OFFICE OF THE ATTORNEY GENERAL

ATTORNEY GENERAL'S BUILDING SECURITY COMMISSION

BUILDING SECURITY STANDARDS

A Final report to the California Legislature

EVELLE J. YOUNGER, Attorney General

January, 1974

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ATTORNEY GENERAL

STATE OF CALIFORNIA

OFFICE OF THE ATTORNEY GENERAL

Department of Justice

STATE BUILDING, LOS ANGELES 90012

January 7, 1974

Honorable Robert Moretti
Speaker of the Assembly
Room 3164, State Capitol
Sacramento, California 95814

Honorable James R. Mills
President pro Tempore of the Senate
Room 5100, State Capitol
Sacramento, California 95814

Gentlemen:

More than two years ago, the Legislature wisely concluded that Californians could be better protected from burglary and other crimes if the state developed a program to study and prevent illegal entries of buildings. In passing Assembly Bill 3030 (Moretti) in 1971, you called upon the California Department of Justice to undertake this work and to submit a final report to you by the fifth legislative day of 1974.

Herewith please find that report, but our research has shown that work in this area cannot be called completely "final" for some time to come. We believe our work provides some real improvement in the area of door and lock systems. If the legislative proposals contained in our report are enacted and we are able to move forward expeditiously to the development of the regulations and standards recommended, we can all share the satisfaction of making Californians safer from crime.

We hope that the report is of interest and that it informs you in some detail about the policy and technical aspects of the Building Security Study. We will, of course, be prepared to answer questions about it, to testify at hearings and to do anything else necessary to inform the legislature about our work.

Sincerely,

Evelle J. Younger

EVELLE J. YOUNGER
Attorney General

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Enclosure

BUILDING SECURITY STANDARDS

Final Report to the California Legislature

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ACKNOWLEDGMENTS

This research was accomplished through the support and active participation of many individuals from several organizations. In addition to the enduring commitment by members of the Attorney General's Building Security Commission, it is appropriate to recognize contributions made by the American Society for Industrial Security, the California and International Conference of Building Officials, the State Building Standards Commission, Western and California Fire Chiefs Association, and offices of the State Architect and State Fire Marshal.

In particular, the security products and building industries should be commended for the enthusiastic support they have given in the past two years, both in the form of technical expertise and in providing products for analysis.

Finally, the efforts of the California Crime Technological Research Foundation's staff, Douglas E. Roudabush, Executive Director, Richard Steele, Laboratory Director, Dr. Francis J. Climent, Research Engineer, and Laboratory Engineers, Melvin Peterson, George Pickman, James Stanfield and James Starr should be recognized for its pioneer work in establishing a technical approach for continued work in this area of the crime prevention field.

PART A

PROGRAM OVERVIEW

CHAPTER I—INTRODUCTION

THE NEED FOR ACTION

It is not necessary to detail with any specificity the need for programs to reverse the upward trends in crime. All of the seven major groupings* showed rate increases in California during 1972. The crime of burglary had one of the highest increases and represented over one-half of the total major offenses reported to the police. This percentage is well above that of the rest of the country, and is the major reason for California's distinctive position as the number one crime state in the United States.

Local communities are alarmed by the threat of crime, as evidenced by the variety of programs they have initiated to deal with the problem. These efforts are to be applauded and encouraged. However, a proliferation of local standards on building security has created problems of inconsistency, causing some legitimate concerns on the part of security products producers and suppliers and creating uncertainty as to the efficacy of various conflicting regulations.

State intervention into local law enforcement activities should be avoided unless such action can enhance existing efforts. Indeed, duplication of local programs is usually less efficient, and is a waste of time, money and effort. However, technical resources must be provided in certain areas too complex for local jurisdictions to become experienced enough in to meet their basic needs. A statewide system for testing, evaluating, and classifying materials covered by regulations will promote the maintenance of a sound technical rationale and enable producers to respond without fear of widespread noncompliance due to regional variations, thus assuring an adequate supply of materials meeting minimum building security standards in the future.

A LEGISLATIVE RESPONSE

On November 30, 1971, Governor Reagan signed Assembly Bill 3030 (Moretti) into law, adding sections 14050 and 14051 to the California Penal Code. They require the Department of Justice to develop and recommend to the Legislature, and thereafter continually review, building security standards for the purpose of reducing the likelihood of burglary in California. Forty thousand dollars was appropriated for this task.

Following the passage of A.B. 3030, the Attorney General's Building Security Commission was formed to assume authority over the program. It is comprised of experts from both inside and outside the Department of Justice, who serve voluntarily and provide direction to staff efforts. A Project Director was then selected by the Commission and appointed by the Attorney General to manage the program. Technical resources are being provided by the California Crime Technological Research Foundation through an agreement with the Commission, and funded with federal grant monies from the California Council on Criminal Justice ($85,000 for the initial study and $150,000 for fiscal year 1973-1974).

*Murder, forcible rape, robbery, burglary, aggravated assault, auto theft, and larceny over $50.

CRIME CAN BE REDUCED

A program such as this can successfully achieve a reduction in the number of burglaries committed in California. It will take some time, however, and a firm commitment from a number of groups. Government must take the initiative, and industry must be willing to accept responsibility for providing strong technical support.

The impact of such initiative and responsibility will be major, and benefits will extend much further than the obvious values of a lowered crime rate. Local enforcement bodies will be supported by a statewide research and development source, obviating the need to maintain a highly technical standard. Security products producers will be assured of statewide consistency, and will have access to an extensive information base to assist them in complying with new regulations.

In California, we currently have a static situation as far as the availability of quality security products is concerned. To supply what is required in terms of quality and quantity, massive new production and distribution capabilities will have to be developed within the next few years. The effect of a rationale standards setting policy can go far in inducing cooperation from producers; and given proper direction, they will provide products that will enable us to achieve our goals.

APPROACH

This program is unique among burglary studies done to date. Essentially it involves a detailed analyais of two fundamental aspects of the problem: 1) *burglary threats,* and 2) *security systems and devices.* The major areas of this approach are as follows:

- Analysis of man's ability to attack and forcibly enter closed premises
- Analysis of the resistance properties of common building components (including security devices) when subjected to attack
- Development of minimum resistance levels for building components based upon the above analyses

In addition, an administrative and legal structure has been developed to enable new standards to become part of the law and begin working toward the goal of reducing the likelihood of burglary. They involve the following tasks:

- Development of a legal procedure to implement building security standards based upon specific resistance levels
- Development of a testing and certification program to enable manufacturers to comply with standards
- Development of a scheme to review the effectiveness of standards and update them in the future

GENERAL RECOMMENDATIONS

- Establish design and performance criteria for door and window systems to obviate the most common non-tool and tool attack techniques employed in California burglaries. These criterion are broken down into five basic categories:
  a) Doors
  b) Hardware
  c) Sliding doors and windows
  d) Windows
  e) Materials
- Establish a legal system to set forth authority to create and maintain standards, and to provide for Health and Safety Code violations for noncompliance.
- Establish a materials and equipment listing procedure to enable security products manufacturers to procure certification of compliance.
- Establish a statewide system for evaluating security needs, and causing regular changes to be made in existing regulations.

CHAPTER II—OUTLINING THE PROBLEM

AN ANALYSIS OF CRIME

Before any program can be established to control crime or, as in the case of this program "to reduce the likelihood of burglary," it is first necessary to determine the elements of the problem, and which elements should be impacted. The following diagram depicts the fundamental elements of burglary in a chronological system of events. The system is not all inclusive, nor are all events present in every case, but within the concept of burglary, these basic elements remain readily identifiable and can be isolated for analysis purposes.

DESIRE—Motivation to commit a criminal act—this is a key element in the control of crime, but it is also the most complex and least understood. A variety of attempts have been instituted to remove or alter criminal motives, including psychological and sociological impact programs and the corrections concept of punishment as a deterrent.

OPPORTUNITY—A favorable circumstance that facilitates the commission of crime—many crime prevention programs suggest methods for citizens to reduce such opportunities through "crime consciousness." Examples include neighborhood alert programs and consumer protection information dissemination.

ACT—The physical carrying out of the criminal desire—this element can be controlled through actual physical restraint. Examples include building security programs to increase attack resistancy, human guards, and other means of interposing a barrier between an attacker and his objective.

PROPERTY—Something of value which is the objective of the criminal act—criminal activity can be restrained if better identification techniques are employed to aid in recovery of property.

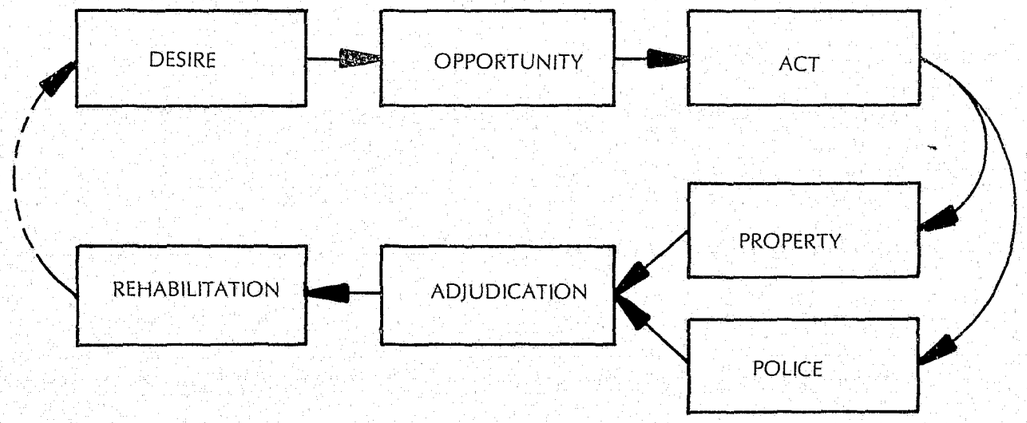
POLICE—A force organized to maintain order, prevent and detect crime, and enforce law—any means to cause the police to become more effective will influence the success of the criminal act. Training programs to increase investigative skills and improved communications systems are examples of programs to increase police effectiveness.

ADJUDICATION—The process of arriving at a decision—anything that will improve the court's ability to ascertain the truth will strengthen our ability to control crime. Better laws and procedures, and speedier disposition of cases are examples of such improvements.

REHABILITATION—The restoration of an offender to a law abiding disposition—any successes in the corrections and sentencing process should directly affect the DESIRE element in the chronology and help curtail criminal activity. The concept of rehabilitation may also include punishment for retribution or isolation of an offender for public protection, but these may be of more interest in a broader corrections sense, rather than as an effect upon motivation.

A more detailed analysis of burglary will obviously reveal many additional complex sub-topics; however, this basic network illustrates some of the mutual dependencies—any one of which can theoretically affect burglary by modification. Of course, some elements will lend themselves to influence more easily than others, and some can be considered of greater potential impact, and thus importance, than others. It is not the intent of this report to arrive at any conclusions on these points, but

Figure 1



merely to point out the fact that various burglary prevention programs fit into the overall crime problem in distinct places.

Fortunately, building security programs usually deal with physical barriers and thus influence the ACT element, one which lends itself to study by physical engineering techniques—a much more exact science than the behavioral sciences required to study some of the other elements. There are some residual "psychological effects" associated with the maintenance of physical barriers which, by nature of a known ability to resist attack, reduce criminal motivation. However, the main emphasis of this research is confined to physical attack (ACT); purely psychological aspects of physical security have not been considered in the development of these initial standards, but nevertheless are important areas to consider in later studies. Some of these include lighting, landscaping, esthetics, plot layout, and other areas that pose mental rather than physical obstacles to a potential intruder.

WHAT IS PHYSICAL SECURITY?

Physical security is the art and science of creating and maintaining authorized control over physical assets. Three fundamental elements are required: 1) *living resources;* 2) *material resources;* and 3) *management and methods.* Security may be achieved by employing a scheme of living and material resources in such a manner as to create a chain of mutual dependencies and create a *barrier.* This barrier is interposed between an attacker and his objective, usually a valuable, and must be overcome before the objective can be attained. Management and methods refer to an organization for directing, controlling, and administering the system, and to policies, procedures, and practices necessary for continuing effective operation of the system. Figure 2 is a graphic portrayal of these fundamental elements.

Barriers

Barriers are systems of devices or characteristics constructed to withstand attack by specified means for a specific period of time. Barriers may be used for perimeter, exterior, or interior protection, and are designed to prevent or delay unauthorized access to property. As illustrated by Figure 2, barriers may consist of either living or material elements.

Living elements consist of on-premises counterforces such as watchmen or sentry dogs, and off-premises counterforces such as private patrols and local law enforcement officers. Although living participants are required to maintain optimum security, they are not of primary interest to this study.

Material elements of barrier systems are classified as either physical or psychological. Physical barriers are made to resist actual attack, and include all building components, such as doors and windows, walls, roofs, floors, and so forth. On the other hand, psychological barriers consist of "deterrent factors" which arise out of maintaining a material barrier. Examples include design features, lighting, as well as physical means which, by nature of a known security value, reduce criminal motivation.

Specifications for Barriers

There are two basic types of barrier specifications: performance and design.

Performance Specifications are only concerned with what a barrier can accomplish, and are not a description of its physical geometry, dimensions, material composition, or movements. A barrier's physical resistance can be expressed in the amount of time it must resist attack by specified means. Performance specifications can be written to cover a part, parts, or total design of a component. For example, specific construction dimensions and materials can be given for a bolt, and performance specifications can be written to cover what is expected of the bolt *or* the entire lock, including installation.

Design Specifications cover the geometry, dimensions, materials, installation and maintenance requirements. The specification may define any kind of device or system that meets the requirements of the performance specification. Thus, design specifications must rely on performance specifications to provide an accurate description of desired security.

Whenever possible, standards derived from this research are expressed in performance terms. In some cases it has been necessary to use both design and performance criteria. Design specifications have also been used to provide supplementary information necessary for use in compliance to the new regulations.

Significance of Time

A material barrier can only be considered a delay factor in the perpetration of a crime, and will eventually be overcome. A barrier system is considered to be successful if it can resist attack for a period of time longer than is required for an informed interceptor (a human guard, for example) to arrive with means to stop the attack.

The possibility of on-site capture depends primarily upon *perpetration time* and *response time.* Perpetration time covers the period from initiation of the criminal act until escape is perfected. Response time is the period between initiation of the criminal act and the arrival of the interceptor (often noted as T.A.P. for time of arrival of police). While it is true that notification is not always timely, or even made at all, a comparison of perpetration and response times provides a good method for determining security needs because it presents a ratio that can be used to measure success or failure of a barrier.

The means of informing the interceptor may be by actual observation, or through some material notifier —mechanical, electronic, and so forth—which transmits knowledge of the attack to the human guard. If the interceptor arrives before or at the moment of departure of the criminal, the probability of capture is very high, and can be increased by extending the perpetration time, reducing the response time, or both. *The extension of the perpetration time through the introduction of physical barriers is the primary approach of this program.* The curve in Figure 3 is representative of chance of apprehension to time spent at the location by the perpetrator, and substantiates the validity of this approach.

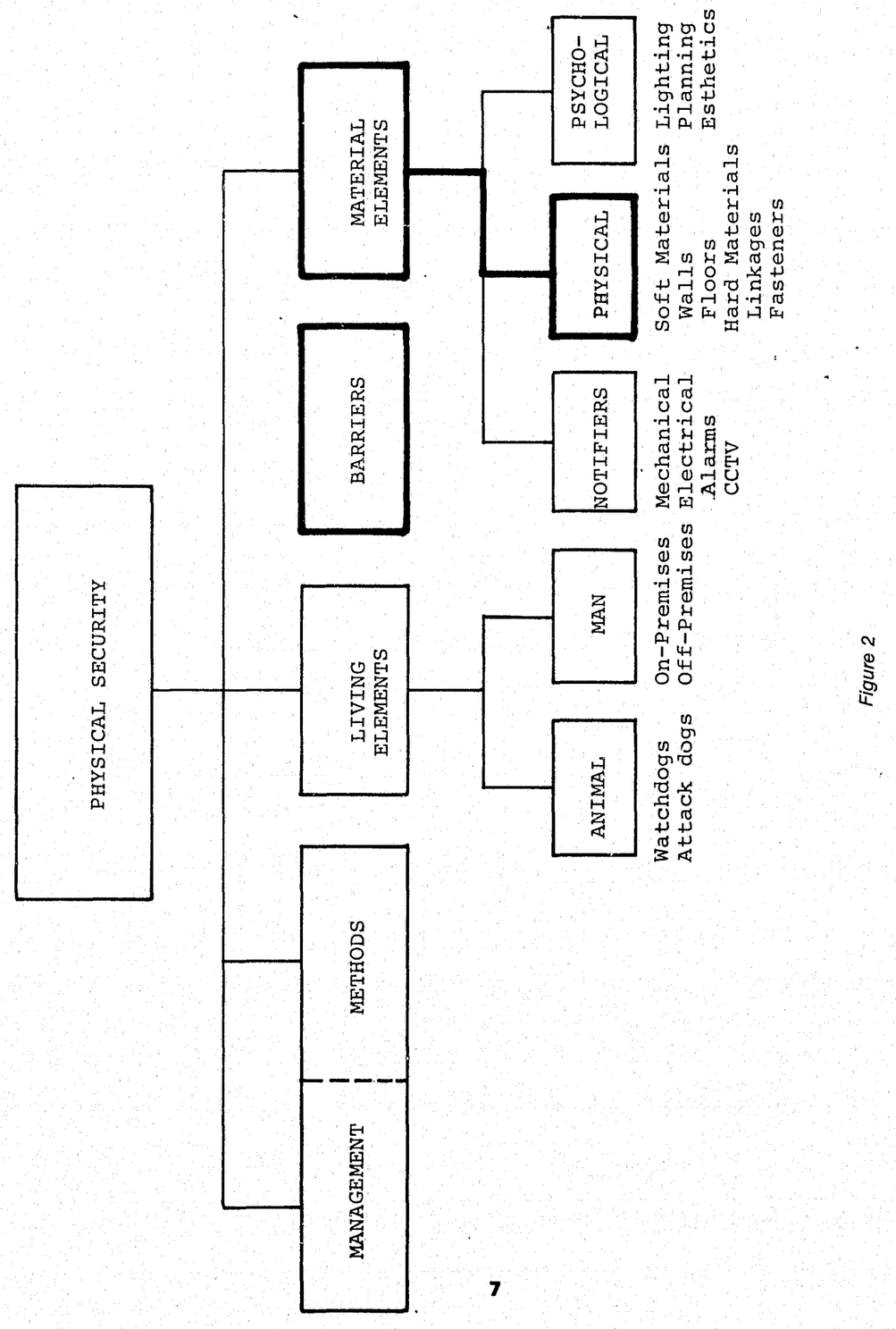


Figure 2

Program Limitations

The enormity of the scope of physical security is apparent. Since time and monetary resources will not permit sufficient research to resolve all questions surrounding the subject, a large part of the responsibility of developing standards involves narrowing the research to yield maximum benefits. The bold lines in Figure 2 illustrate the voluntary limitations on this program imposed by the Building Security Commission.

As previously indicated, the physical ACT of burglary was determined to be of greatest interest in this study. This element can be easily researched, and can be controlled through the introduction or improvement of physical barriers. Adequate barriers increase perpetration time, thereby creating less favorable conditions for an attacker. Necessary means to increase perpetration time, as well as actual physical resistance, can be expressed in quantitative terms.

Window and door systems are attacked most frequently, and are considered in this initial research. *Ninety-four percent of California burglaries are accomplished through entry of windows or doors.* Also, these components generally lend themselves to defeat in a short time without use of complicated means. *Thirty-seven percent of entries require no tools, and three out of four required no force.**

Notification elements, such as alarms and closed circuit television, are a part of material resources according to our interpretation of physical security, but have not been studied in this program because they do not present a physical resistance problem which ordinarily adds to time required to overcome a barrier. Rather, they relate to an interceptor's ability to become informed of a predefined circumstance at a remote location. If we classify notifiers by effect, they should be considered when methods are researched to improve police response time.

DEVELOPMENT OF SECURITY CONTROLS

In General

For thousands of years man has sought to protect his person and property from injury or theft. His dependence on physical controls was based upon this desire, and extended beyond natural elements to other men. Generally, his objective was the same as it is today: to prevent unauthorized entry into protected areas.

Delaying an intruder is of primary importance in physical security. At first, man took advantage of natural barriers such as rocks, caves, hills, water, and trees to provide for this delay. Later, he devised systems comprised of both physical and mental barriers, such as locks or labyrinths, to create a puzzle. Possession of a special instrument, such as a key or knowledge, allowed the possessor to solve the puzzle and remove the barrier. This basic protection system is unchanged today, although modern technology has afforded the development of a high level of protection by physical barriers and a corresponding ability by man to defeat those barriers.

Complexities of our modern society have required government to respond in many ways that have been traditionally thought to be outside of its realm. We have regulations that affect our homes, business, transportation, food, medicine, clothing, as well as personal conduct. One relatively new regulative concept is government development of standards for privately owned buildings (fire and life safety, security, etc.). The basis for such government interest is not only protection of the individual, but also a product of the much broader concept of public welfare as well.

*Selected burglary data from eighteen California jurisdictions during the period 1971-1973—see Appendix B.

The Oakland Approach

Probably the best known example of building security legislation is the Oakland Burglary Security Ordinance. It requires security devices in certain buildings used for business purposes to increase resistance to entry, and authorizes the police chief to require additional controls where he deems it to be necessary. Over a two-year period of comparing data on buildings that met the requirements against those that did not, Oakland was able to demonstrate the worth of the program.

The major shortcoming in Oakland's program and other similar efforts is that they influence design and construction of buildings without regard to man's capability to gain entry. A better program would analyze man's potential threat (using common tools and so forth), and require minimum building physical resistance capabilities to withstand these threats. Flexibility in design, within the specified resistance parameters, should be allowed.

There is no contention that the requirements set forth in the current local programs are incapable of providing security. The problem lies in the fact that it is entirely possible to meet the technical criteria without offering the protection intended by the particular provision. In fact, because of the competitive conditions in the hardware industry, this is often the rule rather than the exception. As an example, the term "hardened steel" is of little use unless a value is assigned to it. This value should in turn be the product of a technical determination of how hard a material *must* be to resist attack by a man employing common techniques. Without this qualification, a material need only be harder than something else to qualify as "hardened," although it may be easily cut, sawed, or drilled. It is also very likely that many good products are excluded by current criteria because they do not conform to typical designs; many may offer better security than more conventional products.

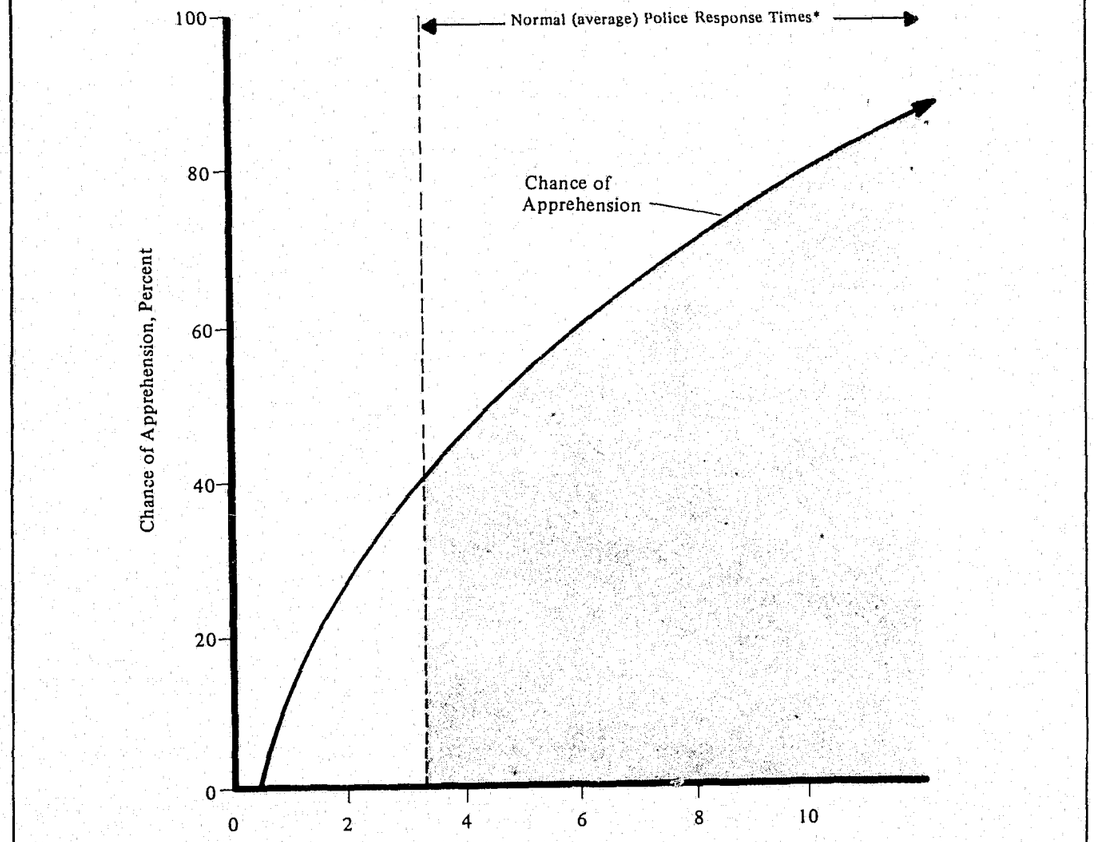
Very narrowly drawn standards probably could assure adequate protection under the current system. However, this would further limit design flexibility, and thus stifle any hopes for improving existing burglary prevention technology.

Lack of Technical Support

Building Security Standards development has been severely limited by lack of technical input at the local level. Police departments or sheriff's offices usually initiate such programs. Although they are in a good position to offer input on modus operandi matters and other crime related topics, their ability to analyze the associated engineering problems is limited at best. On the other hand, the lock industry, and other manufacturing interests, have not been of much assistance either. Through the years they

Figure 3

PERCENT CHANCE OF APPREHENSION
Compared with Perpetration Time



* Derived from Field Response Time, Task Force Report: Science & Technology, President's Commission on Law Enforcement and Administration of Justice, 1967, where time starts when the police have been notified.

have compromised their designs in the interest of marketability and competition to the extent that many products now offer only a fraction of the security offered by their predecessors. Nevertheless, security is emphasized more than ever in advertising, and sales representatives are quick to point out the newest security innovations. No one should be criticized for an aggressive sales attitude. Unfortunately, however, local development of security regulations has been highly influenced to the extent that there is, often, very little engineering basis for the standards ultimately adopted.

Enforcement Problems

Many security ordinances contain an "alternative methods or materials" clause whereby the chief of police or other official may approve such alternatives as providing equivalent security and resistance to forced entry where he finds the proposed design satisfactory, and at least equivalent to that prescribed in the code in strength, effectiveness, burglary resistance, durability and safety. The problem, of course, lies in the subjective nature of such determinations. While on the one hand this procedure remedies some of the over-restrictive contentions, it also opens up a whole new problem area: that of consistency of application and enforcement throughout the state.

Local Control of National Industries

Unless there is compelling need, it is probably inherently unfair for a local agency to implement a standard which is inconsistent or unreasonably stricter than a generally accepted norm. Unfortunately, today a generally accepted norm does not exist. Local standards in California presently do not require design or performance that is widely unavailable, which reflects the fact that standards are based upon the current "state of the art" rather than what could be done. In the event local standards require manufacturers to change their products, the likelihood of compliance is slight because it would involve too small of a portion of the market. On the other hand, if the state establishes minimum standards, in effect becoming an intervener between the local enforcement elements and the producers, chances are greatly improved for gaining compliance from the manufacturers.

PROGRAM OBJECTIVES
Legislative Intent

In enacting Penal Code section 14050, the Legislature cited its desire to "promote the use of technology in crime prevention." But there are several more specific things indicated: first, that it viewed building security standards as an effective approach to crime prevention; second, that it felt state government was in a position to generate the technical material required to support a program of building security standards; and third, while no doubt an approval of the Oakland approach, the initiation of this study by the Legislature also was an indication that there were some doubts as to the ability of local government to develop an effective program without assistance.

Specific Goals

The legislation sets forth three primary objectives that are outlined below. These have been further broken down into secondary objectives by the Building Security Commission for the purpose of developing a program approach.

PRIMARY OBJECTIVE
1. To "develop standards for a statewide building security code designed to prevent or reduce the likelihood of burglary or robbery in any building . . ."

Secondary Objectives
a. To analyze man's ability to attack and forcibly enter closed premises
b. To analyze the resistance properties of common building components (including security devices) when subjected to attack
c. To develop minimum resistance parameters for buildings, based upon a comparison of results from a and b.
d. To develop a legal procedure to implement building security standards based upon these resistance parameters
e. To develop a procedure whereby the International Conference of Building Officials will consider the findings of this research for adoption as building security standards into the Uniform Building Code

PRIMARY OBJECTIVE
2. To "develop means for testing and certifying equipment and materials designed to prevent or reduce the likelihood of burglary or robbery in such buildings."

Secondary Objectives
a. To develop a detailed testing methodology for use by the security products industry in complying with security standards
b. To develop a certification scheme whereby the security products industry may submit products and testing results for evaluation and approval for use by the Attorney General

PRIMARY OBJECTIVE
3. To "continually review and update standards as necessary."

Secondary Objectives
a. To develop a scheme whereby burglary will be periodically analyzed to determine if modus operandi trends call for changes in security standards
b. To develop a scheme whereby security products will be analyzed for new technologies that call for changes in security standards
c. To develop a procedure whereby the California Crime Technological Research Foundation will assist the Attorney General in achieving these objectives and analyze the findings for the purpose of arriving at necessary changes in building security standards

CHAPTER III—METHODOLOGY

INTRODUCTION

In order to achieve physical security, it is necessary to analyze and define two fundamental aspects of the problem: (1) *man's ability to attack;* and (2) *resistance capabilities of physical barriers.* To gain entry into a closed facility, entry resistance must be overcome by man through the application of his mental and physical ability, assisted or not by tools. This ability will be known as man's threat. Where resistance exceeds man's threat, no entry is possible. Since all barriers can be overcome eventually, a barrier is considered successful when it can resist a threat for a period of time long enough to allow appropriate action by an informed interceptor. Specifications for barriers will be based upon a technical description of the resistance ability required to meet or exceed this standard. Specifications may consist of design criteria, performance criteria, or both, depending upon the type of barrier and threat involved. The following material presents a brief description of the research approach. Figure 4 is a pictorial presentation of this approach.

ANALYSIS OF THREATS
In General

The basis of all threats is man's human engineering characteristics. His basic movements can be studied to determine lifting, pushing, kicking, pulling, gripping and twisting capabilities so actual forces created during physical attack on barriers can be computed. Measurements of these basic capabilities have been determined, both with and without tools, during this testing program.

A "standard man" has been selected to represent an above average threat in terms of physical stature, muscle tone, and manual dexterity. He is generally representative of the upper twentieth percentile of males in these attributes. Favorable laboratory conditions allow this standard man to generate threats equal to or greater than those encountered in most field conditions, eliminating the need to go to a potentially more capable standard man and cover "100 percent" of the population.

Specific attack methods selected for analysis represent those used in over ninety percent of forcible entries in California during 1972 (see Appendix B). Each should be covered by recommended barrier resistance specifications. However, because they pose similar engineering problems, many threats can be grouped together, thus requiring fewer specifications than threats.

- *Acquire Test Equipment*
  This includes testing tools, and a test frame apparatus to support placement of window and door systems in common configurations. This allows application of the various threats under simulated field conditions. Equipment for use in analyzing and quantifying threats are also necessary. Some examples include recording oscillographs for recording dynamic strain, load and deflection during attack, and deflection equipment for use in reproducing threats. Some of the more common burglary attack tools are illustrated in Figure 5.
- *Catalogue Threats*
  Threats are classified in five fundamental ways. These may be used separately or in any combination by an attacker.
  a. TRICKERY—Acquisition of the message by an unauthorized user through devious means.
     Example—The use of deception, fraud, conversation, but does not include damage to the system.
  b. CIRCUMVENTION—The bypassing of the physical security system without resorting to force or manipulation.
     Example—Methods that bypass the interceptor, such as entry through openings in an enclosure left unguarded. "Jumping" the ignition circuit in an automobile is a common circumvention method used by car thieves.
  c. FORCE—The damaging or destroying all or part of the physical security system.
     Example—Force can be used to completely destroy a system, or any part, or it may be applied to slightly deform a part, or parts, to gain passage.
  d. MANIPULATION—The process of operating a lock to an unlocked condition by means other than specifically planned.
     Example—Manipulation is entirely confined to attempting to get the lock to operate with something other than the intended means. Lock picks, manipulation keys, and decoders, etc., are used.
  e. ROBBERY—The taking of property in the possession of another by means of force or fear.
     Example—Forcing the authorized possessor to surrender his key or combination.

  FORCE is of primary importance to this research, and has been broken down into sub-categories based upon statistics provided by the Bureau of Criminal Statistics (BCS) from selected California agencies during 1972. For example, within this force category, BCS defines means of entry as i) prying or jimmying, ii) breaking, smashing or forcing, and iii) sawing, boring, cutting or burning. Analyses of these sub-categories has afforded the development of very definitive information on California modus operandi trends, and contributed to the development of threat technology for this program. MANIPULATION and CIRCUMVENTION also present significant problems and are the two other areas considered important to this research.
- *Quantify Threats*
  Threats were studied to isolate the specific physical engineering factors involved during physical attacks on barriers. The objectives of such tests are to duplicate field conditions as nearly as possible, and to determine maximum forces created by any given attack. This force, and related environmental conditions, are recorded for application to sample systems in later barrier analysis.

RESEARCH APPROACH

Figure 4

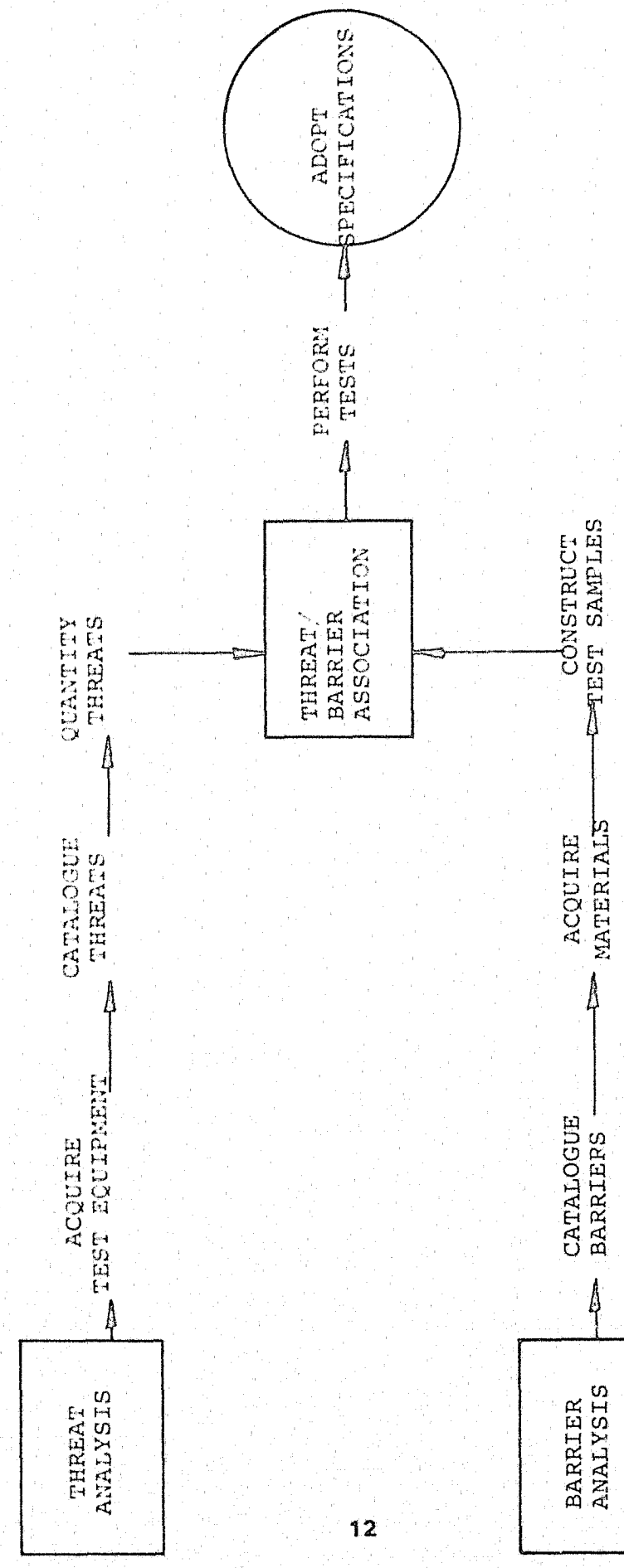
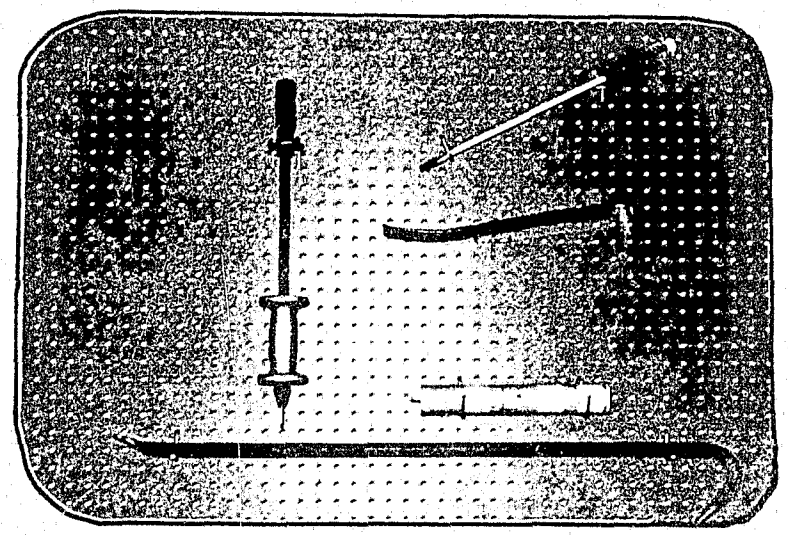
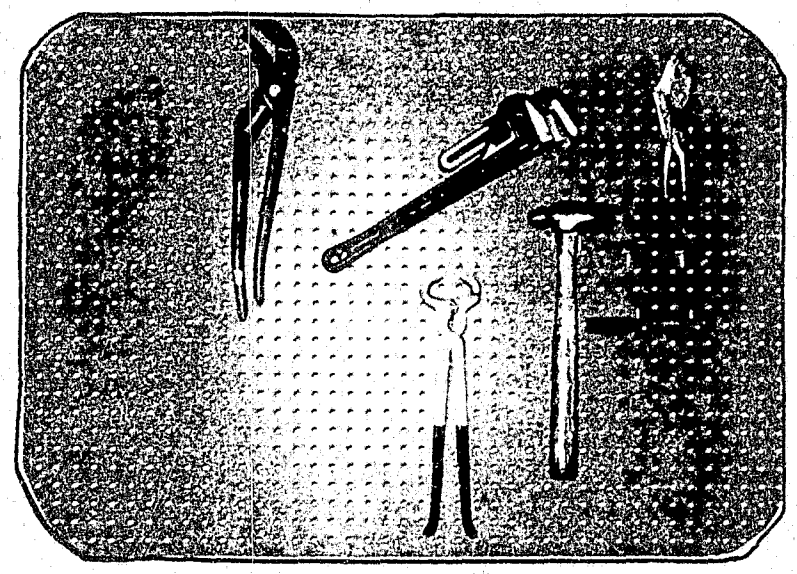


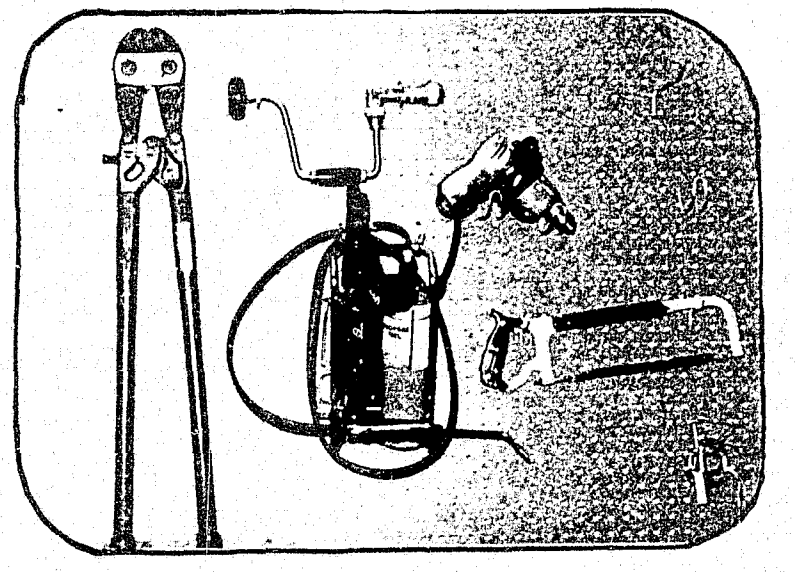
Figure 5



Pry or Jimmy Tools



Breaking, Forcing or Smashing Tools



Cutting, Sawing, Boring or Burning Tools

ANALYSIS OF BARRIERS
In General

The most common door and window system configurations are being studied to determine what factors influence their strength, and what effects result when physical attacks are applied.

- *Catalogue Barriers*
  Barrier systems have been studied, and classified according to basic factors that influence their resistance to physical attack. These have been further broken down into component parts. A set of factors has been specified for each barrier tested.
  Examples of strength influencing factors for door systems may be type of material, size, construction type, method of fastening, type of supporting structures, and so forth. Other barriers lend themselves to a similar breakdown. Factors contained in the most common barrier configurations (e.g., wood door and framing, with common hardware, and so forth) have been given the most research emphasis, and have also been used as models for employment of design changes to increase resistance.

- *Acquire Materials*
  Available materials and equipment have been studied, and representative samples acquired for testing.
  Components were selected for testing on the basis of identification as "security devices" by manufacturers, frequency of use by builders, recommendations from security consultants, and relation to the strength "influencing factors" discussed above.

- *Construct Test Samples*
  A number of barriers were partially constructed from raw materials. These include supporting wood and metal structures for use in conjunction with commonly used components to represent typical residential or commercial use systems. For example, door tests are applied on systems comprised of rough and finish framing, all fire bracing and supporting structures, as well as door fastenings, and hardware. Windows are approached in a similar manner.

THREAT/BARRIER ASSOCIATION
In General

Both man's ability to attack and barrier physical resistance can be expressed in technical terms. A comparison of the two will yield a value—either satisfactory or unsatisfactory, depending upon whether resistance exceeds man's threat, or the threat exceeds resistance. In the study of windows and doors, the problem reduces to determination of loads and allowables against which loads can be compared. Depending on the type of system, the allowable may be the reaction summary of maximum shear, maximum moment, penetration resistance, manipulation time, and so forth.

The problem becomes complicated, however, when the interaction between various components on a system is considered. Selected barriers and threats were considered in the development of a number of "standard systems" for use in testing. These are comprised of components with known interaction characteristics, and make it possible to write specifications for as few as five basic areas to cover a majority of threats encountered in field situations.

- *Perform Tests*
  Sample barriers are subjected to threats under conditions simulating actual field situations. Dynamic loading is used, but static test procedures are computed for use in test certification processes where equivalent results are obtainable. See Chapter V for a more detailed discussion of static and dynamic loading.

- *Adoption of Specifications*
  There are five basic areas that are covered. Each is comprised of inter-dependent elements which must be considered together to achieve a predictable result.
  a. Doors
  b. Hardware
  c. Windows
  d. Sliding Doors and Windows
  e. Materials (Local Penetration Resistance)

Doors and hardware were the first areas considered in this program, and standards for these will be initiated first. As technology develops, each category will be covered.

CHAPTER IV—IMPLEMENTATION

IN GENERAL

Penal Code Section 14050 requires the Department of Justice to "create and thereafter continually review and update" building security standards "to be submitted to the State Building Standards Commission for adoption as a part of Title 24 of the California Administrative Code."

A specific vehicle for implementation is not set forth, but basically must consist of (i) an administrative structure for development and review of standards, and a certification program to insure compliance in the manufacture and installation of security products, and (ii) a legal structure consisting of a statutory scheme to provide for enforcement at the local level through building code changes and Health and Safety Code provisions.

DEVELOPMENT OF REGULATIONS

In order for building security standards to become law, they must be adopted by the Attorney General under an applicable authority, and then reviewed and accepted by the State Building Standards Commission for inclusion in the State Building Standards Code maintained in Title 24. As now worded, Penal Code section 14050 does not confer this authority, but such authority does exist in Government Code section 12538.5 or 12587, which provide generally that the Attorney General may make rules and regulations necessary for administration of his responsibilities under this type of program. Through this enacting authority, regulations may be adopted under the applicable title in the Administrative Code.

Title 11, California Administrative Code contains chapters on the Attorney General and Commission on Peace Officer Standards and Training. The adoption of building security standards by the Attorney General, consistent with his responsibilities under penal Code section 14050 and under authority cited in the Government Code, may be accomplished under this title. It is recommended that an additional sub-chapter be added to Chapter 1 (Attorney General) on building security standards.

State Building Standards Commission

Created by Section 18900 et seq. of the Health and Safety Code, this body serves to eliminate duplication, conflict and overlapping in state building regulations and not to substitute the responsibilities now vested by law in various state agencies.

Each concerned agency continues to prepare such building regulations as it is authorized and finds necessary, but such regulations are not effective until approved by the State Building Standards Commission.

The Building Standards Commission maintains Title 24, California Administrative Code, in cooperation with concerned state agencies to provide a State Building Standards Code containing all building standards issued by individual agencies. This code contains references to all state laws relating to building standards and supersedes all existing administrative regulations relating to building standards issued by individual state agencies. This code is the adopted minimum state building standard in California, and must be met or exceeded at local levels, subject to exceptions under special circumstances.

The Uniform Building Code, as maintained by the International Conference of Building Officials, is generally incorporated as the adopted state standard. An agreement has been made with ICBO, whereby it will consider the Attorney General's adopted building security standards for inclusion into the Uniform Building Code. For the purpose of establishing *California* law, this "marriage" would probably not be necessary because standards adopted by the Attorney General under Title 11 will ultimately become part of the minimum state standard if and when they are approved by the Building Standards Commission. However, it is the view of the Attorney General's Building Security Commission and ICBO that building security standards belong in the Uniform Building Code, and will be more readily accepted by local enforcement elements if they appear in the Code as regular amendments and approved by the ICBO in the development state. This will also assure an orderly, proven review procedure for future changes as they are developed and adopted by the Attorney General. In short, ICBO participation can insure an efficient, workable scheme for program review and cause this program to pay national crime prevention dividends.

Construction Materials and Equipment Listings

A certification structure has been formulated similar to the State Fire Marshal requirements for fire protection equipment. It provides for listing by the Attorney General, construction materials, assemblies of materials, equipment, methods of construction, methods of installation of equipment and assemblies of equipment that conform to the conditions set forth in the regulations. Such listing will be construed as sufficient evidence that the particular product meets or exceeds the burglary resistance specified for the assigned use and category.

Application procedures are specified, including requirements for test reports from independent testing laboratories and provision for sample specimens taken from regular production. When such steps are necessary for evaluation of a material or system, the Attorney General may provide for assembly or erection of sample specimens (e.g. door systems). Every listed material will be required to be labeled according to requirements set forth by the Attorney General.

Evaluation and listing fees shall be submitted with each application for evaluation and listing; it will be retained by the Attorney General to offset costs incurred through evaluation of the materials and equipment.

Testing laboratories will be qualified as either Approved Testing Organizations or Approved Inspection Service Agencies. The latter will not qualify as a testing facility, but may perform periodic inspections of listed materials and equipment to determine if production line fabrication and workmanship is in accordance with the conditions of listing. Testing organizations may test and inspect. Qualification as either an Approved Testing Organization or Approved Inspection Service Agency will depend upon conformance to rules set forth by the Attorney General and filed with the Secretary of State. A draft of these rules is included as Article 1.50 in Appendix E.

Minimum Building Code Requirements

Regulations adopted by the Attorney General under Title 11 must provide all of the information necessary for enforcement elements to enforce such regulations, and for building owners to comply with the regulations. When considered together with technical guidelines developed by the California Crime Technological Research Foundation, they would also provide sufficient information for producers to manufacture, construct or assemble products that meet the regulations.

The purpose, scope, design specifications, and performance tests for each building component or system requested will be specified, including drawings, references and technical descriptions where necessary for classification. Detailed test reporting procedures for proprietary construction materials and equipment listings will also be set forth. Proposed regulations for adoption into Title 11 are attached as Article 4 in Appendix F.

Procedural Requirements

The California Administrative Procedure Act and the California Administrative Code, Chapter 1, enumerate the procedural requirements to be followed during preparation and adoption of regulations. These requirements include, but are not limited to, regulation format, filing procedures, and public hearing procedures.

At least thirty days prior to the adoption of a regulation, notice of the proposed action must be published in a newspaper of general circulation, must be filed with the Rules Committee of each house of the Legislature, and may be given to others enumerated in section 11423 of the Government Code. This notice must contain a statement of the time and place of the proceedings for adoption, a reference to the authority under which the regulation is proposed and either the express terms or an informative summary of the proposed action. On the date set for the hearing, the agency must afford any interested persons the opportunity to present statements, arguments, or contentions in writing, and it may also provide the opportunity to present these orally. Upon considering such presentations, the agency may adopt the regulation or decide to modify it prior to adoption.

It is proposed that hearings on building standards be conducted in several phases because of the volume of material and diversity of interests. For example, the first hearing should deal with door systems support structures and basic materials. Next, hardware can be dealt with . Aluminum sliding doors and windows are another quite distinct area. A schedule has been set up, whereby each important area will be dealt with at a public hearing during 1974.

Health and Safety Code Changes

It is suggested that a number of new sections be added to the Health and Safety Code, outlining the Attorney General's authority in this area, and establishing uniform rules and regulations. In addition, authority to establish a listing program for construction and materials must be established, and a fee structure set forth. A section should also be added to place enforcement responsibility on chief building officials and their authorized representatives.

All California jurisdictions should be required to adopt regulations adopted by the Attorney General, without modification, except where there are special needs and a higher level within the classifications provided is adopted. This is consistent with Penal Code Section 14050, which allows local jurisdictions to adopt stricter standards than those enacted by the state. Any violation of minimum rules and regulations adopted by the Attorney General would be a violation of the Health and Safety Code. A draft of proposed new sections is attached as Appendix E.

Implementation Logistics

It has been stated that the total output of all United States hardware manufacturers for one year would be insufficient to supply each home in the country with one new lock. Although California's new regulations will present a much less dramatic problem, the fact still remains that it just will not be possible to implement the program without a rather lengthy "phasing in" process.

As to who should be the first required to comply, the following program is suggested:

- New Construction— July, 1974 (current work)
  January, 1974 (1975 work)
- Existing Construction— Beginning July, 1975
  Note: This will require additional technical information because not all of the recommendations derived out of this initial work can be applied to existing structures.
  a. Change in ownership
  b. Change in occupancy
  c. Major alterations (over 50% of initial costs)

PART B

TECHNICAL ASPECTS

CHAPTER V—TESTING METHODOLOGY

INTRODUCTION

In August 1972, the California Crime Technological Research Foundation (CCTRF) undertook a research and testing program at the request of the Attorney General. Its main objective was to provide technical input to the Attorney General's Building Security Commission for assistance in the development of security performance standards for private residences and certain commercial structures. To be technically usable, information had to be based upon performance characteristics of construction materials and equipment when subjected to attack—and it had to be relatively uncomplicated for use in production and certification of products.

SCOPE

As previously indicated most attacks occur at windows or doors, and these are the main areas of concentration in this program although some spillover effect into other areas is apparent. Five basic generic catagories within these two areas are being studied. They are as follows:

- Doors (exterior single and double)
- Hardware
- Sliding Doors and Windows
- Windows (other than sliding)
- Construction Materials

After initial work on characterization of man's ability to gain entry was accomplished, the first area to be analyzed was single wooden door systems. This involved evaluation of the most critical threat in terms of force at the weakest point in the system. Study of structural elements demonstrated their relative importance to the strength of the system. Further, evaluation of door attachments and locking devices produced dramatic findings.

Work in several areas is still in progress, and will be continued through 1974. As the necessary data is derived, standards will be proposed for each of the remaining five areas. It is important that standards be deferred in some areas until sufficient information is generated. At this time much of the pertinent data has been developed, but testing and certification procedures are still being developed.

Since it is of no present value to implement standards that cannot be met, we have chosen to work with industry and attempt to assist in the creation of high resistance equipment to meet our projected minimums in various areas. In all cases, as soon as it is technically feasible, standards will be implemented. Figure 6 represents projected progress during the period between now and October 1974.

Obviously, this program transcends its legal and technical beginnings. It is a pioneer effort in the development of technical information to support government policy decisions for the improvement of an environment that currently allows our property and persons to be vulnerable to criminal attack.

SECURITY SYSTEMS APPROACH TO TESTING

Reference has been made to door and window assemblies as systems. An approach, designed to address this concept, was formulated wherein the assemblies are treated as systems comprised of interdependent elements (component parts). Minimum performance levels may be specified for individual parts, or for the unit as a whole.

In most cases, when an attack by force is made against a door or window system, the early reaction is a local concentration on the system; but this energy is quickly spread throughout the system, being absorbed in different degrees by various parts of the system. For example, when a door is subjected to an impact threat (kicking, shoulder impact, etc.), the shock of the blow is not only felt by the door, but is transferred to the framing and support structure through the fastening elements of the system (lock parts, hinges, striker plate, and so forth). Depending on the rigidity of the system, varying amounts of energy are absorbed by the component parts, pushed back into the impacter, transferred by the fastenings, or just plain lost. Essentially then, evaluating window and door systems goes far beyond a cursory study of locks or doors and presents a problem somewhat like the proverbial chain where total strength is dependent upon the weakest link or element.

In our security system's testing process, the weakest point in any given system is isolated first. This point is then strengthened and the system re-tested to find the next weakest point, and so forth, until, theoretically, the entire system will fail at one time. This process has demonstrated that system components cannot properly be evaluated by restricting performance comparisons to like components on a "bench test" basis. In other words, a hinge cannot be evaluated in view of its performance in a system. Once the system is shown to provide acceptable performance, component performance can be isolated and a standard established for the component based upon the share of support it must lend to the entire system during attack.

TESTING TECHNOLOGY

As previously stated, this testing program addresses the task of reducing burglary through an increase in access resistance. To achieve this goal, a system's approach to the task was formulated.

The block diagram depicted below illustrates the basic system components.

Man, endowed with specific physical and mental capabilities, enhanced or not by the mechanical advantage of various devices must, in the form of "threats," overcome the entry barrier resistance to gain access. If physical engineering terms are used to quantize the human engineering characteristics of man, threats, and

Figure 6

BUILDING SECURITY STANDARDS — SECOND YEAR

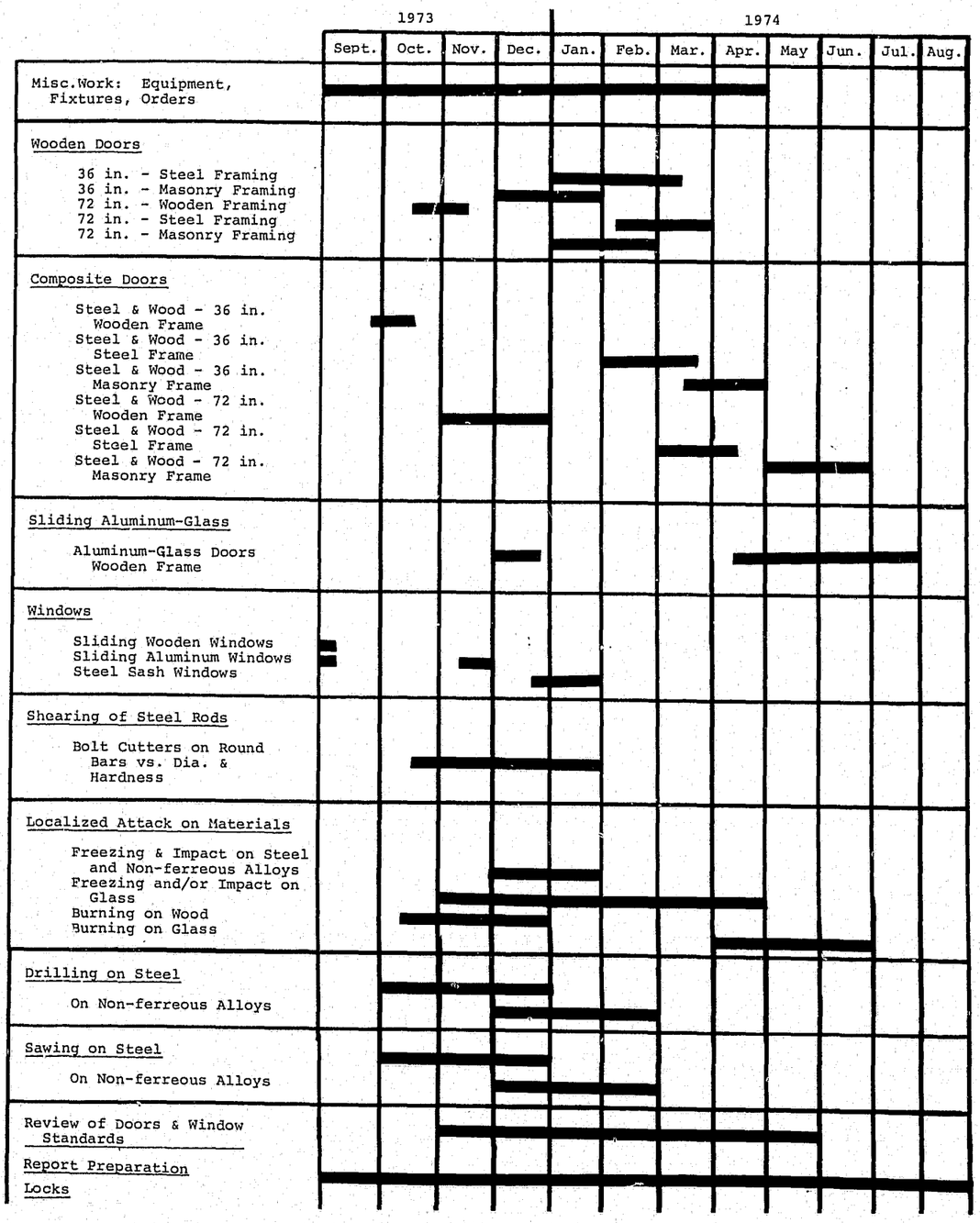
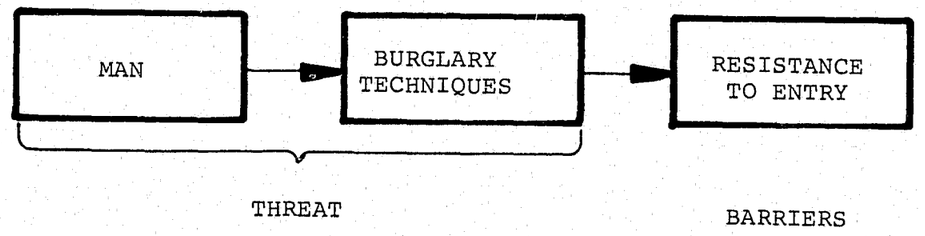


Figure 7



entry resistance, the ability to gain entry reduces to the following building security margin of safety equation:

$$E = \left(\frac{R}{M} - 1\right) \times 100$$

WHERE:
E = Entry Security Safety Margin (%)
R = Barrier Resistance to Entry
M = Man's Threat

If E is positive, resistance exceeds man's capability and entry is not possible with the percentage of safety margin given. If E is negative, entry is possible and the percentage of lack of security safety margin is defined.

ANALYSIS OF THREATS

Figure 8 sets forth the standard man's physical attributes and also identifies commonly used techniques and tools that may be employed by man.

Static and Dynamic Loading

In the characterization of man's threat, both static and dynamic loads must be considered. To distinguish between the two types, we can state that a load is static when the time used in its application is relatively long —that is, the load is slowly and progressively increased to its maximum value. An example of a static loading is that created by a bumper jack actuated between the joints of a door to spread them. A hammer blow, foot or shoulder impact, on the other hand, are examples of dynamic loads.

Taking the "shoulder impact as a typical dynamic threat, we find that the input energy is approximately that acquired by the weight of the man with the velocity that he has upon impact. The input kinetic energy of this man at impact can be expressed by:

$$U_i = \tfrac{1}{2}\,(w/g)V^2 \qquad (1)$$

Where
U_i = the input kinetic energy, expressed as in lbs.
w = weight of man (lbs.)
g = gravity = 386 in. × sec. ^{2}
v = velocity of the man at the time of impact in. × sec. ^{1}

Figure 8

BREAKDOWN OF THREATS

Man

- 180 pounds
- 6-feet tall
- Muscle Tone
  a. Lift Capability - 150 lbs.
  b. Grip — 13 lbs.
  c. Arm Strength — 1 arm
  1. Pull — 52 lbs.
  2. Push — 50 lbs.
  3. Up — 24 lbs.
  4. Down — 26 lbs.
  5. Outboard — 17 lbs.
  6. Inboard — 22 lbs.

Technique/Tools

- Force
  a. Shoulder Impact
  b. Foot Impact
  c. Lifting
  d. Pry Bar
  e. Pipewrench
  f. Pullers
  g. Hammer — 1 lb.
  h. Bumper Jack Spreader
  i. Freezing
  j. Bolt Cutter
  k. Drill
  l. Torch
  m. Sawing
  n. Thrown Missile
  o. Battering Ram
- Manipulation
- Circumvention

Immediately after the impact, the input energy of the man U_i, is transformed into several energies:

U_L = Energy lost in the impact in form of local deformations and heat
U_R = Energy received by the door assembly
U_M = Energy retained by the man causing the shoulder impact such that:

$$U = U_L + U_R + U_M$$

Considering Rayleighs' Method of energy analysis for a dynamic system, the energy received by the door, U_R, is instantaneously transformed into the kinetic energy of accelerating the mass of the door. This kinetic energy, in turn, is reacted by the potential energy developed from the elastic deformation of the door and support structures.

This potential energy acquired by the door in the deformed shape, may be expressed in terms of an equivalent spring constant, K (lbs/in) which can be measured for each door configuration at a predetermined loading point. The potential energy of deformation under dynamic load can be expressed as:

$$U_R = \tfrac{1}{2}(K)(d_d^2) \qquad (3)$$

Where

U_R = Potential energy received by the door assembly (in-lb)
K = equivalent spring constant (lb/in)
d_d = maximum dynamic deflection of door at loading point (in.)

The equivalent spring constant of the door, K, is measured by determining the deflection, d, of the structure at the predetermined loading point as a function of an applied static load, F_s, such that:

$$K = F_s/d \qquad (4)$$

Later in dynamic tests, the dynamic deflections, d versus time are recorded by means of an oscillograph at the loading point. Since the values of d and K are known, U may be determined from equation (3). Now we can define an equivalent *dynamic force*, F , such that:

$$F_d = (K)(d_d)$$

where F represents the equivalent dynamic force that would deform the door to a potential energy level of U such that:

$$U_R = \tfrac{1}{2}(K)(d_d^2) = \tfrac{1}{2}(F_d)(d_d) \qquad (5)$$

F is the value referred to as dynamic force in the present report and is the load which will be used to conduct static load tests on the door designs.

It should be mentioned at this point, that any static tests made, using the values of dynamic force as a static force, will be on the safe side due to the slightly larger values (in our cases) of allowable stresses that could be applied to materials in general under dynamic loading. Hence, in static tests of door assemblies, the acceptance tests shall call for using the higher force (dynamic value) in conjunction with the lower strength of the structure.

If the maximum value of test energy applied to the door assembly for a given threat, U_a, is compared to the expected input energy of the man for the same threat, U_i, the building security margin of safety can be determined. For example:

$$E = \left(\frac{K}{M} - 1\right)100$$

Therefore, when

$R \equiv U_a$
$M \equiv U_i$

$$E = \left(\frac{U_a}{U_i} - 1\right)100$$

= Entry security safety margin (%)

Specific Threats

The common threats subjected to exterior doors by the standardized man have been both studied and tested in order to quantify them in engineering terms. The objective was to determine the forces or amounts of energy most likely to be deployed in each of the threats. During this phase of the program, the tests on door assemblies were made applying forces or energies specified below. The threats investigated and their corresponding values are as follows:

DOOR SYSTEMS

Threat 1. Shoulder Impact
Maximum energy input to the door assembly is 1800 value in-lbs based on a 180 pound man impacting at 88 in/sec.

Threat 2. Foot Impact
Maximum energy input to the door assembly by a 180 pound man was measured to be 775 in-lbs.

Threat 3. Lifting
Maximum lifting capability = 150 lbs.

Threat 4. Pry Bar
Maximum moment based on 200 lb. force and 30-inch lever arm = 6000 in-lb.

Threat 5. Battering Ram
Considering a 16-lb. steel bar as a ram, the maximum energy input to a door assembly is 1050 in-lb.

Threat 6. Hammer
A man swinging a 1-lb. hammer was measured to be able to apply an energy input of 125 in-lb per blow.

Threat 7. Bumper Jack
Standard bumper jacks are rated to 2000 lbs. The force of the jack can be applied between the two jambs of a door in order to spread them and overcome, by deflection, the length of the latch throw.

Threat 8. Sawing
Maximum linear penetration (in/min) to be determined.

Threat 9. Drilling
Maximum linear penetration (in/min) to be determined.

GLAZING MATERIALS

Threat 10. Glass Cutter
Maximum penetration to be determined.

Threat 11. Spring Loaded Punch
Maximum axial penetration to be determined.

Threat 12. Thermal Shock
Maximum temperature gradient (ΔT/sec) for a torch or freezing to be determined.

Threat 13. Thrown Missle
The maximum missile weight and input energy to be determined.

LOCK SYSTEMS

Threat 14. Lock Picking
Specific manipulation threats will not be discussed in detail. However, we have identified approximately 20 different manipulation techniques, and have considered each of these in the development of specifications. Many of them present similar engineering problems. The employment of specific design practices cannot totally protect against manipulation threats; however, considerable time may be required to defeat a lock, depending on the level of skill possessed by the operator and the resistance characteristics of the lock. Some of the more common manipulation threats are shimming, picking, rapping, impressioning, gunning, decoding, try-out and manipulation keys.

Threat 15. Circumvention
There are a number of circumvention techniques that must be prevented during the construction of locks. Some of the more common methods include passage through the keyway to the locking bolt or locking means, and lifting the pins over the plug shear line through the use of a comb key.

Threat 16. Puller
The "slide hammer" or "dent puller" commonly sold for use in automobile body repair. It also serves as a tool to pull the plug or lock cylinder out of the lock body or housing, exposing the internal mechism for operation by finger or screwdriver. With this tool, a hardened self-tapping screw is engaged fully in the lock cylinder's keyway. A tensile impact load of as great as 200 in-lbs may then be applied by operating the tool in its intended manner.

Threat 17. Screwdriver and Wrench
With a screwdriver inserted in the keyslot, a torque of approximately 1,200 in-lbs may be applied, using an adjustable wrench.

Threat 18. Pipe Wrench
With an 18-inch long pipe wrench (the maximum size considered easily concealable), a torque of approximately 3300 in-lbs may be applied to a door knob or protruding cylinder housing.

Threat 19. Hacksaw or Hacksaw Blade
After the molding strip is removed or pried away, a hacksaw blade is inserted between the door and door jamb and the bolt is twisted to an open position. The applied torque is to be determined.

Threat 20. Shoulder or Foot (Kick) Impact
(Same as 1 and 2)
The standard man can apply a maximum of 1800 in-lbs of energy by either means to a door assembly. The maximum load reacted by the door latch or bolt depends on the door assembly configuration.

Threat 21. Drift Punch and Hammer
A punch and hammer are used to force the bolt back into the body of the lock; thereby allowing it to clear the striker. An average man can apply 250 in-lbs of energy with a 1-pound hammer.

Threat 22. Bolt Cutter
Maximum load to be determined.

Threat 23. Bolt Nipper
A bolt nipper applied to a protruding lock cylinder. Maximum force to be determined.

Threat 24. Freezing
Maximum temperature gradient (ΔT/sec) to be determined.

Threat 25. Drilling
(Same as 9)
The maximum axial penetration (in/min) of a drill in the lock cylinder to be determined.

ANALYSIS OF BARRIERS

To gain a better understanding of the resistance capabilities of a door or window assembly, these systems have been identified by those components (resistance parameters) which are encountered in construction and influence the resistance to attack. In turn, the variables of each parameter have been defined which influence the strength that the parameter has on the total system. The following refers to exterior door and lock systems; a discussion on window systems will be presented when window resistance parameters are completely defined.

Exterior Doors

Figure 9 summarizes the resistance parameters and related variables utilized in the door testing program. For any particular design a number of resistance parameters are involved. The configurations used in the testing program have been limited to those which are commonly found in California construction. The assemblies of these configurations are duplicated in the laboratory and are subjected to threats simulating, as far as possible, actual field conditions.

Locks

The resistance capabiiity of a lock is measured on the basis of both strength and length of time it can resist a threat. The moveable type labyrinth locks considered in this work include the pin tumbler and lever design configurations for the lock cylinders. The resistance parameters of a typical lock cylinder are depicted in Figure 10.

STANDARD SYSTEMS

For any particular door or window system, a minimum of one resistance parameter is usually required from each group to adequately describe the system. Since there are inumerable combinations theoretically available to producers of systems, it is readily apparent that some "standard systems" should be described and evaluated to help guide industry research and development and assist field inspection processes. Many elements of door and window systems, particularly supporting structure designs and materials, are industry-wide in use, and will not lend themselves to proprietary listing anyway, thus requiring some kind of generic listing by the Attorney General as meeting or exceeding minimum requirements. (See Appendix F, Article 1.5)

The most commonly used and typical reacting exterior single door (wood) assembly which lends itself to a "standard system" approach is described below. This system, when modified according to specifications set forth by the Attorney General, meets the basic requirements for resistance against impact and spreading attacks.

Material:—Wood
Aspect Ratio: Width, 36", Height, 80", Thickness 1¾"
Door Frame: Wood

Door Construction: Solid Core
Fasteners: Three steel hinges using four No. 9 screws, ¾" long on each leaf of each hinge. A lock system and corresponding striker plate or plates mounted on the frame jamb facing.
Support Structure:—Standard wooden frame (See Figure 11) specified by FHA "Minimum Property Standards For One And Two Living Units."
Specifications: The materials for the frame, doors and siding, to comply with FHA "Minimum Property Standards For One And Two Living Units" and revisions.

Figure 9
EXTERIOR DOOR RESISTANCE PARAMETERS AND RELATED VARIABLES

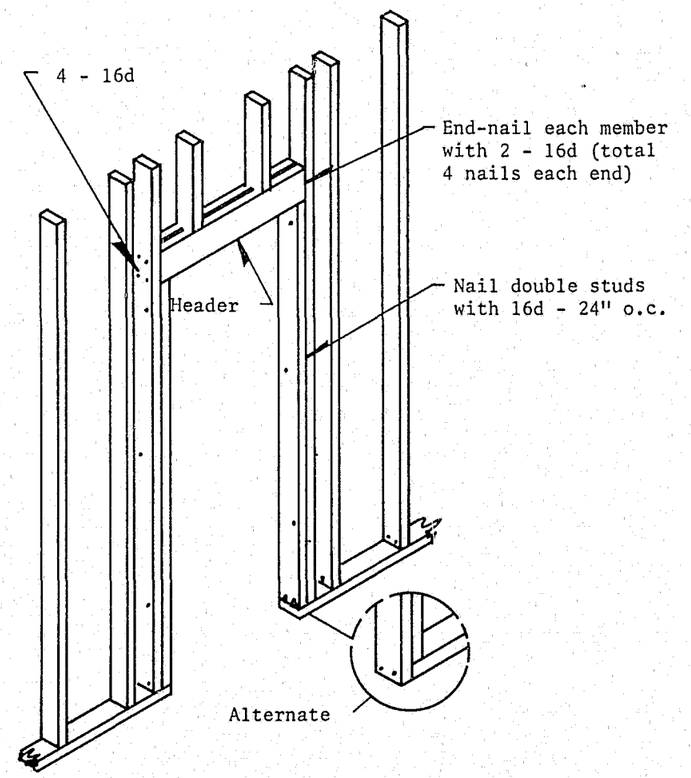
A. Material (Any Component)
  1. Wood
  2. Metal (Composite)
  3. Metal
B. Aspect Ratio (Door)
  1. Width
    a. 36" single
    b. 72" double
    c. 96" sliding
  2. Length
    a. 80"
C. Thickness (Door)
  1. 1-⅜" — 2"
D. Door Frame
E. Type of Construction (Door)
  1. Hollow Core
  2. Solid Core
  3. Metal Clad
  4. Glass
F. Boundary Fasteners
  1. Butt Hinges
  2. T-Hinges
  3. Dead Bolt
  4. Spring Latch
  5. Dead Latch
  6. Bars
G. Method of Attachment of Fasteners
  1. Screws
  2. Mortise Joint
    a. Reinforced
    b. Non-Reinforced
  3. Striker Plate Assemblies
  4. Welding
  5. Adhesive
H. Support Structure
  1. Wooden framing (FHA)
  2. Steel framing
  3. Masonry construction
  4. Precast/Pre-stressed concrete
I. Secondary Structures or Devices to Negate Threats
  1. Method of trim
  2. Materials of trim
  3. Protective coverings for fasteners and openings
J. Local Reinforcement

*Note: For any particular door system, a minimum of one resistance variable is required from each parametric group.

Figure 10
LOCK RESISTANCE PARAMETERS

A. Material
  1. Brinell/Rockwell Hardness
B. Labyrinth Carrier
C. Labyrinth Passage
D. Labyrinth Base (tumbler)
  1. number tumblers
  2. number springs
  3. number combinations or permutations
  4. operational life
E. Fixed Base
F. Barrier
G. Locking Bolt
H. Bitting Interval
I. Striker Plate
J. Number of Pins

Figure 11
TYPICAL FHA SINGLE DOOR FRAMING



CCTRF

CHAPTER VI — TECHNICAL FINDINGS

INTRODUCTION

General program findings are presented by generic categories as listed in the proceeding chapter. Recommendations based on these findings are broken down in the same manner — as are the proposed regulations for inclusion into Title 11 (see Appendix G). Detailed technical data on test procedures and results is not included in this report, but will be made available by CCTRF as a separate document entitled "A Technological Approach to Building Security". Whenever possible, performance criteria is used to define security recommendations. Where the area of concern lends itself to an industry-wide generic description, this is included as an alternative to the suggested performance test when comparable security can be obtained by following a design specification. In some instances (e.g., lock cylinders), both design and performance specifications are required to insure compliance. Drawings and photographs are included where necessary for clarification.

DOOR SYSTEMS
Summary and Conclusions

Of the nine system resistance categories identified, three groups (FHA wood framing, steel framing, concrete framing), consisting of thirteen separate configurations, were set up for testing. The resistance capabilities of these systems were determined in increasing order of stiffness, and minimum normal and lateral load specifications were set up for the weakest.

Early static failure tests on the systems indicated a need for reinforcement of both door and door frame at the lock bolt and strike. Further experiments with dynamic loading generated simple design improvements which greatly improved resistance. A number of basic conclusions were reached:

- Conventional wood door and framing systems will not successfully resist man's capability to apply normal loading unless local reinforcement is made of the door and frame at the lock and strike areas.
- Hollow core doors require additional reinforcement to insure adequate strength at the lock area, and to protect against penetration threats.
- Conventional wood framing systems will not successfully resist lateral loading threats, applied with common tools, unless reinforcement to supporting structures is made.
- Hardware, in general, can successfully resist normal loading created by man's threats, but weakness exists in the attachment to wooden components and the ability of wood components to resist transferred loads.

Recommendations
(wood frame, single door systems)

PERFORMANCE

1. The assembly shall be capable of resisting the energy imparted by an impacter weighting 180 lbs., with a velocity of 88 in. x sec. $^{-1}$ at impact. Response of the door to the dynamic force shall indicate a rise time of not less than .04 ±.01 sec. from zero to full load. Point of impact on the door shall be 12 inches from the lock fastening point with the strike on a line to the center hinge.
2. Alternatively, the assembly shall be capable of resisting a static force of 1500 lbs. applied 12 inches from the lock fastening point with the strike on a line to the center of the middle hinge.
3. The system shall resist a static load of 2000 lbs. applied between the joints in a spreading action at mid-heighth from top to bottom. Maximum deflection shall be less than the effective engagement of the bolt in the strike to prevent disengagement.

ALTERNATIVE DESIGN SPECIFICATION

In lieu of the above tests, compliance will be recognized where the system substantially complies with the following design specifications:

Framing—Standard wooden framing as depicted in Figure 12, including special nailing schedule, with the studs and joint facing fastened together by nailing exteriod plywood over the basic structure. Fire struts shall be placed adjacent to the lock area, and well fitted. (Framing of this design has resisted a 2000 lb. lateral load, with a 0.3 in. deflection).

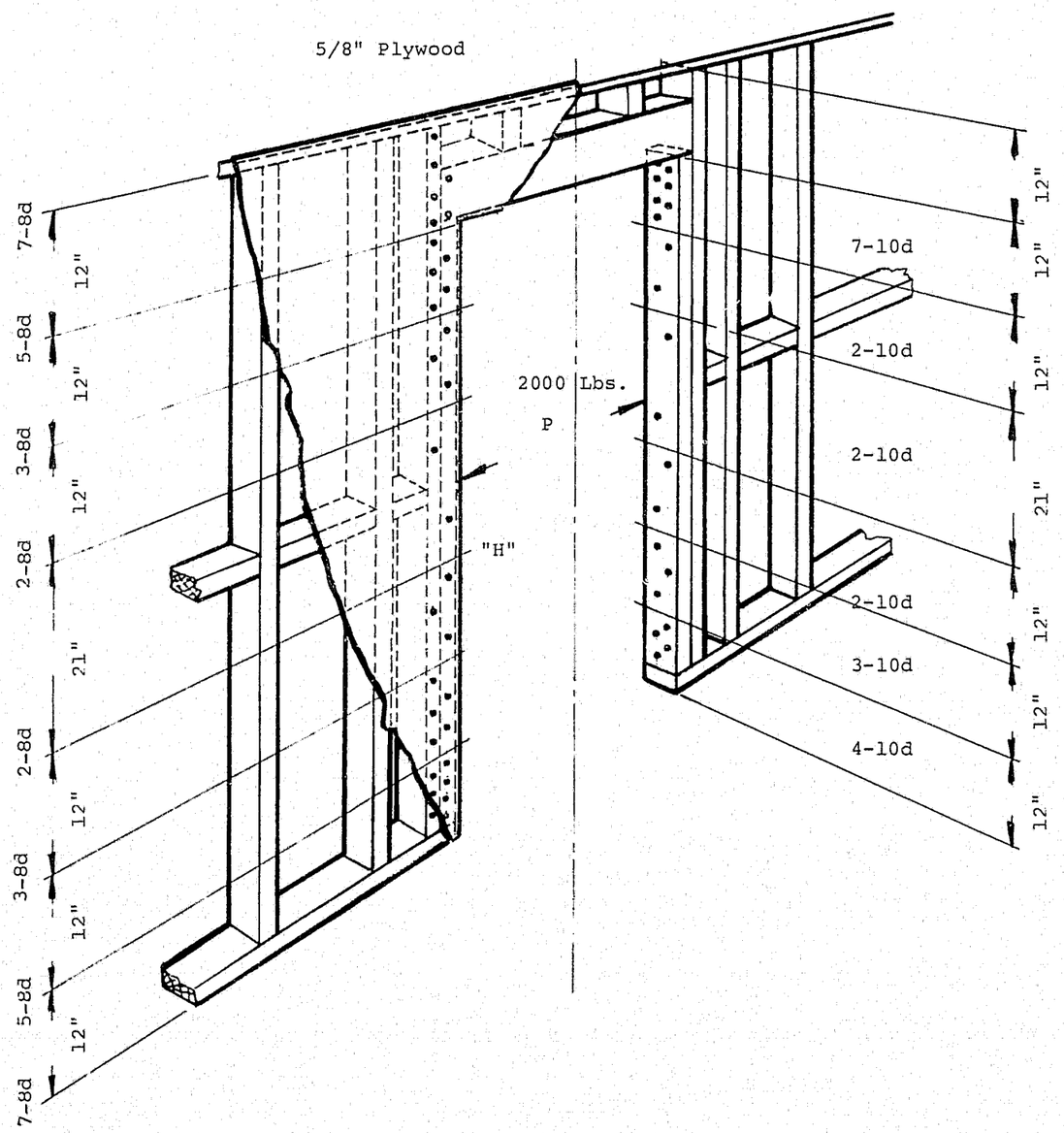
Door—Solid core doors are acceptable. Core assemblies of hollow core flush doors shall, in addition to compliance with PS-51 (Commercial Standards and Product Standard, National Bureau of Standards, U.S. Government Printing Office, Washington, D.C.) include adjacent to the outside face, a single layer of carbon steel expanded metal. Minimum requirement for this material is ¼" opening, 20 gauge metal, 0.83 lbs. per square foot. This material is equivalent to a 1010 steel and meets the specifications for MIL-M-17194C steel.

Hardware—Must meet or exceed all specifications set forth in the following section, including the addition of door edge stiffener plates as depicted in Figure 13, and strike design as depicted in Figure 14.

Figure 12

NAILING SCHEDULE TO REDUCE SPREADING OF DOOR JAMBS UNDER LATERAL LOADING

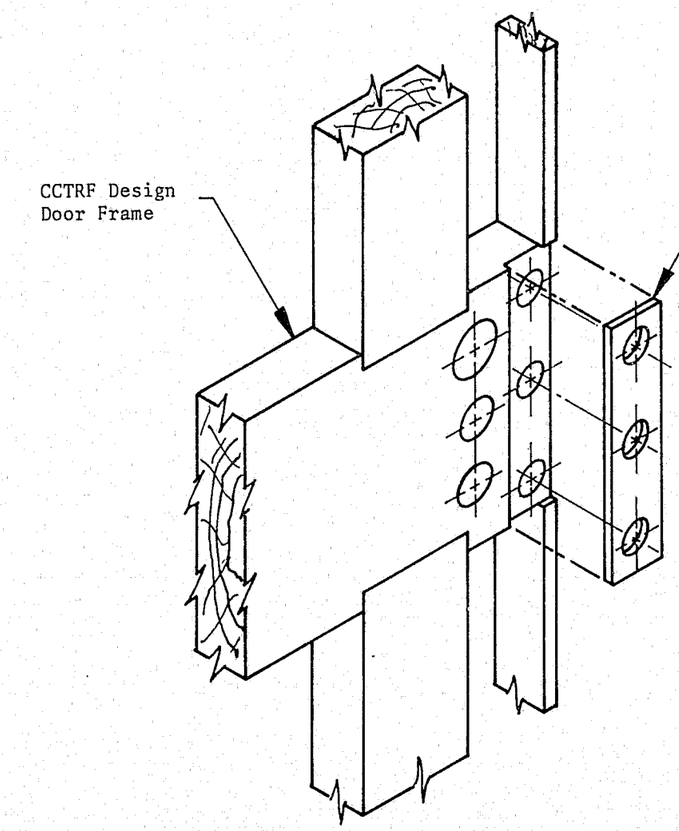
UNDER A FORCE OF 2000 LBS. EACH JAMB DEFLECTED .3 -IN.



"H" = 1/2 door height

Figure 13

CCTRF DOOR EDGE STIFFENER PLATE DESIGN



CCTRF

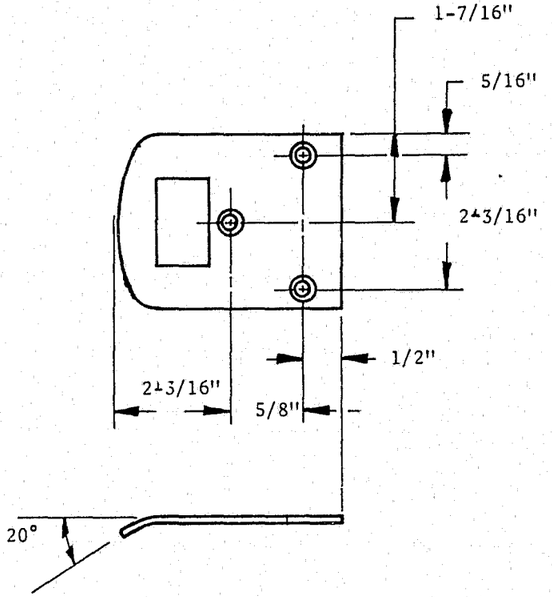
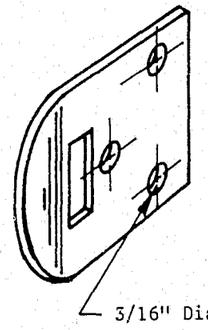


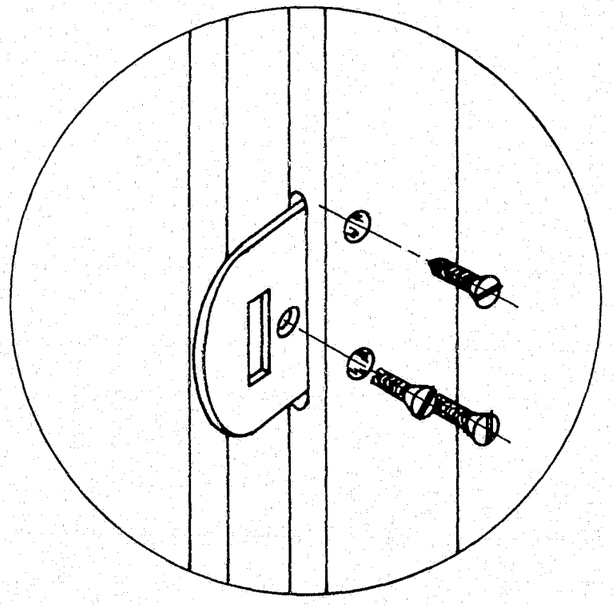
Figure 14

CCTRF STRIKER PLATE DESIGN



Material:

3/32" thick ASTM 1020 steel (Chrome or brass plated)



CCTRF

HARDWARE
Summary and Conclusions

The hardware components of door and window systems perform a number of important functions. They obviously fasten two or more other components of the system together, and allow access by means of a locking and unlocking function. They also operate to help transfer energy from one element in the system to another during violent attack (e.g., to transfer loading forces from the door to the strike and to the framing). When properly designed they also may assist other elements of the system perform their respective functions by strengthening them against localized attacks (e.g., reinforcement rows around a lock to protect wood doors, and guards to prevent cylinder extraction).

Locks provide the main interest of hardware analysis, although there is a subordinate interest in hinges. The latter generally play a lesser role in actual burglary resistance because they are subject to fewer attack techniques and, unless installed on the outside, are less accessible to localized attack than locking devices.

Analyses of various devices are directed toward, what we consider to be, relative weaknesses, and do not reflect overall evaluations as to the efficacy of products. However, descriptions of specific threats and performance data from this research is available to responsible industry and government representatives upon request. Additionally, informal liaison between producers, builders, designers, architects and the Attorney General's office will continue on both a technical and policy level.

LOCKS

The key or combination operated element in a locking system is vulnerable to attack in the five fundamental ways discussed in preceding material (trickery, circumvention, force, manipulation, and robbery). Extensive testing and analysis on approximately 50 locks of various designs and quality yielded over 100 ways to defeat them. They varied greatly in their resistance.

Many were defeated easily with simple tools; others required much time and knowledgeable attack techniques. The most common examples for *force, circumvention,* and *manipulation* threats were considered when recommendations were developed. A number of threats proved to pose similar engineering problems, and thus are covered by a few basic requirements. Generally, this is accomplished by minimum performance levels, but some design specifications are suggested in areas where performance tests proved less than objective.

Of the various lock cylinder designs, the pin tumbler cylinder, employing tumblers arranged to follow each other in a line, is the most commonly used on buildings today (see Figure 15). Such locks usually have five or six pins, and may have from 15 to 300 thousand permutations. Different keyways can increase the number of possible combinations accordingly. This cylinder approaches the optimum for human use and convenience. Its overall size makes it easy to install and service. Each lock can be operated by several different keys if required (master keying). Unfortunately, many ways for defeating pin tumbler locks have been discovered, and many things have been done to obviate the intent of its original design during the past 100 years.

Lock cylinders are subject to many force threats; but they are also highly vulnerable to manipulation and circumvention threats. Depending on the skill of the operator and resistance characteristics of a particular cylinder, considerable time may be required to defeat a good lock. However, as other components, given time and proper circumstances, any locking system can be defeated in one or more ways.

The following basic conclusions about the resistance capabilities of locks against attack have been reached:

- Locks, in general, will not successfully resist common tool attacks.
  a. Latchbolts are subject to prying or "jimmying." (Deadbolt types are much better in this respect.)
  b. Lock cylinders and plugs can generally be extracted with pulling tools.
  c. Lock cylinders can usually be removed with twisting tools.
  d. Key-in-knob locks are usually easily overcome by twisting forces applied to the outside knob.
  e. Lock bolts, when accessible, are vulnerable to cutting.
- Lock bolts *will,* in general, successfully resist shear forces created by normal loading due to impact threats.

Recommendations

PERFORMANCE:

1. When installed in a test door, the lock assembly must resist a static load of 1500 pounds applied as shown. (See Figure 16.)
2. Lock cylinders shall resist impact loads of 200 inch-pounds applied to an outward direction. A comparable static test is as follows:
3. When the lock bolt is extended (locked), the mechanism holding it in place shall resist a compressive load of 200 pounds applied to the end of the bolt, parallel to its center line.
4. If the locking mechanism can be defeated by a torsional load on the outside door knob, then the mechanism must resist a torsional load of 3,300 inch-pounds in either direction while in the locked position.
5. If a torsional load can be applied to the lock cylinder by any tool, it must resist a torsional load of 3,300 inch-pounds in either direction.
6. Each key cylinder must resist a torsional load of 1,200 inch-pounds in either direction, applied to the keyway with a tool simulating a key.
7. The bolt must resist sawing by a hacksaw for a period of five minutes minimum.
8. Locks shall be attached to their supporting materials so that under violent attack, directed at the lock or surrounding area, the supporting material will fail before the lock assembly and attachments.
9. Locks shall have a minimum of 10,000 interchange free combinations (a key for any one of the 10,000 combinations used, will not operate any other lock keyed to any of the other 10,000 combinations).
10. It should not be possible to make a key section that will operate in key sections different from each other, when said key sections are used to increase the number of non-interchangeable combinations. (This specification is not meant to cover masterkeyed locks.)
11. Where a building or complex containing separate dwellings, proprietorships or similar distinct occupancies, and access is limited to specific authorized persons, locks on passage doors providing

access to a dwelling or proprietorship should have combinations different from locks accessing the other dwellings or proprietorships. This requirement shall also apply to separate dwellings on individual properties, constructed and developed under the same general plan at the same time.

12. Locks shall resist all forms of manipulation (shimming, picking, picking gun) for a period of five minutes when attacked by a person with Class B (see Appendix B) skills, using commercially available equipment brought to the state of Class B art.
13. Locks shall be designed and constructed to prevent passage through the lock keyway to the locking bolt or locking means.
14. Locks shall be constructed of materials that will permit normal operation and maintain all security requirements after fifty thousand (50,000) insertions and complete operations in the locking and unlocking direction of the operating key or keys.
15. Locks shall be installed to meet or exceed lock manufacturer's installation specifications. Said instructions must meet performance and design specifications required by the Attorney General.
16. Construction locks must meet all specifications at the time of occupancy by the dweller.

DESIGN REQUIREMENTS

17. For wooden doors, door edge stiffener plates must be supplied either with the lock (Figure 13) or incorporated into the design of the lock to prevent the failure of the door under impact loading described in the door system section.
18. Striker plates must be of the design depicted in Figure 14, or otherwise be designed to successfully transfer loading under impact threats to the framing structure, thus precluding failure of the jamb structures.
19. The lock shall utilize at least one 1-inch minimum throw bolt or be of a design to otherwise satisfy the intent of the standard to prevent a spreading threat, i.e., interlocking bolt.
20. Masterkeyed locks shall use no more than two master discs for any one tumbler and no more than three tumblers should have master key splits in any five tumbler lock, nor more than four tumblers shall have master splits in any six tumbler lock.
21. The barrier passageway in any mechanical locks shall be no more than one-third of the bitting interval (BP ⟨ ⅓ BI). Refer to Figures 17, 18, 19.
22. Locks shall have a minimum of five tumblers and five springs urging the drivers and pins into locking positions for pin and tumbler types.

It should be noted that although the above lock recommendations are generally directed toward pin tumbler designs, it is not the intent of this research to exclude other designs. Where other configurations are shown to have equal or superior security characteristics in all of the areas specified, they should be considered acceptable as meeting the intent of the requirements.

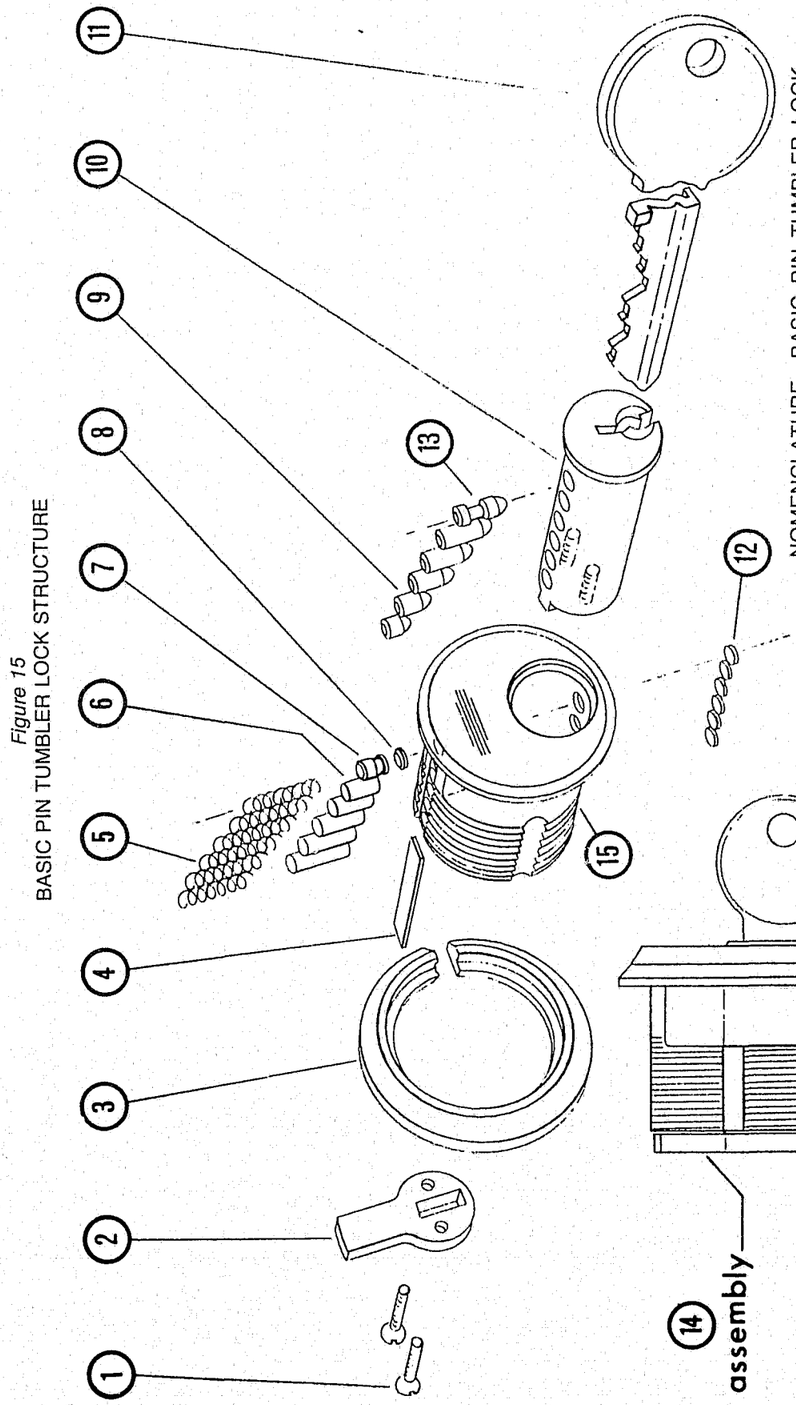
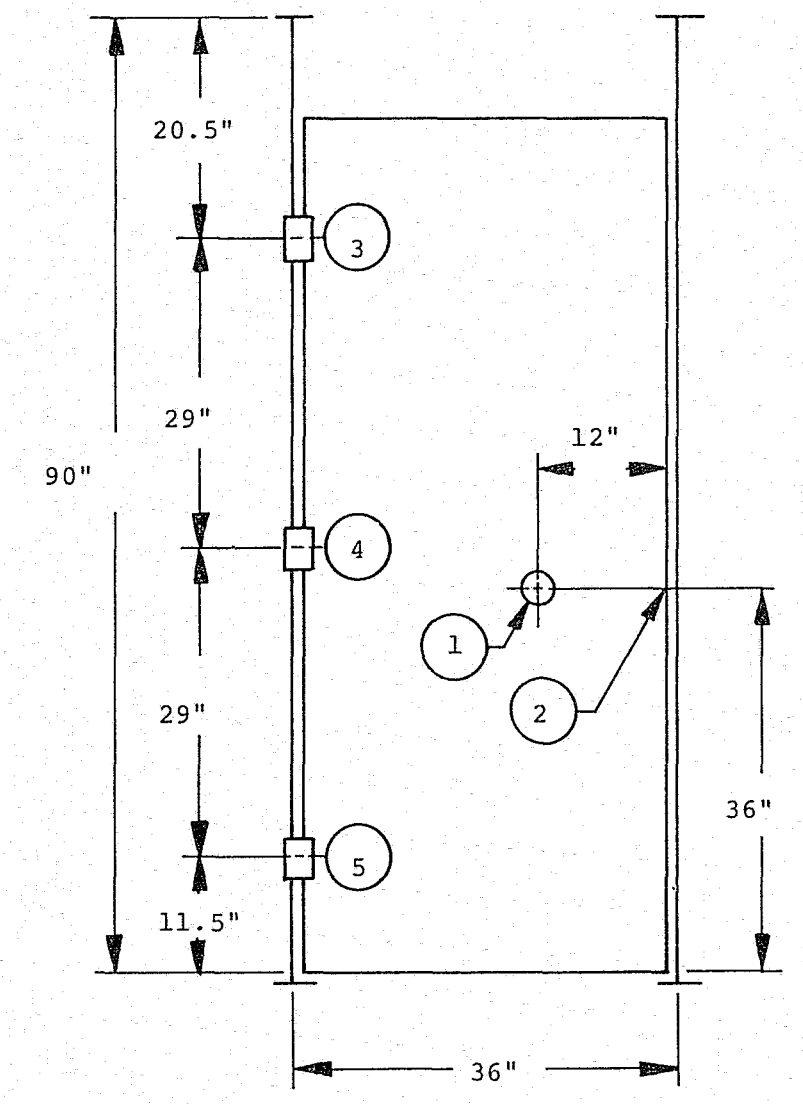


Figure 15
BASIC PIN TUMBLER LOCK STRUCTURE

NOMENCLATURE—BASIC PIN TUMBLER LOCK STRUCTURE

1. Cam Screws
2. Cam
3. Retainer Ring
4. Spring/Driver Retainer
5. Driver Springs
6. Drivers
7. Mushroom Driver
8. Master Keying Wafer
9. Tumbler
10. Plug
11. Key
12. Pin Loading Plugs
13. Mushroom Tumbler
14. Assembly
15. Housing

Figure 16
DYNAMIC LOAD DOOR TESTS
LOCATION OF EXTENSIOMETERS AND LOAD INPUT



No.	Item
1	Load Point
2	Latch
3	Upper Hinge
4	Middle Hinge
5	Lower Hinge

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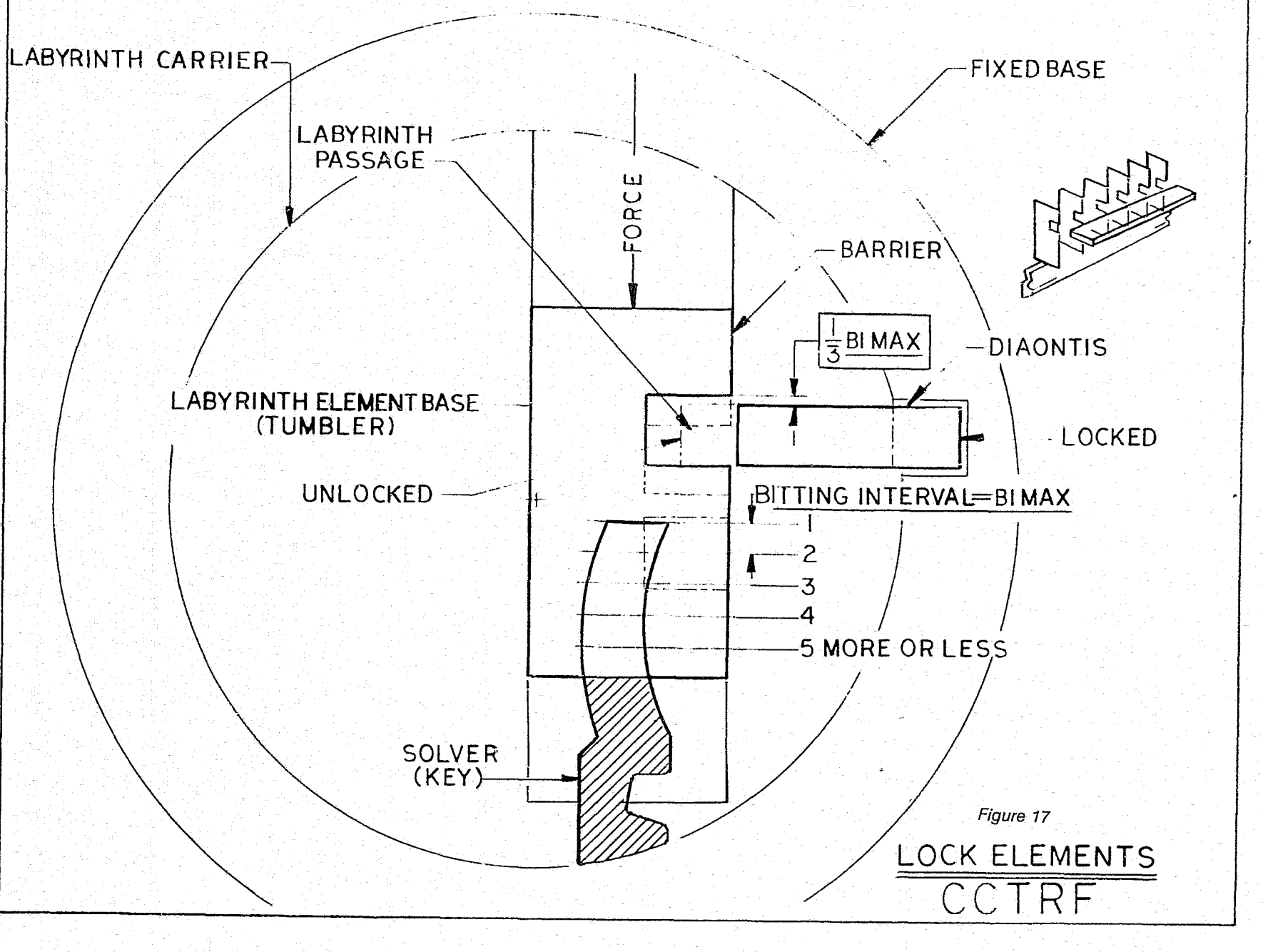

Figure 17
LOCK ELEMENTS
CCTRF

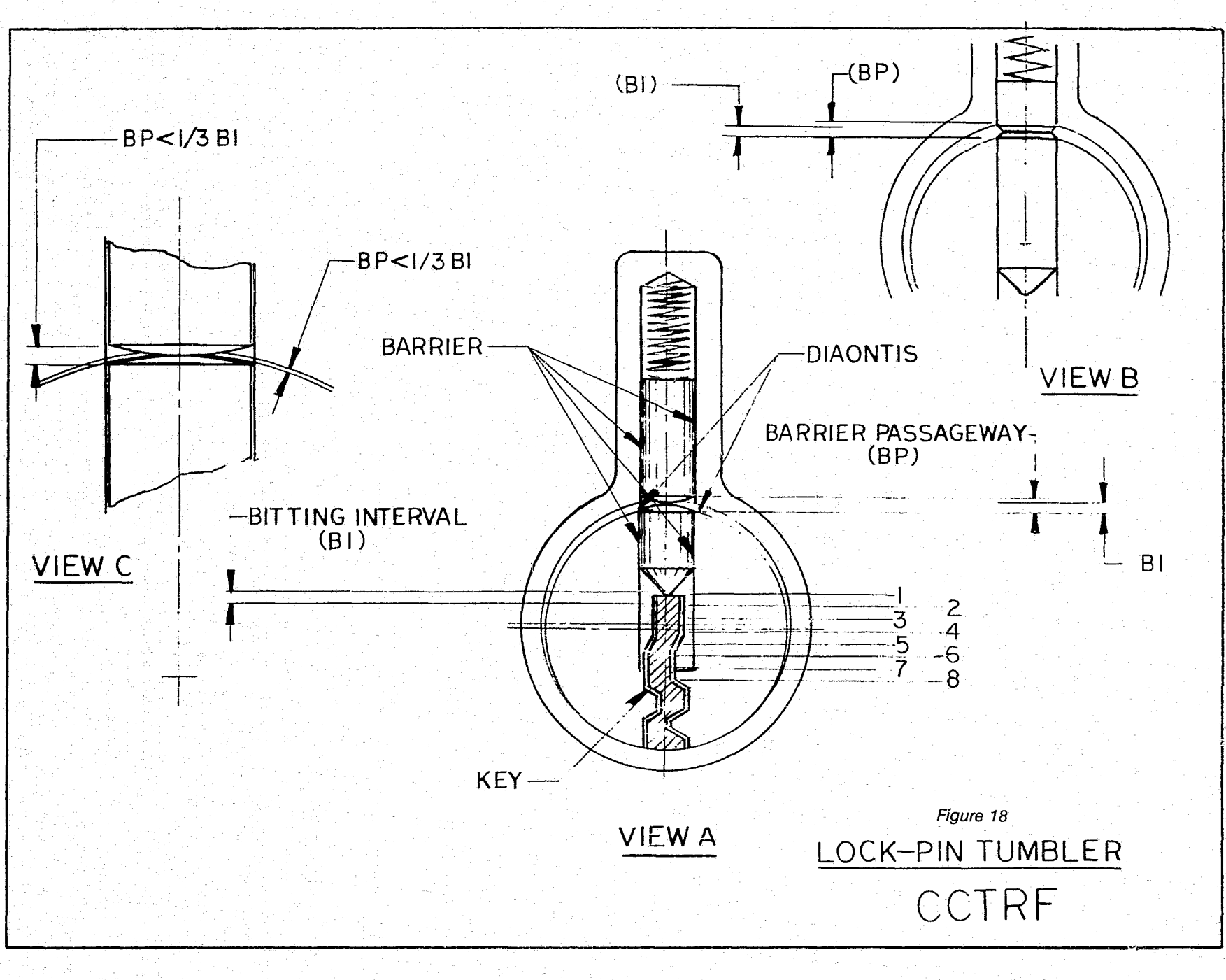

Figure 18

LOCK-PIN TUMBLER

CCTRF

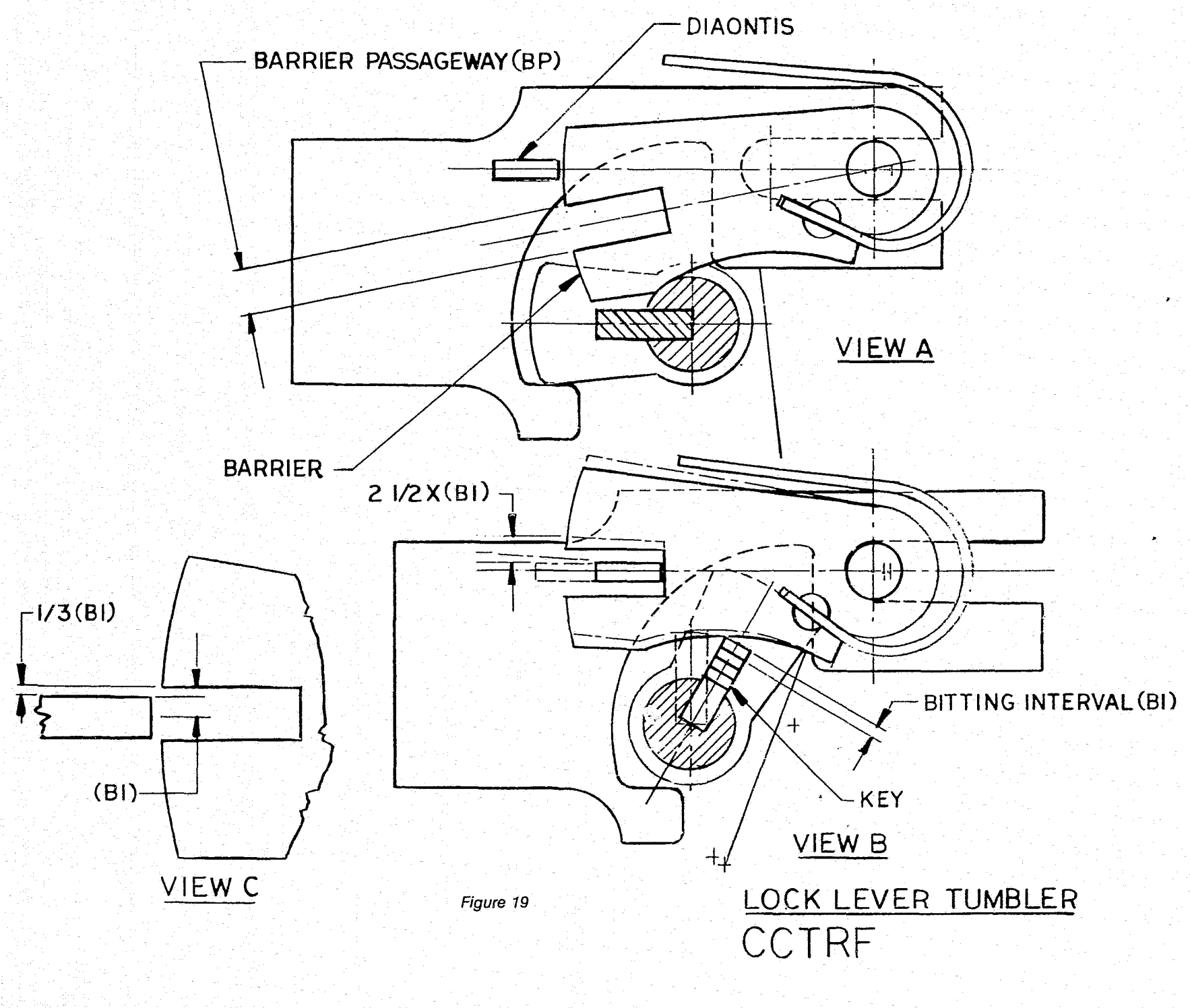

Figure 19

LOCK LEVER TUMBLER

CCTRF

APPENDICES

APPENDIX A

Penal Code Section 14050 et seq.

§ 14050. Development of building security standards.

(a) The Department of Justice shall encourage the use of technology in the prevention of crime. To this end it shall develop for recommendation to the Legislature, and thereafter continually review, building security standards. In carrying out these duties, the department shall consult with the Office of Architecture and Construction of the Department of General Services and shall, but is not limited to:

(1) Develop standards for a statewide building security code designed to prevent or reduce the likelihood of burglary or robbery in any building, including new single-family residences, apartments, public-owned buildings, commercial, and industrial buildings.

(2) Develop means of testing and certifying equipment and materials designed to prevent or reduce the likelihood of burglary or robbery in such buildings.

(b) In carrying out its duties pursuant to subdivision (a) the department shall seek the advice of the State Fire Marshal, to insure that fire and life safety standards are not impaired, and shall consult with the Office of Architecture and Construction regarding state building standards.

(c) The department shall submit a progress report to the Legislature, including preliminary recommendations for building security standards to be submitted to the State Building Standards Commission for adoption as part of Title 24 of the California Administrative Code, relating to building standards, not later than January 5, 1973, and a final report not later than the fifth legislative day of the 1974 session. Thereafter, the department shall continually review and update these standards as necessary.

§ 14051. Consultation among city and county officials. The chief law enforcement and fire officials of every city shall consult with the chief officer of their city who is charged with the enforcement of laws or ordinances regulating the erection, construction, or alteration of buildings within their jurisdiction for the purpose of developing local security standards and regulations supplemental to those adopted as part of Title 24 of the California Administrative Code, relating to building standards. The chief law enforcement and fire officials of every county shall consult with the chief officer of their county who is charged with the enforcement of laws or ordinances regulating the erection, construction, or alteration of buildings within their jurisdiction for the purpose of developing local security standards and regulations supplemental to those adopted as part of Title 24 of the California Administrative Code, relating to building standards. No provision of this or any other code shall prevent a city or county from enacting building security standards stricter than those enacted by the state.

APPENDIX B

SELECTED DATA TABLES
CRIME SPECIFIC — BURGLARY
PROGRAM

SECTION 1

This section is a compilation of selected burglary data from a twelve agency study initiated in late 1972. It is used to show trends in points of entry.

CRIME SPECIFIC PROGRAM BURGLARIES 1973 TWELVE AGENCY PROGRAM

PREMISES BY POINT OF ENTRY

V7

PREMISES	TOTALS	DOOR	WINDOW	FLR-BSMT	WALL	RF-ATC	OTHER
FMLY HOME	12659	6486	5089	10	11	10	1053
APT-DPLX	5717	3427	2030	5	12	3	240
OTHER RES	1445	1169	211	1	15	0	49
BUSINESS	5055	2690	1507	5	154	210	489
INDUST	562	333	153	1	23	12	40
GOVM'T	1506	694	691	3	8	22	88
OTHER	287	201	55	1	2	3	25
TOTALS	27231	15000	9736	26	225	260	1984

CRIME SPECIFIC PROGRAM BURGLARIES 1973 TWELVE AGENCY PROGRAM

PREMISES BY POINT OF ENTRY

V7

PREMISES	TOTALS	DOOR	WINDOW	FLR-BSMT	WALL	RF-ATC	OTHER
FMLY HOME	100.00	51.24	40.20	.08	.09	.08	8.32
APT-DPLX	100.00	59.94	35.51	.09	.21	.05	4.20
OTHER RES	100.00	80.90	14.60	.07	1.04	.00	3.39
BUSINESS	100.00	53.21	29.81	.10	3.05	4.15	9.67
INDUST	100.00	59.25	27.22	.18	4.09	2.14	7.12
GOVM'T	100.00	46.08	45.88	.20	.53	1.46	5.84
OTHER	100.00	70.03	19.16	.35	.70	1.05	8.71
TOTALS	100.00	55.08	35.75	.10	.83	.95	7.29

CRIME SPECIFIC PROGRAM BURGLARIES 1973 TWELVE AGENCY PROGRAM

PREMISES BY POINT OF ENTRY

V7

PREMISES	TOTALS	DOOR	WINDOW	FLR-BSMT	WALL	RF-ATC	OTHER
FMLY HOME	46.49	43.24	52.27	38.46	4.89	3.85	53.07
APT-DPLX	20.99	22.85	20.85	19.23	5.33	1.15	12.10
OTHER RES	5.31	7.79	2.17	3.85	6.67	.00	2.47
BUSINESS	18.56	17.93	15.48	19.23	68.44	80.77	24.65
INDUST	2.06	2.22	1.57	3.85	10.22	4.62	2.02
GOVM'T	5.53	4.63	7.10	11.54	3.56	8.46	4.44
OTHER	1.05	1.34	.56	3.85	.89	1.15	1.26
TOTALS	100.00	100.00	100.00	100.00	100.00	100.00	100.00

SELECTED DATA TABLES
CRIME SPECIFIC—BURGLARY PROGRAM
SECTION 2

This section is a compilation of selected burglary data from a six major agency study for the period from April 1972, when the program started, until March 1973. It is used to show trends in means of entry.

KEY

Means of Entry:

0 No entry attempt only. Entry is attempted but not gained.
1 Not specified or unknown. The means cannot be logically determined.
2 No force, door or window left unlocked or removed screen to open unlocked window, etc.
3 Used pass key or pick or slip lock with celluloid, playing card, shim. A lock defeating type tool is the means to gain entry.
4 Pries or jimmies. A minimum amount of force is used to gain entry such as removing louvers, prying a lock, prying a window, jimmying a door, etc.
5 Breaks, forces, smashes. More force is used than in 4, such as breaking a window, forcing or smashing a window or door. The breaking or forcing can be with hands or feet or an impact tool.
6 Saws, bores, burns, cuts glass, cuts lock. Whenever a tool is used to cut, burn or bore to gain entrance.
7 Explosives. Whenever any explosives or explosive tool is used.
8 Tunnels. Whenever a tunnel is dug to gain entrance.
X All other. When the method used does not seem to fit any other category.

CRIME SPECIFIC PROGRAM BURGLARIES 1972 SIX AGENCY PROGRAM

PREMISES BY MEANS OF ENTRY

V5

PREMISES	TOTALS	0	1	2	3	4	5	6	7	8	X
FAMILY HOME	41.25	40.14	46.67	48.53	28.54	42.15	38.68	21.91	50.00	.00	27.27
APTS-DUPLXS	24.98	22.30	23.67	24.76	44.18	23.39	21.74	8.99	.00	.00	.00
HOTEL ROOM	.92	.23	1.67	.95	2.38	.71	.62	.56	.00	.00	.00
OTHER RESID	3.65	1.64	2.67	6.33	3.38	3.30	1.68	5.62	.00	.00	.00
SERVICE BUS	7.66	10.33	4.33	3.57	5.51	9.29	10.17	17.42	50.00	.00	18.18
SALES BUS	6.38	11.03	4.00	4.43	2.00	5.04	10.08	13.48	.00	100.00	36.36
VEH SALES	.49	.70	.00	.14	.25	.61	.82	1.12	.00	.00	.00
PVT OFFICES	2.05	3.29	1.00	1.27	3.00	2.17	2.30	2.25	.00	.00	.00
HOTEL-MOTEL	.22	.00	.00	.27	.75	.14	.14	.00	.00	.00	.00
MED OFFICES	1.09	1.64	.33	.45	1.00	1.37	1.54	1.12	.00	.00	.00
ENTERT-REC	1.02	.94	.33	.77	1.00	1.46	.91	1.69	.00	.00	.00
WAREHOUSE	1.67	1.41	1.67	.99	.88	2.03	1.54	11.80	.00	.00	.00
INDUSTRIAL	3.61	1.41	7.00	3.71	3.13	3.02	3.79	8.99	.00	.00	9.09
FINANCIAL	.10	.47	.00	.09	.00	.09	.10	.00	.00	.00	.00
GOV'MT	.28	.23	.67	.27	.13	.28	.34	.00	.00	.00	.00
SCHOOLS	3.01	1.64	3.33	2.21	2.63	2.92	4.46	1.69	.00	.00	.00
CHURCHES	.87	.94	1.00	.99	1.00	.90	.72	.00	.00	.00	.00
OTHER/UNSPF	.73	1.64	1.67	.27	.25	1.13	.38	3.37	.00	.00	9.09
TOTALS	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

CRIME SPECIFIC PROGRAM BURGLARIES 1972 SIX AGENCY PROGRAM

PREMISES BY MEANS OF ENTRY

PREMISES	TOTALS	0	1	2	3	V5 4	5	6	7	8	X
FAMILY HOME	3356	171	140	1074	228	894	806	39	1	0	3
APTS-DUPLXS	2032	95	71	548	353	496	453	16	0	0	0
HOTEL ROOM	75	1	5	21	19	15	13	1	0	0	0
OTHER RESID	297	7	8	140	27	70	35	10	0	0	0
SERVICE BUS	623	44	13	79	44	197	212	31	1	0	2
SALES BUS	519	47	12	98	16	107	210	24	0	1	4
VEH SALES	40	3	0	3	2	13	17	2	0	0	0
PVT OFFICES	167	14	3	28	24	46	48	4	0	0	0
HOTEL-MOTEL	18	0	0	6	6	3	3	0	0	0	0
MED OFFICES	89	7	1	10	8	29	32	2	0	0	0
ENTERT-REC	83	4	1	17	8	31	19	3	0	0	0
WAREHOUSE	136	6	5	22	7	43	32	21	0	0	0
INDUSTRIAL	294	6	21	82	25	64	79	16	0	0	1
FINANCIAL	8	2	0	2	0	2	2	0	0	0	0
GOV'MT	23	1	2	6	1	6	7	0	0	0	0
SCHOOLS	245	7	10	49	21	62	93	3	0	0	0
CHURCHES	71	4	3	22	8	19	15	0	0	0	0
OTHER/UNSPF	59	7	5	6	2	24	8	6	0	0	1
TOTALS	8135	426	300	2213	799	2121	2084	178	2	1	11

CRIME SPECIFIC PROGRAM BURGLARIES 1972 SIX AGENCY PROGRAM

PREMISES BY MEANS OF ENTRY

PREMISES	TOTALS	0	1	2	3	V5 4	5	6	7	8	X
FAMILY HOME	100.00	5.10	4.17	32.00	6.79	26.64	24.02	1.16	.03	.00	.09
APTS-DUPLXS	100.00	4.68	3.49	26.97	17.37	24.41	22.29	.79	.00	.00	.00
HOTEL ROOM	100.00	1.33	6.67	28.00	25.33	20.00	17.33	1.33	.00	.00	.00
OTHER RESID	100.00	2.36	2.69	47.14	9.09	23.57	11.78	3.37	.00	.00	.00
SERVICE BUS	100.00	7.06	2.09	12.68	7.06	31.62	34.03	4.98	.16	.00	.32
SALES BUS	100.00	9.06	2.31	18.88	3.08	20.62	40.46	4.62	.00	.19	.77
VEH SALES	100.00	7.50	.00	7.50	5.00	32.50	42.50	5.00	.00	.00	.00
PVT OFFICES	100.00	8.38	1.80	16.77	14.37	27.54	28.74	2.40	.00	.00	.00
HOTEL-MOTEL	100.00	.00	.00	33.33	33.33	16.67	16.67	.00	.00	.00	.00
MED OFFICES	100.00	7.87	1.12	11.24	8.99	32.58	35.96	2.25	.00	.00	.00
ENTERT-REC	100.00	4.82	1.20	20.48	9.64	37.35	22.89	3.61	.00	.00	.00
WAREHOUSE	100.00	4.41	3.68	16.18	5.15	31.62	23.53	15.44	.00	.00	.00
INDUSTRIAL	100.00	2.04	7.14	27.89	8.50	21.77	26.87	5.44	.00	.00	.34
FINANCIAL	100.00	25.00	.00	25.00	.00	25.00	25.00	.00	.00	.00	.00
GOV'MT	100.00	4.35	8.70	26.09	4.35	26.09	30.43	.00	.00	.00	.00
SCHOOLS	100.00	2.86	4.08	20.00	8.57	25.31	37.96	1.22	.00	.00	.00
CHURCHES	100.00	5.63	4.23	30.99	11.27	26.76	21.13	.00	.00	.00	.00
OTHER/UNSPF	100.00	11.86	8.47	10.17	3.39	40.68	13.56	10.17	.00	.00	1.69
TOTALS	100.00	5.24	3.69	27.20	9.82	26.07	25.62	2.19	.02	.01	.14

APPENDIX C
DEFINITIONS FOR VARIATIONS IN ABILITY TO ATTACK LOCKS

Class A Ability
A person with the ability to devise special methods and techniques and build and use special equipment and tools to defeat high security locks of all kinds. Such a person can manipulate combination locks, can defeat safety deposit lever locks, can sight read lever locks, and skillfully employs methods and techniques known only to a few experts; has advanced masterkeying ability, manufacturing, service and installation knowledge.

Class B Ability
A person with the ability to manipulate medium security locks. Can pick a standard five pin tumbler lock in five minutes or more. Can use picking gun, can drill locks, can change lock combinations. Has servicing knowledge advanced enough to correctly service most commercial pin tumbler locks and combination locks. Uses key duplicating and originating equipment.

Class C Ability
A person with the ability to pick low security locks, use tryout keys and manipulation keys, duplicate and make keys from code numbers, use key making equipment, shim locks, drill locks; has elementary service and installation ability. Resorts to circumvention whenever possible.

Class D Ability
A person with the ability to duplicate keys and to make keys from code numbers. Uses key duplicating equipment. Can use simple tools to force open simple locks. More often, will try to circumvent locks.

Class E Ability
A person with the ability to operate locks with the key or combination. Can force open locks where it is obvious that simple tools can be used. More often, will try to circumvent locks by entering through a window or other entrances left unguarded.

NOTE: Only Class A abilities are consistently excellent. Other classes may be exceptional in some ways and poor in others.

APPENDIX D
Glossary

BARRIER A material or living element which is interposed between an attacker and his objective, and which must be overcome to achieve that objective.

BURGLARY RESISTANCE The characteristic of a building or building component to withstand forcible attack applied for the purpose of accomplishing successful entry. Burglary resistance may be described in terms of time, energy, or a combination of both.

BURGLARY THREAT Man's specific mental and physical abilities enhanced or not by the mechanical advantage of various devices, to overcome entry barrier resistance and gain access.

CHANGE KEY A material or device planned and constructed to operate a specific lock having its own individual combination.

CIRCUMVENTION The process of circumventing or by-passing a lock which permits relative movement or separation of the members or objects which were fastened together by said lock. Circumvention is confined to methods that by-pass the interpreter, such as entry or exit through openings in the enclosure left unguarded.

KEY A material or device providing means for operating a mechanical lock.

LOCK/CHANGE KEY OPERATED A device for fastening two or more members or objects together, and in a lock or fastened condition limits their relative movement of separation; said device being planned or constructed to be operated by a single change key combination; and includes means, operated by a change key having said individual combination, for operating the device into an unlocked condition permitting relative movement or separation of the members or objects.

LOCK/COMBINATION In this type lock, tumblers or barriers are generally made in the form of discs. These discs are rotated by a dial located on the face of the enclosure and having a series of numbers or symbols on its face. Rotation of the dial causes rotation of control means, which is generally a pin (fly) or some other device on one of the tumblers, which in turn, cooperates with another tumbler, and so forth. Turning the dial will locate the tumblers and line up the passageways and permit the traveler to pass through all the tumbler barriers.

LOCK/KEY OPERATED A mechanical device for fastening two or more members or objects together, and in a locked or fastened condition limits their relative movement or separation; and includes means, operable by a key, for operating the device into an unlocked condition permitting relative movement or separation of the members or objects.

LOCK/MASTERKEYED A mechanical device for fastening two or more members or objects together, and in a locked or fastened position limits their relative movement or separation; said device being planned and constructed as one of a series or group of mechanical key locks, all of which are operable by a key having the same masterkey combination and each of which is operated by a key having a planned individual key combination and a master key having a planned master key combination, for operating the device into an unlocked condition permitting relative movement or separation of the members or objects.

LOCK/MECHANICAL A device for fastening two or more members or objects together, and in a locked or fastened condition limits their relative movement or separation; and includes means operable into an unlocked condition permitting relative movement or separation of the members or objects.

LOCK/PERMUTATION These locks are key operated. The function of the key is to arrange the barrier passageways into a straight line. The traveler then, instead of following through a tortuous labyrinth, travels in a straight line through the barrier openings. Locks of this type include pin tumbler locks, lever locks, and disc tumbler locks.

LOCK/TUMBLER (movable labyrinth) Locks of this type may be divided into two classes: Permutation Locks and Combination Locks.

LOCK/WARDED (fixed labyrinth) Locks of this type are made of a housing with an opening (keyhole) to receive a key. The labyrinth may be created in two planes—by wards obstructing the keyway—and by internal wards arranged normal to the centerline of the key barrel.

MANIPULATION The process of operating a lock to a locked or unlocked condition by means other than that planned for operating said lock. Manipulation is confined to attempts to fool the interpreter into accepting a false message.

MANIPULATION KEY A material or device which may be variably positioned or manipulated in a lock's keyway until such action develops a condition within the lock which enables the lock to be operated.

MASTER KEY A material or device planned and constructed to operate all locks in a series or group of locks, each having its own individual combination and change key other than the master key for operating that combination only, and each lock construction being a planned part of the series or group for operation with the master key.

PHYSICAL SECURITY The art and science of creating and maintaining control over physical assets.

ROBBERY The taking of property in possession of another by means of force or fear.

TRYOUT KEY A material or device which may or may not be one of a set of similar devices, each key made to operate a series or group of locks of the total lock series or group, the key or keys being constructed to take advantage of unplanned construction similarities in the series or group operated thereby.

APPENDIX E
RECOMMENDED ADDITIONAL SECTIONS TO THE HEALTH & SAFETY CODE

Section 1. Adoption of minimum building security standards; violation. The Attorney General shall prepare and adopt rules and regulations establishing minimum standards for building security for the protection of life and property against forcible entry upon any building. Rules and regulations adopted pursuant to this section shall establish minimum standards to the manufacture, production, installation and maintenance of building components and equipment that are subjected to attack during burglary. Violation of any rule or regulation shall be deemed to be in violation of this chapter.

Section 1.1. Uniform application of rules and regulations. The rules and regulations adopted by the Attorney General pursuant to Section 1 regarding any building or structure shall apply uniformly throughout the State of California and no state agency, city, city and county, county, or other political subdivision of this State, including, but not limited to, a chartered city, city and county, or county, shall adopt any ordinance or regulation which is less restrictive than the rules and regulations adopted by the Attorney General pursuant to Section 1.

Section 2. Book of building security rules and regulations. The Attorney General shall prepare in book or bulletin form excerpts of the laws, rules, and regulations dealing with security and may make single copies of such laws, rules, and regulations available, without cost, to California building officials and to owners and managers of establishments governed by such laws, rules, and regulations.

Section 2.1. Looseleaf bulletin of construction materials, etc., meeting building security standards; revisions; distribution; unlisted items. The Attorney General shall prepare and publish in looselead form lists of construction materials and equipment and methods of construction and of installation of equipment, together with the name of any person, firm, corporation, association, or similar organization listed as the manufacturer, representative, or supplier, which are in conformity with building security standards provided by Title 11 of the California Administrative Code. The Attorney General shall periodically prepare and publish in looseleaf form revisions to this list.

Copies of such lists or revisions shall be distributed at the cost of printing by the Attorney General to persons who have filed written requests for such approved lists or revisions.

It shall not be construed that because a material, assemblies of materials, method of construction and installation of equipment has not been listed, as permitted by this section, that such a material, assemblies of materials, method of construction and installation of equipment does not conform to the building security standards provided by Title 11 of the California Administrative Code.

Section 2.2. Application for listing; fees; industrywide materials and assemblies. Any person, firm, corporation, association, or other organization desiring listing pursuant to Section 2.1 shall first make application to the Attorney General on forms provided by him. Such applications shall be accompanied by the listing fee as follows:

(a) Except as provided in subdivisions (b) and (c), the original and annual renewal fee for the listing of a material, equipment, method of construction, or method of installation of equipment for any person, firm, corporation, association, or similar organization shall be fifty dollars ($50). The original and annual renewal fee for the next four additional materials, equipment, methods of construction or of installation of equipment shall be twenty-five dollars ($25) for each listing. The original and annual renewal fee for additional materials, equipment, methods of construction, or method of installation of equipment shall be ten dollars ($10) for each listing in excess of five listings.

The Attorney General may list in generic terms without a listing fee materials or assemblies of materials classed by him as industrywide and conforming to standards established by the regulations adopted pursuant to Section 1. He may list without a listing fee methods of construction and of installation of equipment classed by him as industrywide in application and use.

Section 2.3. Duration of listing; disposition of fees. The annual and renewal listing established by Section 2.2 shall be for the fiscal year period from July 1st to June 30th or for the remaining portion thereof. All moneys collected from original and annual renewal fees pursuant to Section 2.2 shall be deposited in the General Fund.

Section 2.4. Regulations. The Attorney General may adopt regulations to implement, interpret, make specific or otherwise carry out the provisions of Sections 2, 2.1, 2.2, and 2.3.

Section 2.5. Enforcement of regulations. The Attorney General, the chief building official and their authorized representatives may enforce in their respective areas, rules and regulations that have been formally adopted by the Attorney General for the prevention of burglary and for the protection of life and property against burglary attack.

APPENDIX F
TITLE 11—LAW

CHAPTER I—Attorney General
SUBCHAPTER 1. Burglary Resistance Standards

Article 1. Administration

1.00. Title. These regulations shall be known as the "Regulations of the State Attorney General" and shall constitute the Basic Building Design and Construction Standards of the State Attorney General. They may be cited as such, and will be referred to herein as "these regulations."

1.02. Purpose. These regulations have been prepared and adopted for the purpose of establishing minimum standards for building security for the protection of life and property against forcible entry upon any building.

1.03. Scope. (a) These regulations shall govern the construction and maintenance of any structure which falls within the definition of "buildings" as set forth in Article 3 of this Code.

(b) These regulations shall apply to new occupancies immediately, and existing occupancies beginning July 1, 197 .

(c) Exception. Buildings controlled by the Federal Government.

1.04. Basis. These regulations are intended to establish reasonable building security standards and are predicated on the basis that man's ability to attack and forcibly enter closed buildings can be described in terms of time and energy, and the introduction of physical barriers of varying resistance to these attacks can increase the time needed to accomplish entry success.

1.05. Validity. If any article, section, subsection, sentence, clause or phrase of these regulations if for any reason held to be unconstitutional, contrary to statute, exceeding the authority of the State Attorney General, or otherwise inoperative, such decision shall not affect the validity of the remaining portion of these regulations.

1.06 Local Ordinances. Nothing contained in these regulations shall be considered as abrogating the provisions of any ordinance, rule or regulation of any city, city and county, or county governmental agency, providing such local ordinance, rule or regulation is not less stringent than these minimum standards.

1.07. Report of Arrest. Any inspection authority who, in the exercise of his authority under Section of the Health and Safety Code, causes any legal complaints to be filed or any arrest to be made shall notify the State Attorney General immediately following such action.

1.08. Violations. Any person who violates any regulation contained in Subchapter 1 of Chapter 3, Title 11 of the California Administrative Code shall be considered in violation of Section of the Health and Safety Code.

(ADMINISTRATIVE REGULATIONS TO BE)
(FILED WITH THE SECRETARY OF STATE)

ARTICLE 1.50

CONSTRUCTION MATERIALS AND EQUIPMENT LISTINGS

1.50. General. (a) Construction materials, assemblies of materials, equipment, methods of construction, methods for installation of equipment, and assemblies of equipment listed by the Attorney General in accordance with the provisions of this article shall be construed as conforming to the applicable provisions of these regulations without submission of further evidence thereof, and shall be assumed to possess the burglary resistance specified when constructed and installed in accordance with the conditions of their listing.

(b) Regulation Identification. Except when otherwise specified, construction materials, equipment, methods of construction, methods for installation of equipment, and assemblies of equipment are herein identified as "materials and equipment", may be cited as such, and will hereafter be referred to in this article as "materials and equipment".

(c) Limitation. Acceptance under the provisions of Section 1 (a) shall be limited to the material and equipment listed and shall not extend to any other product.

(d) Expired Listing. It shall not be construed that an expired listing of any material or equipment previously listed by the Attorney General, automatically conforms with the current provisions of these regulations.

1.51. Method and Scope of Listings. (a) Method. Listings of materials and equipment shall be in either of two forms, i.e., proprietary or generic. Proprietary listing shall be separately published by the Attorney General in accordance with the provisions of Section , Health and Safety Code. Materials and equipment classed by the Attorney General as industry-wide may be designated in generic terms in regulations in accordance with the provisions of Section , Health and Safety Code.

(b) Scope. The provisions of this article shall be limited to proprietary listings.

1.52. Application for Evaluation and Listing. (a) Original. Any person, firm, corporation, association or similar organization desiring the listing of any material or equipment shall submit a completed application for evaluation and listing to the Attorney General on forms provided by him. Such form shall be accompanied by the appropriate evaluation and listing fees as prescribed in Section 1.61.

Application for reinstatement of a listing which has been expired for one year or more shall be considered as an original application for evaluation and listing.

Applications for evaluation and listing received after December 31 shall be accompanied by the evaluation and listing fees plus the renewal fee for the next ensuing fiscal year.

(b) Renewal. Any person, firm, corporation, association, or similar organization desiring a revision to be made to the listing of any material or equipment shall submit a completed application for revision to the Attorney General on forms provided by him. Such form shall be accompanied by one-half the fee for evaluation as prescribed in Section 1.61. If such revision requires re-evaluation of the test report or technical data submitted, the full evaluation and the revision fee shall be submitted.

1.53. Effective date of Listing. Materials and equipment shall be considered as listed upon approval thereof by the Attorney General as shown in the files at the Office of the Attorney General.

Listings shall be valid from the date of approval through the next ensuing June 30.

1.54. Required Submissions for Listing. (a) Sample Specimens. In addition to the application and fee required by Section 1.2, the Attorney General may require that sample specimens, taken from regular production, be submitted to him for evaluation. The Attorney General may require the assembly or erection of a sample specimen for evaluation purposes.

The applicant shall assume all responsibility relating to the assembly or erection of such a specimen, including but not limited to the cost, liability and removal thereof. The applicant shall arrange for the removal of any specimen submitted to the attorney General or which has been assembled or erected pursuant to this section, within 60 days of notification by the Attorney General. The Attorney General may, at his discretion, dispose of any specimen submitted to him following the 60 day notification.

(b) Test Reports and Technical Data. Every application for evaluation and listing of a material as equipment which is required by these regulations to be tested, shall be accompanied by a test report issued by an approved testing organization. Technical data shall be submitted with any application when required by the Attorney General. Each application for an evaluation and listing of a burglary-resistant design, and when required by the Attorney General, shall be accompanied by two sets of black-line drawings and one set of mylar drawings for reproduction.

1.55. Test Specimens. Specimens submitted to laboratories for testing shall be from regular production. Acceptance for listing will not be considered on the basis of any examination of hand made equipment or products.

1.56. Publication of Submitted Data. The Attorney General reserves the right to publish all or any part of any test report or technical data submitted to him and relating to a listed material or equipment.

1.57. Labels. Every material or equipment which is listed by the Attorney General shall bear a label conforming to the provisions of this section. Labels shall be placed in a conspicuous location and shall be attached by the manufacturer during production or fabrication.

Exceptions:

(1) Materials or equipment which bear the label of an approved testing organization, provided such organization conducts factory inspections of the material and workmanship during fabrication and assembly.

(2) Upon written request, the Attorney General may exempt specified materials or equipment from the labeling requirement provided he finds such labeling impractical or impossible. In such cases, however, sufficient evidence shall be furnished indicating the means by which said materials or equipment may be reasonably identified.

(a) Format. Labels shall be produced or obtained by the listee from the Attorney General, and shall consist of the format and color applicable to the particular class of product to be labeled.

(b) Identification. Labels shall be marked with the following information:

(1) Insert in or above the top scroll the item listed. Examples: "Entry Door Lock"; "Glazing Material."

(2) Insert into top scroll the name and address of the listee.

(3) Insert in the bottom scroll the listing number issued by the Attorney General and all other data as may be specified by the Attorney General, dependent upon the product and its intended use.

(c) Illegal Use. No person shall attach any label conforming to the provisions of this section to any product which is not listed by the Attorney General.

(d) Inspection Service. Every listee using the label described in this section shall provide for the inspection service specified in Section

When there is no readily available inspection service agency, a listee may contract with the Attorney General for the conduct of inspections of its production line fabrication and workmanship in accordance with the provisions of this section.

Reimbursements under such contract shall be payable to the Attorney General and shall be as follows:

(1) $100.00 for each 24-hour period or fraction thereof on a portal to portal basis, and

(2) All travel expenses, including but not necessarily limited to air, train and bus fare, automobile rental and automobile mileage at $.10 per mile.

1.58. Approved Testing Organization. (a) Qualifications. For the purposes of this article, an approved testing organization shall mean any person, firm, corporation or association which conforms to all the following:

(1) Equipped or has access to facilities which are equipped to perform tests in accordance with the required test procedures.

(2) Organizations which employ personnel who are qualified for testing.

(3) Approved by the Attorney General.

It shall be incumbent upon persons, firms, corporations, or associations desiring approval as a testing organization to initiate a request and present to the Attorney General evidence of their qualifications which in the judgment of the Attorney General is sufficient to grant approval.

(b) Discontinued Approvals. Approvals granted to any testing organization either prior to or after the effective date of this section may continue in effect unless rescinded by the Attorney General for cause.

(c) Limitations. Approval as a testing organization shall not be granted to any person, firm, corporation, or association for the purpose of conducting tests of materials or equipment manufactured, sold, or similarly processed or handled by such persons, firm, corporation or association.

1.59. Testing Equipment. (a) General. Testing equipment used or intended to be used to determine the fire-resistive rating or classification of any material or equipment to be listed by the Attorney General, shall be inspected and evaluated by the Attorney General to determine conformance with the required conditions for such testing equipment as set forth in the appropriate test standards.

(b) Maintenance. All testing equipment shall be maintained in good repair devoid of any defect which would affect the burglary resistant rating or classification of any material or equipment to be tested.

(c) Cost of Service. Any testing organization which desires approval pursuant to Section 1.58, shall be liable for the necessary advance arrangements for all costs incurred by one representative of the Attorney General in conducting any service rendered under Section 1.59 (a) above.

1.60. Approved Inspection Service Agency. (a) General. An approved inspection service agency is any person, firm, corporation, or association which periodically and on a continuous basis, conducts inspections of listed materials and equipment to determine if the production line fabrication and workmanship is in accordance with the conditions of listing.

(b) Qualifications. Qualifications for acceptance as an approved inspection service agency shall include any person, firm, corporation, or association which conforms to all of the following:

(1) Employs personnel who are qualified for testing.

(2) Approved by the Attorney General.

It shall be incumbent upon persons, firms, corporations, or associations desiring approval as an inspection service agency to initiate a request and present to the Attorney General evidence of their qualifications which in the judgment of the Attorney General is sufficient to grant approval.

(c) Discontinued Approvals. Approvals granted to any inspection service agency either prior to or after the effective date of this section may continue in effect unless rescinded by the Attorney General for cause.

(d) Limitations. Approval as an inspection service agency shall not be granted to any person, firm, corporation, or association for the purpose of conducting inspections of materials or equipment manufactured, sold or similarly processed or handled by such person, firm, corporation or association.

(e) Frequency of Service. Inspections by an approved inspection agency shall be made of the production of every material or equipment as stipulated in Section 1.60 (a), not less than 4 times each calendar year. Such inspections shall be on an unannounced basis.

(f) Reports. Reports shall be made by the approved inspection service agency of every inspection made, the original of which shall be submitted to the listee and a copy thereof submitted to the Attorney General within 30 days of inspection.

1.61. Fees. Each application for listing shall be accompanied by a fee or fees in accordance with the provisions of this section.

(a) Evaluation Fees. The fee for evaluating any material and equipment shall be as follows:

(1) Material and Equipment $50.00

(b) Listing Fees. The fee for listing any material and equipment shall be as follows:

(1) Material and Equipment $35.00

(c) Disposition of Fees. Evaluation and listing fees shall be submitted simultaneously with each application for evaluation and listing. If the material and equipment is not found to be in conformance with the provisions of these regulations, the listing fee shall be returned to the applicant. The appropriate evaluation fee shall be retained by the Attorney General to offset the costs incurred through evaluation of the material and equipment.

(d) Listing Period. Listing fees shall be applicable to a fiscal year between July 1 and June 30, or for any portion thereof.

1.62. Violations. No person, firm, corporation or association shall knowingly or intentionally represent any material or equipment as being approved and listed by the Attorney General when such material or equipment is not so approved and listed. Such misrepresentation shall constitute a violation within the meaning of Section Health and Safety Code.

Article 2. Alternate Means of Protection and Appeals

2.01 Request for Alternate Means of Protection. The provisions of these regulations are not intended to prevent the use of any equipment, material or assembly of materials, method of construction, method of installation of equipment, or means of protection not specifically prescribed by these regulations. The enforcing agency may approve any such alternate providing the proposed design is satisfactory and complies with the content of these regulations and that the material, assembly of materials, equipment, method of construction or method of installation of equipment, or means of protection afforded is, for the purpose intended, at least equivalent to that prescribed in these regulations in quality, strength, effectiveness, burglary resistance, durability and safety.

Request for approval to use an alternate material, assembly of materials, equipment, method of construction, method of installation of equipment, or means of protection shall be made in writing to the enforcing agency by the owner or his authorized representative, and shall be accompanied by a full statement of the conditions. Sufficient evidence or proof shall be submitted to substantiate any claim that may be made regarding its conformance.

Approval of a request for use of an alternate material, assembly of materials, equipment, method of construction, method of installation of equipment, or means of protection made pursuant to these provisions shall be limited to the particular case covered by request and shall not be construed as establishing any precedent for future requests.

2.02 Appeals. When a request for alternate means of protection has been denied by the enforcing agency, the applicant may file a written appeal to the Attorney General for consideration of his proposal. The Attorney General shall, after considering all of the facts presented, determine if the proposal is, for the purpose intended, at least equivalent to that specified in these regulations in quality, strength, effectiveness, burglary resistance, durability and safety, and he shall transmit such findings and his recommendation to the applicant and to the enforcing agency.

Article 3. Definitions and Abbreviations

3.02 "B" Definitions.

a) The term "building" means any structure as to which state agencies have regulating power, built for support, shelter, housing or enclosure of persons, animals, chattels, equipment or property of any kind, and also includes structures wherein things may be grown, made, produced, kept, handled, stored or disposed of. All appendages, accessories, apparatus, appliances, and equipment installed as a part thereof, but "building" shall not include machinery, equipment of appliances installed for manufacture or process purposes only, nor shall it include any construction installations which are not a part of a building, any tunnel, mine shaft, highway or bridge, or include any house trailer or vehicle which conforms to the Vehicle Code.

b) The term "building official" shall mean the enforcing authority as stipulated by statute.

c) The term "burglary resistance" shall mean the characteristic of a building or building component to withstand forcible attack applied for the purpose of accomplishing successful entry. Burglary resistance may be described in terms of time, energy or a combination of both.

3.05 "E" Definitions.

a) The term "enforcing agency" shall mean the designated department or agency as specified in statutes.

3.21 "U" Definitions.

UBC shall mean the Uniform Building Code as published by the International Conference of Building Officials.

Article 4. Requirements

4.00 General. These standards represent the judgment of the Attorney General as to the basic requirements for the construction and performance of the products listed under each category. These requirements are based upon sound engineering principles, research, records of tests and field experience, and on appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

The observance of the requirements of these standards by a manufacturer is one of the conditions of continued listing by the Attorney General of the manufacturer's product. The Attorney General assumes no responsibility for the effect of such observance or non-observance by the manufacturer upon the relations between the manufacturer and any other party or parties arising out of the sale or use of the product or otherwise.

A product which complies with these requirements will not necessarily be eligible for listing if, when examined and tested, it is found to have other features which impair the result contemplated by these requirements.

A product employing materials or having forms of construction differing from those detailed in these requirements may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be listed.

Many tests required by these standards are inherently hazardous. The Attorney General neither assumes nor accepts any responsibility for any injury or damage that may occur during or as a result of tests, wherever performed, whether performed in whole or in part by the manufacturer or the Attorney General, and whether or not any equipment, facility, or personnel for or in connection with the test is furnished by the manufacturer or the Attorney General.

4.01 Door Systems.

a) Purpose. Door system requirements are intended to protect against normal (both dynamic and static) and lateral loading applied during common burglary practices.

b) Scope. These requirements are intended to cover wood, metal, and masonry supporting structures utilizing wood and metal doors, both single and double configurations.

c) Performance

1) Wood frame and door, single configuration.

A) Normal loading. The assembly must be capable of resisting the energy imparted by an impacter weighing 180 pounds, travelling at 90 inches x sec^{-1} at impact. Response of the door to the dynamic force should indicate a rise time of not less than ± .01 seconds from zero to full load. Point of impact on the door must be twelve inches from the lock fastening point with the strike on a line to the center hinge.

Alternately, the assembly must be capable of resisting a static force of 1500 pounds applied twelve inches from the lock fastening point with the strike on a line to the center of the middle hinge.

B) Lateral loading. The system must resist a static force of 2000 pounds applied between the jambs in a spreading action at mid-height from top to bottom. Maximum deflection must be less than the effective throw of the bolt into the strike to prevent disengagement (this standard is based upon the recommended basic design described in subsection C with the use of a one-inch throw bolt).

d) Design. In lieu of the tests, compliance will be recognized where the system substantially complies with the following design specifications:

1) Wood frame and door, single configurations.

a) Framing. Standard wooden framing as depicted in Figure 12, including special nailing schedule, with the studs and jamb facings fastened together by nailing exterior plywood over the basic structure. Fire struts shall be placed adjacent to the lock area, and well fitted.

b) Door. Solid core doors are acceptable. Core assemblies of hollow core flush doors shall, in addition to

compliance with PS-51 (Commercial Standards and Product Standards, National Bureau of Standards, U.S. Government Printing Office, Washington, D.C.) include adjacent to the outside face, a single layer of carbon steel expanded metal. Minimum requirement for this material is ¼" opening, 20 gauge metal, 0.83 lbs per square foot. This is equivalent to 1010 steel and meets MIL-M-17194C steel specifications.

4.02 Hardware.

a) Purpose. Hardware requirements are intended to obviate the most common tool and non-tool attacks applied locally.

b) Scope. The requirements are intended to cover outside door locking devices, and fasteners.

c) Performance.

1) Wood frame and door, single configuration.

a) When installed in a test door, the lock assembly must resist a static load of 1500 pounds applied as shown (See Figure 16.)

b) Lock cylinders shall resist impact loads of 200 inch-pounds applied to an outward direction.

c) When the lock bolt is extended (locked), the mechanism holding it in place shall resist a compressive load of 200 pounds applied to the end of the bolt, parallel to its center line.

d) If the locking mechanism can be defeated by a torsional load on the outside door knob, then the mechanism must resist a torsional load of 3,300 inch-pounds in either direction while in the locked position.

e) If a torsional load can be applied to the lock cylinder by any tool, it must resist a torsional load of 3,300 inch-pounds in either direction.

f) Each key cylinder must resist a torsional load of 1,200 inch-pounds in either direction, applied to the keyway with a tool simulating a key.

g) The bolt must resist sawing by a hacksaw for a period of five minutes minimum.

h) Locks shall be attached to their supporting materials so that under violent attack, directed at the lock or surrounding area, the supporting material will fail before the lock assembly and attachments.

i) Locks shall have a minimum of 10,000 interchange free combinations (a key for any one of the 10,000 combinations used, will not operate any other lock keyed to any of the other 10,000 combinations.)

j) It should not be possible to make a key section that will operate in key sections different from each other, when said key sections are used to increase the number of noninterchangeable combinations. (This specification is not meant to cover masterkeyed locks.)

k) Where a building or complex containing separate dwellings, proprietorships or similar distinct occupancies, and access is limited to specific authorized persons, locks on passage doors providing access to a dwelling or proprietorship should have combinations different from locks accessing the other dwellings or proprietorships. This requirement shall also apply to separate dwellings on individual properties, constructed and developed under the same general plan at the same time.

l) Locks shall resist all forms of manipulation (shimming, picking, picking gun) for a period of five minutes when attacked by a person with Class B (see Appendix C) skills, using commercially available equipment brought to the state of Class B art.

m) Locks shall be designed and constructed to prevent passage through the lock keyway to the locking bolt or locking means.

n) Locks shall be constructed of materials that will permit normal operation and maintain all security requirements after fifty thousand (50,000) insertions and complete operations in the locking and unlocking direction of the operating key or keys.

o) Locks shall be installed to meet or exceed lock manufacturer's installation specifications. Said instructions must meet performance and design specifications required by the Attorney General.

p) Construction locks must meet all specifications at the time of occupancy by the dweller.

d) Design.

1) Wood frame and door, single configuration.

a) For wooden doors, door edge stiffener plates must be supplied either with the lock (Figure 13) or incorporated into the design of the lock to prevent the failure of the door under impact loading described in the door system section.

b) Striker plates must be of the design depicted in Figure , or otherwise be designed to successfully transfer loading under impact threats to the framing structure, thus precluding failure of the jamb structures.

c) The lock shall utilize at least one 1-inch minimum throw bolt or be of a design to otherwise satisfy the intent of the standard to prevent a spreading threat, i.e., interlocking bolt.

d) Masterkeyed locks shall use no more than two master discs for any one tumbler and no more than three tumblers should have master key splits in any five tumbler locks, nor more than four tumblers shall have master splits in any six tumbler locks.

e) The barrier passageway in any mechanical locks shall be no more than one-third of the bitting interval (BP ⟨ ⅓ BI). Refer to Figures 17, 18, and 19.

f) Locks shall have a minimum of five tumblers and five springs urging the drivers and pins into locking positions for pin and tumbler types.

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END