2. Pinning/recombining cylinders:
 - 2.1. Shall only be performed by facility-approved locksmith department.
 - 2.2. Shall be on the facility's key system unless approved by KCA.
 - 2.2.1. Combine to all appropriate levels of keying unless pre-approved by KCA.
 - 2.2.2. SKD combinations must be pre-approved by KCA.
3. Installing locks:
 - 3.1. Shall only be performed by facility-approved locksmith department.
 - 3.2. Shall be on facility's key system unless approved by KCA.
4. Preventative maintenance shall be performed regularly to ensure proper operation of keys and locks and to maintain security.
 - 4.1. Worn keys shall be replaced to avoid breakage.
 - 4.2. Worn or poorly functioning cylinders shall be replaced to maintain proper security.
 - 4.3. All facility key machines shall be checked and calibrated regularly, at least on a monthly basis.
5. Locksmithing work shall only be performed by:
 - 5.1. An in-house locksmith department, or
 - 5.2. A facility-approved outside locksmith business.

Condensed Model Key Control Policy

The following is to be used as a guide for developing a key control policy, and to assist in the understanding of how a formalized key control policy should be formatted. When used in conjunction with the Key Control Policy Elements of ASSA ABLOY's Key Control Design Guide, this sample key control policy can be tailored to meet a facility's specific key management objectives.

Purpose

The purpose of this Key Control Policy is to help protect the life, property, and security of this facility and all its occupants.

Specification

This facility shall use a key control system and administrative policies that facilitate the adoption and enforcement of this Key Control Policy.

General

The introduction of a key control policy is essential for the security of this facility and the protection of personnel, property, and equipment.

Facility shall appoint a Key Control Authority with power and authority to: develop all policies and procedures related to the facility's key management system; and, appoint or become the Key Control Manager to execute and enforce key control policies and procedures.

The Locksmith Shop (internal or contracted service), unless otherwise directed, is responsible for making keys, installing and maintaining locks and cylinders.

No person shall knowingly alter, duplicate, copy, or make a facsimile of any key to a lock of a building or property thereof without receiving permission from a person duly authorized.

Key Control

The Key Control Authority will determine appropriate policy and method for the issuing and collecting of all keys.

All keys shall be stored in a secured locked cabinet.

The Key Control Authority shall utilize an effective key control management program and assign the appropriate individual(s) to maintain its use.

To facilitate effective key control, the Key Control Authority may impose a nominal key deposit.

Policy and Procedures

Issuing of Keys

All keys remain the property of _____ (Insert name of facility).

All keys shall be properly authorized by signature before issuing, and shall only be issued by a designated individual.

The process for which keys shall be issued will be based on defined policies and procedure as set forth by the Key Control Authority.

Keys should be issued only to individuals who have a legitimate need for the key.

The number of master keys issued should be limited.

Returning Keys

All keys shall be returned to the issuing department by the keyholder of record.

All lost keys shall be reported immediately to the Key Control Authority. It shall be the facility's policy that when keys are lost or stolen, to recombine immediately any cylinders accessed by the lost keys.

All found keys shall be returned to the Key Control Authority.

Employee Responsibilities

Employees shall only use their keys to access their assigned work areas and should lock doors when leaving any secured area. Employees must also ensure that keys are safeguarded and properly used.

The unauthorized possession, use or reproduction of a key may constitute theft or misappropriation. Any employee who violates this policy may be subject to disciplinary action.

Specific Applications

a. Educational K-12

Following are specific examples of additional elements that should be considered when tailoring a key control policy for Educational, K-12 facilities:

1. K-12 facilities require heightened lock and key management to protect a highly vulnerable population of students and staff.
 - 1.1. Any policy must restrict the distribution and ensure the retrieval of keys.
 - 1.2. Access through entrance doors must be tightly controlled.
 - 1.3. Threats: drugs, kidnapping, vandalism, terrorism, violence, abuse.
2. Lockdown conditions and procedures.
3. Limited school year with extended periods of vacation or closure that require return of keys or lock-out of many keyholders.
4. Community usage and access requirements:
 - 4.1. Special access authorization requirements.
 - 4.2. Special requirements for unlocking requests.
5. A school district may have many buildings, often spread over a wide geographical area.
 - 5.1. This may require special considerations for service, remote key duplication and issuance.
6. Unique types of keyholders:
 - 6.1. Teachers.
 - 6.1.1. Keys should normally be returned at end of academic year.
 - 6.2. Substitute teachers.
 - 6.2.1. Temporary issued keys.
 - 6.3. Administration.
 - 6.4. Maintenance/Service/Security.
7. Administered by local government and subject to state, federal, and local laws.

b. Healthcare Facilities

Following are specific examples of additional elements that should be considered when tailoring a key control policy for Healthcare facilities.

Healthcare facilities, including hospitals, clinics, and nursing homes provide unique demands upon a key system. Facilities protecting a more vulnerable population, such as children, the sick or infirm, the aged, those with infectious diseases, those susceptible to infection, or those with mental impairment, even including the criminally insane, can present a diverse set of needs. Some of those considerations are:

1. Healthcare facilities (“HCF’s”) may require a strong KCA that can enforce key issuance and return policies despite the strong needs and powerful personalities of doctors and administrators.
2. HIPPA privacy requirements.
3. HCF’s have different departments with varying security needs:
 - 3.1. Obstetrics.
 - 3.2. Pediatric wards.
 - 3.3. Psychiatric detention areas.
 - 3.4. Infectious disease areas.
 - 3.5. Emergency rooms.
 - 3.6. Elderly care with anti-wandering requirements.
 - 3.7. Unique elevator controls.
 - 3.8. Pharmacy: storage and dispensary.
 - 3.9. Security department with full access abilities.
 - 3.10. Custodial and cleaning staff must have full access to keep high sanitation standards.
 - 3.11. Radiology.
 - 3.12. Laboratories.
4. HCF’s often allow free access, 24x7x365, to visitors and attendants, but still require a high degree of control within the building itself.

5. An HCF may have many buildings united under one key system.
6. Unique types of Keyholders:
 - 6.1. Doctors.
 - 6.2. Nurses.
 - 6.3. Administrators.
 - 6.4. Maintenance and technicians.
 - 6.5. Cleaning supervisors.
 - 6.6. Security.
 - 6.7. Temporary staff with high turnover.
 - 6.8. Outside contractors.
 - 6.9. Researchers.
7. Unique accreditation and federal, state and local government inspection and legal requirements.

c. Colleges and Universities

Following are specific examples of additional elements that should be considered when tailoring a key control policy for colleges and universities.

1. Colleges and universities require heightened security measures in lock and key management to protect a highly vulnerable population of faculty, staff and students.
 - 1.1. Any policy must restrict the distribution and ensure the retrieval of keys.
 - 1.2. The key control policy must properly blend the needs of the physical security locking system with other access control measures.
 - 1.3. Different security needs for academic buildings, housing—undergraduate and graduate, on-campus and off-campus—administrative, physical plant, and other outside contracted services must also be considered in the key control policy.
 - 1.4. Threats: theft, vandalism, terrorism, violence, student pranks, protesters.
2. Colleges and universities may have many different department types and usages with varying requirements. They may include:
 - 2.1. Academic.
 - 2.2. Dormitories and Commons (or simply Housing).
 - 2.3. Athletics.
 - 2.4. Real Estate.
 - 2.5. Apartments.
 - 2.6. Hotels and lodging.
 - 2.7. Physical Plant.
 - 2.8. Government and industry research laboratories.
3. Standard school year calendar with extended breaks or closure that require return of keys or lock-out of keyholders.
4. Community usage and access requirements:
 - 4.1. Special access authorization requirements.
 - 4.2. Special requirements for unlocking requests.
5. Types of Keyholders:
 - 5.1. Administrators.
 - 5.2. Staff.
 - 5.3. Professors.
 - 5.4. Maintenance and security.
 - 5.5. Students.
 - 5.5.1. Keys should normally be returned at end of academic year, or during periods of lock out.
 - 5.6. Contracted services.
 - 5.6.1. Temporary issued keys, to be returned as specified
 - 5.7. Researchers.

d. Office Buildings

The following are examples of additional elements that should be considered when tailoring a key control policy for Office Buildings.

1. Administration of tenant space v. core space.
 - 1.1. Tenant space belongs to the office and retail occupants of a building and can change regularly both in size, structure and composition.
 - 1.2. Core space is the backbone or support area of a building represented by private mechanical, electrical, communications, janitorial, roof as well as public areas such as stairwells, lobbies, shipping and loading areas, parking areas, etc.
2. Tenants often request or insist upon their own key system and key management procedures managed independently from building management.
 - 2.1. Each tenant may have its own KCA or should use one provided by building management.
3. Administration and structure of keys and key system are often designed by floor and may or may not overlap with the structure of tenant usage.
4. High traffic flow of public non-keyholders during the day (though more and more may be required to be escorted or identified first), versus very limited access after hours.
5. Vacant or unoccupied space.
6. High rate of change and redesign of the key system with tenant turnover.

Glossary of Terms and Definitions

This glossary of terms and definitions relates to this Key Control Policy and should not be considered universal.

For a complete listing of all terms relating to cylinders, keys and master keying references refer to ALOA's sponsored publication ***The Professional Glossary of Terms Relating To Cylinders, Keys, and Master Keying.***

Any definitions herein that were adopted from ALOA's publication are indicated by an asterisk.

Bitting*

1. The number(s) which represent(s) the dimensions of the key cut(s).
2. The actual cut(s) or combination of a key.

Blind Code Number*

A designation, unrelated to the bitting, assigned to a particular key combination for future reference when additional keys or cylinder may be needed.

Change Key

Change Key (CK) – sometimes referred to as “Day Key.”
The lowest level key in a key system.

Credential

See key

Controlled Cross Keying *

A condition in which two or more different keys of the same level under the same higher level key(s) operate one cylinder by design, i.e. XAA1 operated by AA2 code symbol.

Cross Keying

The deliberate process of combining a cylinder (usually in a master key system) to two different keys which would not normally be expected to operate it together.

Pinning a cylinder in a key system to additional keys other than those identified to operate the cylinder based on the cylinder's Standard Key Code key symbol.

Control Key

A key to remove and/or install an interchangeable or removable core.

Grand Master (GM)

The TMK in a 3 level Master Key system, or a Grand Master (GM) key in a higher level Master Key system.

Great Grand Master (GGM)

The TMK in a 4 level Master Key system, or a Great Grand Master (GGM) key in higher level Master Key system.

Great Great Grand Master (GGGM)

The TMK in a 5 level Master Key system or a Great Grand Master (GGM) key in a higher level Master system.

Key

A token, credential, or device used to grant or deny access. For this manual the word “key” shall refer to electronic and mechanical devices.

Key Control*

Any method or procedure which limits unauthorized acquisition of a key and/or controls distribution of authorized keys. A systematic organization of keys and key records.

Key Control Authority (KCA)

The individual or group having responsibility and jurisdiction for creating, enforcing, and administering all key control policies and procedures.

Key Symbol*

A designation used for a key combination in the standard key coding system, e.g., A, AA, AA1, etc.

Keyed Alike (KA)*

Of or pertaining to two or more locks or cylinders which have or are to have the same combination. They may or may not be part of a keying system.

Keyway (Kwy)

A pattern of milling (warding) groove configurations of that appear on each side of the key blank that may be for a single keyway or a family of key sections that are part of a multiplex keyway family.

Key Section

A single grooved pattern that is milled onto each side of a key blank and is one of a series of groove patterns belonging to the same factory keyway family.

Master – Key Sections

A groove pattern representing different individual key sections that are milled into each side of a single key blank. These milling patterns are part of a pre-defined group of groove patterns all belonging to the same factory keyway family.

Master Key (MK)

The TMK in a level 2 Master Key system, or Master Key (MK) in a higher level Master Key system.

Multiple Keyholder

An individual authorized to be issued multiples of any single key for purposes of bulk key issue.

Multiplex Key Blank

A key blank whose side milling or wardings are part of a manufacturer's particular series of key sections.

Multiplex Master Key System

A master key system that takes advantage of a manufacturer's sectional keyway family to create very large master key systems.

NMK - Not Master Keyed

Used as a suffix to a key set that indicates the cylinder built to this key symbol is only to be operated by the change key and no master level keys are to operate the in the cylinder. This term maybe interpreted differently by various manufacturers. NMK may mean that only the Master Key is not to operate in the cylinder. You may also see NGMK meaning only the GM key is not to operate in the cylinder, or NGGMK meaning that only the GGMK key is not to operate in the cylinder.

Sequence Lock

A lock designed to retain one or more keys captive until another key is inserted, turned and trapped. The second key is retained until the first key is returned and turned to the captive position.

Shift Keys

Keys or key rings issued to individuals only for the duration of their work period, to be returned at the end of his/her work shift.

TMK * - Top Master Key

The highest level master key in a particular key system.

Uncontrolled Cross Keying*

A condition in which two or more different keys under different higher level key(s) operate one cylinder by design, i.e. XAA1 Operated by AB1

VKC - Visual Key Control System

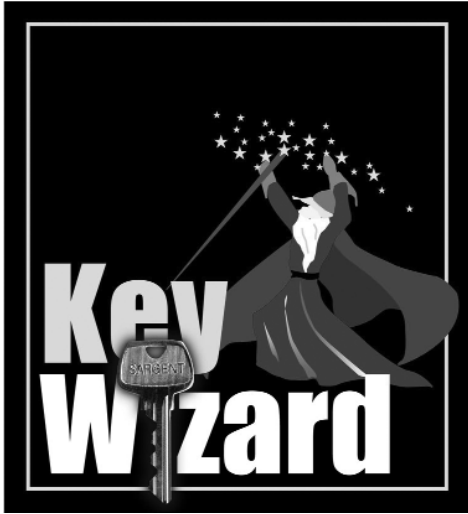
The stamping of cylinders and/or key bows in a master key system with the "Standard Key Coding System" identification symbol.

UL437

The Underwriters Laboratory Test Standard for High Security Cylinders.

Some of these terms and definitions have been taken from *The Professional Glossary of Terms Relating to Cylinders, Keys, and Master Keying*, developed by the "Master Keying Study Group of the ALOA Sponsored Task Group for Certified Training Programs."

The Professional Glossary of Terms Relating to Cylinders, Keys, and Master Keying is a recognized standard in the hardware industry for terms and definitions related to cylinders and keys used by the manufacturers and users of products generated by the hardware locking industry.



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Any terms and definitions taken from the *The Professional Glossary of Terms Relating to Cylinders, Keys, and Master Keying* that appear in this document are marked with an (*) asterisk. Any terms not marked with the asterisk are terms and definitions that have evolved over the years at ASSA ABLOY AMERICA and continue to be applied in the everyday processing of cylinders, keys and master keying systems. Non- asterisked terms appearing in this book should not be construed as being necessarily recognized as the standard by all manufacturers.

Key Control Design Guide:

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Authors:

Lee A. Garver, DAHC

ASSA ABLOY Door Security Solutions
Business Development Manager – Key Systems
New Haven, CT

Clyde T. Roberson, CML, AHC, CPP

Medeco Security Locks
Salem, VA

David A. Steele

Sargent Manufacturing Company
New Haven, CT

Original Publication: June 2005

Revised: July 2007

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Marietta, Georgia
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Bensenville, Illinois
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Kailua, Hawaii
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Pittsford, New York
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Key System Schematic Forms

Form KSS-1 is for a 4-level system. All grands are printed under the great grand. You just fill in the name of the area or department for each, including the total number of master keys anticipated under each grand.

Form KSS-2 is used for a grand master key system or for the A grand under a great grand master key. All master key symbols are preprinted on the form. You again just fill in the area or department and the number of change keys for each master, including all expansion. Changes directly under the grand (A1, etc.) are handled in the last box.

Form KSS-3 is just like KSS-2, but there are no symbols printed on it. You use this form as a continuation of KSS-2 to map out the masters under each grand beyond A. It is also usable to map out changes under each master key if you need to go to that level of detail.

Instructions: Fill in area or dept. associated with each grand master, together with the total number of masters, including future expansion. Do not use the letters I, O, Q or X as grand master key symbols.

GGM
Area or Department
Planned # of Grands

Great Grand Master Key

Control

CMK

(Selective MK)

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Job Reference Information:

ASSA ABLOY

Instructions: Fill in area or dept. associated with each master. Fill in total number of changes, including future expansion. Do not use the letters I, O, Q or X as master key symbols.

A
Area or Department
Planned # of Masters

Grand Master Key

- Control
- CMK
- _____

(Selective MK)

<table border="1"> <tr><td>AA</td></tr> <tr><td>Area or Department</td></tr> <tr><td>Planned # of Changes</td></tr> </table>	AA	Area or Department	Planned # of Changes	<table border="1"> <tr><td>AE</td></tr> <tr><td>Area or Department</td></tr> <tr><td>Planned # of Changes</td></tr> </table>	AE	Area or Department	Planned # of Changes	<table border="1"> <tr><td>AJ</td></tr> <tr><td>Area or Department</td></tr> <tr><td>Planned # of Changes</td></tr> </table>	AJ	Area or Department	Planned # of Changes	<table border="1"> <tr><td>AN</td></tr> <tr><td>Area or Department</td></tr> <tr><td>Planned # of Changes</td></tr> </table>	AN	Area or Department	Planned # of Changes	<table border="1"> <tr><td>AT</td></tr> <tr><td>Area or Department</td></tr> <tr><td>Planned # of Changes</td></tr> </table>	AT	Area or Department	Planned # of Changes	<table border="1"> <tr><td>AY</td></tr> <tr><td>Area or Department</td></tr> <tr><td>Planned # of Changes</td></tr> </table>	AY	Area or Department	Planned # of Changes
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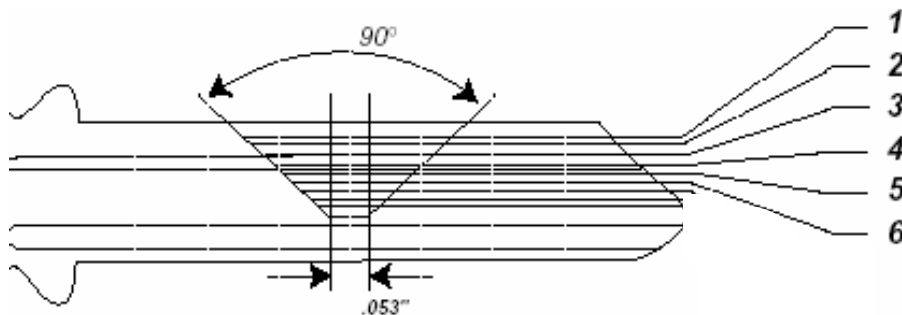
Mathematics of Master Keying

This small handout cannot possibly address the many complexities of master keying and the capacity of one specific master key system relative to another. Rather, this simplification is designed to provide the architectural hardware consultant and sales person enough basic technical and mathematical principles to be comfortable handling a keying conference and submitting expansion specs to the factory for new systems and additions to existing systems.

All numbers referenced here are *theoretical* and are based on one keyway. They are offered for comparison and general understanding only. Actual numbers will be smaller due to physical limitations in certain cylinders and in cutting keys. Cross keying and selective master keys reduce the numbers further. Master ring cylinders, on the other hand, use totally different rules and yield much larger systems.

If you are planning a new system and find that the expansion numbers are a 'close fit' for one or more levels of keying, check with the Corbin Russwin Key Systems Department *before* committing to the expansion with your customer.

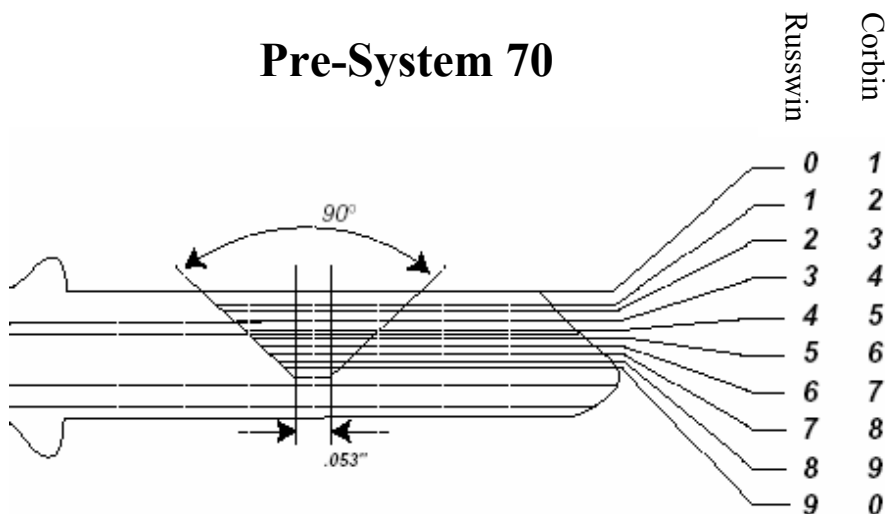
System 70



In System 70, the increment between depths is large enough that you can use every depth in each cut position of keys within the same system.

There are 6 depths total. Removing one for the top master key leaves 5 for progression. Therefore, **the multiplier for System 70 is 5.**

Pre-System 70

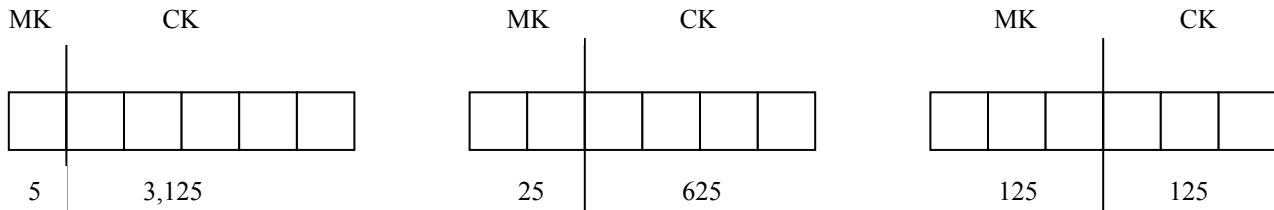


In Pre-System 70, the increment between depths is so small that you must skip every other depth in each cut position of keys within the same system.

Each cut uses either odd or even depths, totaling 5 for any one cut. Removing one for the top master key leaves 4 for progression. Therefore, **the multiplier for Pre-System 70 is 4.**

System 70 Guidelines

Grand Master Key Systems *6-pin*



Note: each square represents one pin chamber of the cylinder/key

Example:

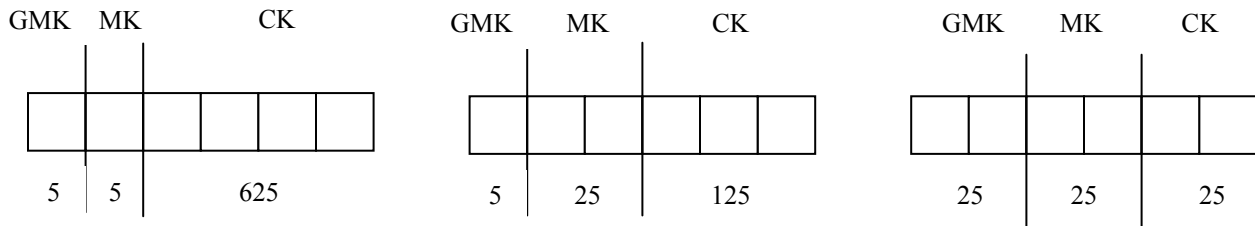
1. System spec is 1-20-50 (1GMK, 20 MKs and 50 changes under each MK)
 - Possible with 1 keyway: 2 chambers ($5 \times 5 = 25$) for MKs and 3 chambers ($5 \times 5 \times 5 = 125$) for changes.
 - Done with one chamber to spare.
 - Remember, the top master (here, the GMK) is always “free.” You don’t do any progression to obtain it.
2. System spec is 1-50-150 (1 GMK, 50 MKs and 150 changes under each MK)
 - Not possible with 6-pin cylinder on 1 keyway: MKs need 3 chambers ($5 \times 5 \times 5 = 125$) and changes need 4 chambers ($5 \times 5 \times 5 \times 5 = 625$)

Option1: Use 1 keyway with 7 pin cylinders.

Option2: Use 3 multiplex keyways with 6-pin cylinders. 4 chambers for change keys ($5 \times 5 \times 5 \times 5 = 625$) 2 chambers for MKs ($5 \times 5 = 25$) and repeat on 2nd and part of 3rd keyways. Theoretically, 2 keyways would suffice ($25 + 25 = 50$) but the 25 is a theoretical number which will be slightly reduced in reality.

System 70 Guidelines

Great Grand Master Key Systems *6-pin*



Note: each square represents one pin chamber of the cylinder/key

Example:

3. System spec is 1-6-10-60 (1GGMK, 6 GMKs, 10MKs under each GMK and 60 changes under each MK)

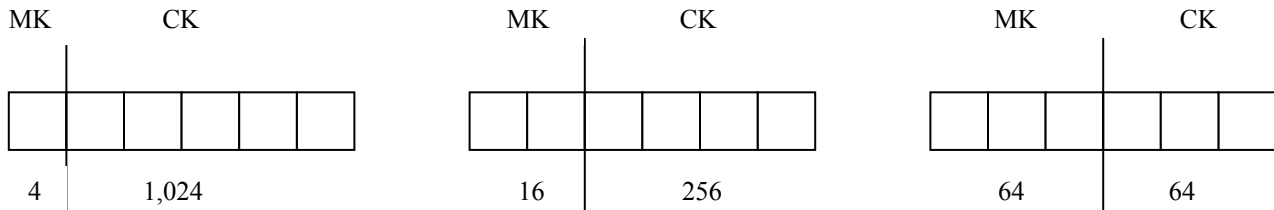
- Remember, the top master (here, the GGMK) is always “free”. You don’t do any progression to obtain it.
- Not possible on one 6-pin keyway. Need 2 chambers ($5 \times 5 = 25$) for GMKs, 2 for MKs and 3 ($5 \times 5 \times 5 = 125$) for changes.

Option1: Use 1 keyway with 7 pin cylinders.

Option2: Use 2 multiplex keyways with 6-pin cylinders. 3 chambers for change keys ($5 \times 5 \times 5 = 125$) 2 chambers for MKs ($5 \times 5 = 25$) and divide the grands to have 3 on the first keyway and 3 on the second.

Pre-System 70 Guidelines

Grand Master Key Systems *6-pin*



Note: each square represents one pin chamber of the cylinder/key

Example:

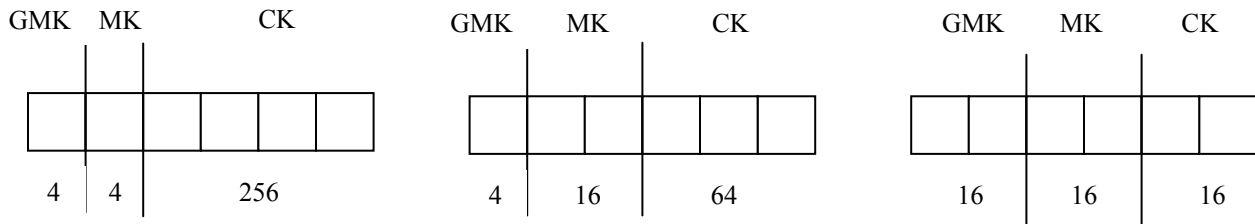
4. System spec is 1-20-50 (1GMK, 20 MKs and 50 changes under each MK)
 - Possible with 1 keyway: 3 chambers ($4 \times 4 \times 4 = 64$) for MKs and 3 chambers ($4 \times 4 \times 4 = 64$) for changes.
 - Remember, the top master (here, the GMK) is always “free.” You don’t do any progression to obtain it.
5. System spec is 1-50-150 (1 GMK, 50 MKs and 150 changes under each MK)
 - Not possible with 6-pin cylinder on 1 keyway: MKs need 3 chambers ($4 \times 4 \times 4 = 64$) and changes need 4 chambers ($4 \times 4 \times 4 \times 4 = 256$)

Option1: Use 1 keyway with 7 pin cylinders.

Option2: Use 4 multiplex keyways with 6-pin cylinders. 4 chambers for change keys ($4 \times 4 \times 4 \times 4 = 256$) 2 chambers for MKs ($4 \times 4 = 16$) repeated on 4 keyways ($4 \times 16 = 64$)

Pre-System 70 Guidelines

Great Grand Master Key Systems 6-pin



Note: each square represents one pin chamber of the cylinder/key

Example:

- System spec is 1-6-10-60 (1GGMK, 6 GMKs, 10MKs under each GMK and 60 changes under each MK)
 - Remember, the top master (here, the GGMK) is always “free”. You don’t do any progression to obtain it.
 - Not possible on one 6-pin keyway, even with 7-pin cylinders. Need 2 chambers ($4 \times 4 = 16$) for GMKs, 2 for MKs and 4 chambers ($4 \times 4 \times 4 \times 4 = 256$) for changes. Theoretically, only 3 are needed for changes ($4 \times 4 \times 4 = 64$) but 64 is *theoretical* and we need 60 *actual*. Play it safe.
- Option1: Use 2 keyways with 7 pin cylinders. 4 chambers ($4 \times 4 \times 4 \times 4 = 256$) for changes, 2 chambers ($4 \times 4 = 16$) for MKs and 1 chamber (4) for the grands, distributing 3 grands on each keyway.
- Option2: Use 6 keyways with 6-pin cylinders. 4 chambers ($4 \times 4 \times 4 \times 4 = 256$) for changes and 2 ($4 \times 4 = 16$) for MKs. Each of the 6 grands on its own keyway.