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MILITARY HANDBOOK

SECURITY HARDWARE INSTALLATION,
OPERATION, AND MAINTENANCE



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ABSTRACT

This handbook provides a description of specific physical security hardware adopted for Department of Defense use. Technical instructions include installation, operation, maintenance, and repair of the hardware.

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FOREWORD

This military handbook has been developed from an evaluation of facilities in the shore establishment, from surveys of the availability of new materials and construction methods, and from selection of the best design practices of the Naval Facilities Engineering Command (NAVFACENGCOC), other Government agencies, and the private sector. This handbook was prepared using, to the maximum extent feasible, national professional society, association, and institute standards. Deviations from this criteria, in the planning, engineering, design, and construction of Naval shore facilities, cannot be made without prior approval of NAVFACENGCOC HQ Code 04.

Design cannot remain static any more than the functions it serves or the technologies it uses. Accordingly, recommendations for improvement are encouraged and should be furnished to Commanding Officer, Naval Civil Engineering Laboratory, Code L30, Port Hueneme, CA 93043; telephone (805) 982-5743.

THIS HANDBOOK SHALL NOT BE USED AS A REFERENCE DOCUMENT FOR PROCUREMENT OF FACILITIES CONSTRUCTION. IT IS TO BE USED IN THE PURCHASE OF FACILITIES ENGINEERING STUDIES AND DESIGN (FINAL PLANS, SPECIFICATIONS, AND COST ESTIMATES). DO NOT REFERENCE IT IN MILITARY OR FEDERAL SPECIFICATIONS OR OTHER PROCUREMENT DOCUMENTS.

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Section 1: INTRODUCTION

1.1 Scope. Numerous specifications, regulations, and instructions require that physical security hardware be installed on doors, buildings, rooms, storage spaces, and cabinets to preserve an area's integrity. This handbook provides a description of physical security hardware and instruction for installation, operation, maintenance, and repair of specific physical security hardware adopted for Department of Defense (DOD) use. This handbook includes both commercial and DOD-designed physical security hardware. Definitions pertaining to the use of locks and hasps are included in Paragraph 1.5.

THIS HANDBOOK SHALL NOT BE USED AS A REFERENCE DOCUMENT FOR PROCUREMENT OF FACILITIES CONSTRUCTION. IT IS TO BE USED IN THE PURCHASE OF FACILITIES ENGINEERING STUDIES AND DESIGN (FINAL PLANS, SPECIFICATIONS, AND COST ESTIMATES). DO NOT REFERENCE IT IN MILITARY OR FEDERAL SPECIFICATIONS OR OTHER PROCUREMENT DOCUMENTS.

1.2 General. Section 2 includes a description of physical security hardware; Section 3 contains instructions for installation of the hardware; Section 4 discusses operation of the physical security hardware; Section 5 discusses maintenance; and Section 6 discusses the repair of physical security hardware. The types of security hardware used by DOD, and included in this handbook, are as follows:

- a) Padlocks
 - Low security
 - Medium security
 - High security (single and dual control)
- b) High-security locking devices (TUFLOC)
- c) Hasps
 - Low security
 - High security
- d) Anti-intrusion barriers

1.3 Safety Summary. Safety is an inherent responsibility of command; therefore, its implementation, direction, and control shall be through the chain of command, with line managers and supervisors being primarily responsible for ensuring safe operations and working conditions. Safety program management or coordination, with the provision of advice and recommendations on safety to the line managers and supervisors, is a staff function to the chain of command performed by the Safety Officer. The supervisory chain of command is responsible for ensuring that physical working conditions are maintained, and working tasks are conducted, as safely as feasible within available resources and mission requirements. All personnel are responsible for knowing, understanding, and observing all safety precautions applicable to their work and their work area.

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1.3.1 Life Safety. Life safety aspects are not covered by this publication. Security personnel should recognize that securing buildings, rooms, doors, and windows entails special consideration of both Federal and local laws relating to life safety. The application of physical security hardware normally must be approved by a fire marshal.

1.3.2 General Safety Precautions. The following general safety precautions are not related to any specific procedure. They are recommended safety precautions that personnel must understand and apply during many phases of operation and maintenance.

1.3.2.1 Do Not Service or Adjust Alone. Under no circumstances shall any person reach within an enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

1.3.2.2 Moving Equipment. Personnel shall remain clear of equipment that is in motion. Should equipment require adjustment while in motion, a safety watch shall be posted. The safety watch shall have full view of operations being performed and immediate access to controls capable of stopping equipment motion.

1.3.2.3 Cardiopulmonary Resuscitation. Personnel working with or near high voltages shall be certified in the methods of cardiopulmonary resuscitation. Such information may be obtained from the Bureau of Medicine and Surgery and the American Red Cross.

1.3.2.4 Standard Good Practice. Personnel shall observe all standard practices in installing, replacing, operating, and testing equipment (dry hands and clothing, removing personal jewelry, use of rubber mats or other insulating devices, etc.).

1.3.3 Warnings and Cautions. Warnings and cautions applying to physical security hardware, as covered in this publication, are summarized below. These warnings and cautions are repeated throughout the publication following paragraph headings and preceding the text where they apply.

WARNING

Avoid prolonged contact with, or inhalation of, cleaning solvents. Avoid use near heat or open flame, and provide adequate ventilation. (Pages 52, 57, 61)

CAUTION

Before welding TUFLOC in place, remove central bolt from lock as heat may damage it. (Page 26)

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CAUTION - Continued

Do not attempt to turn key if it is not fully inserted into keyway. If key does not turn when firm pressure is applied, do not force it as this may bend, crack, or break key.
(Pages 43, 45, 47, 49, 51, 57, 58)

Do not turn key while pulling it out.
(Pages 43, 45, 49, 52, 57, 61)

Do not use excessive force. If difficulty is encountered in drawing central bolt out after key has been turned to unlocked position, push or pull on door while gently pulling on key.
(Page 49)

Petroleum-based products should never be used for lock maintenance. (Page 54)

1.4 Definitions.

a) Astragal. A strip of wood or metal used to cover the opening (gap) between the two doors in a set of double doors.

b) Bitting. The part of a key that is cut/configured to match the specific lock tumbler configuration.

c) Blade. That part of a key that contains the cuts.

d) Blank. Also referred to as a keyblank. Any uncut key produced by a manufacturer to fit its own lock keyways or keyways made by other lock manufacturers.

e) Bolt. (Padlock) The movable part that holds the shackle in the closed (locked) position.

f) Bow. That part of the key that is held in the hand or fingers when exerting turning force on the blade of the key.

g) Cam. That part of the keylock that transmits motion from the key, plug, or cylinder to the bolt, moving the bolt to the locked or unlocked position.

h) Case. The outer housing that contains the locking mechanism.

i) Central Bolt. (TUFLOC) The movable part that contains the keyway, pins, springs, and deadbolt. The central bolt is used to secure the two halves (hinges) of the lock together.

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- j) Closure. The door, window, or movable structure used to close an opening that is to be secured.
- k) Code. The alphanumeric or numerical symbols assigned by manufacturers or locksmiths to a key that indicate the depths of the cuts and their location on the blade of the key. When provided, the code is usually found on the bow.
- l) Control Key. (High- and Medium-Security Padlocks) The special key issued by the manufacturer to be used for disassembly and maintenance only. This key should never be used for normal operation of the locks. (Interchangeable Core Locks) The key specifically cut for removing and replacing the lock core.
- m) Core. The part of a lock or padlock that consists of the shell, plug, springs, tumblers, spring cover, and retainer.
- n) Cover. (High- and Medium-Security Padlocks) The part that can be removed to permit inspection and disassembly of the lock when the control key is turned to the control (disassembly) position.
- o) Cylinder. The part of a lock that contains the plug, pins, and springs.
- p) Deadbolt. Any lock designed so that when the bolt is extended, it cannot be pushed back or opened with pressure against the end of the bolt.
- q) Drivers. The topmost set of pins in a pin tumbler lock.
- r) Forced Entry. Unauthorized entry gained through a locked device which produces damage that is readily discernible to unit personnel.
- s) Grandmaster Key. A key that will open all the locks in several master keyed sets (Figure 1).
- t) Hardware. A general term to describe the locks, keys, and hasps providing physical security.
- u) Hasp. (High Security) One of a family of devices procured under MIL-H-29181, "General Specification for Hasp, High Security, Shrouded, for High and Medium Security Padlock," and MIL-H-24653, "General Specification for Hasp, High Security, Shrouded for Shipboard Doors and Hatches Using High and Medium Security Padlock." The hasps may be required or recommended where a high degree of resistance to forced and surreptitious entry is desired. (Low Security) A hinged or unhinged metal strap fastened to a closure, designed to pass over a fixed staple and secured with a padlock.
- v) High Security. (Locks, Hasps, and Alarms) Security devices that, through testing, have been determined to provide the highest level of protection available. (Spaces) Any space so designated because of the equipment or material stored or the operations carried out therein. Such spaces require high-security physical security hardware and systems.

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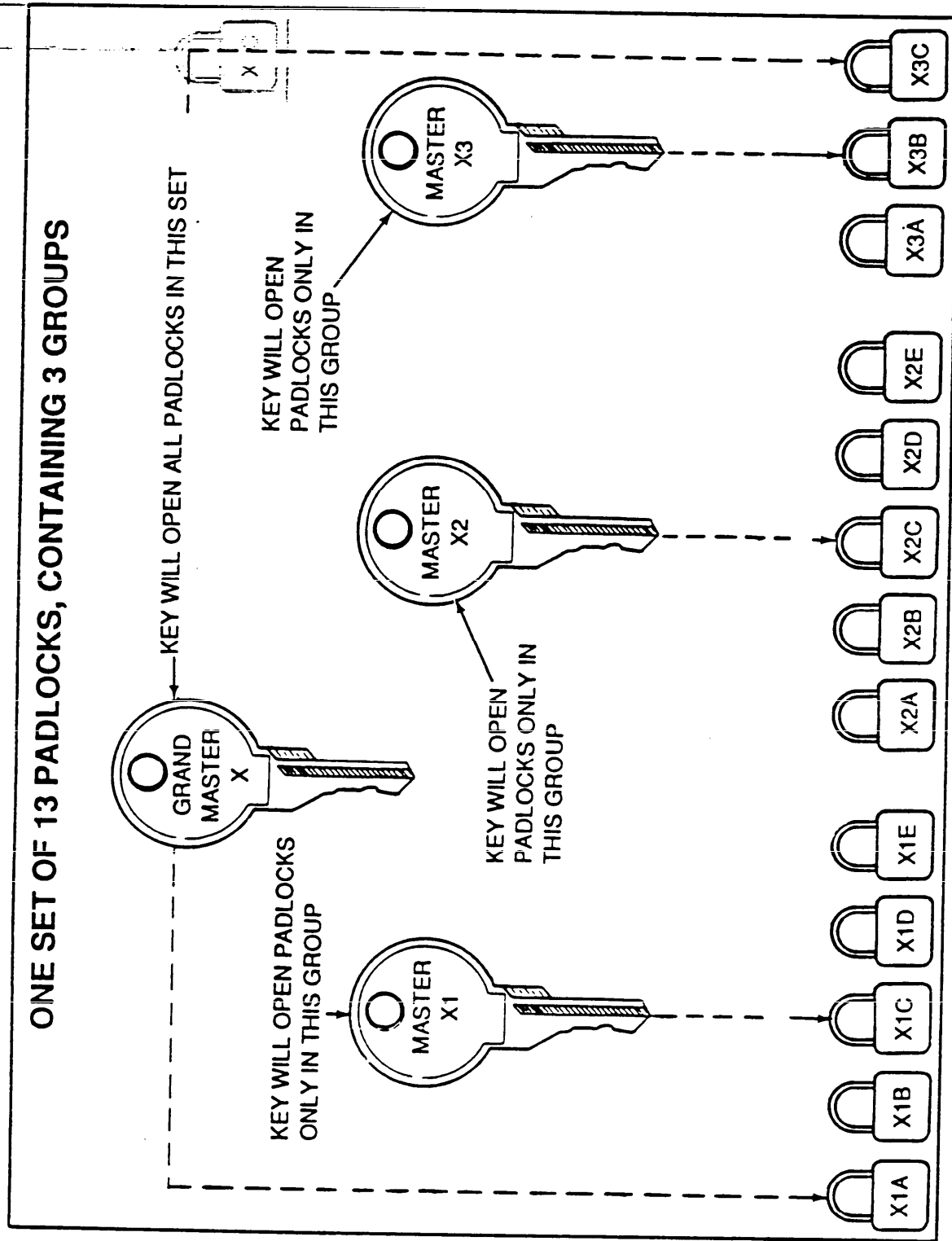


Figure 1
Identification Padlock Set

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w) Jamb. The vertical side post of a doorframe.

x) Keyblank. See Blank.

y) Key Changes. The theoretical number of different keys that can be made to fit a particular type of lock, based on the number of pins and the number of available cuts; i.e., a six-pin cylinder, with eight cuts available, would equal 8^6 (262,144) theoretical key changes.

z) Keyway. The opening in a plug, cylinder, or lock case configured to accept only the keyblank designed for that particular lock.

aa) Low Security. (Padlocks and Hasps) Low-security padlocks and hasps satisfy most access control requirements for offices and other non-critical areas. Control of access offers protection for office equipment, supplies, and personal items, and limits accountability to personnel designated for staffing and maintaining these areas.

bb) Master Key. A key that will operate two or more locks that can also be operated with their own key (Figure 1).

cc) Medium Security. (Padlocks) Those padlocks that provide protection against forced and surreptitious entry. For some applications, medium-security padlocks may be used with high-security hasps to constitute a high-security system for conventional arms, ammunition, and explosive spaces.

dd) Operating Key. The key used for normal operation of a lock.

ee) Padlock. A portable lock that consists of a case and shackle (Figure 2).

ff) Pin. A tumbler usually installed directly under the spring in the core.

gg) Pin Tumbler. Tumbler usually of cylindrical shape.

hh) Plug. The round core with keyway of a lock cylinder that accepts the key and is turned with it.

ii) Proprietary Keyway. The keyway of a lock that belongs exclusively to a particular company or individual. The milling of the keyway may not be used in any lock other than the owner's, and the owner is the only one authorized to buy keyblanks for the lock. All medium- and high-security padlocks and TUFLOC's used by the Government have a proprietary keyway.

jj) Relative Security. The degree of defense a security device offers against different forms of attack.

kk) Security System. A term used to encompass all facets of a command's security program being considered; i.e., locks, closed-circuit television (CCTV), security containers, guards, alarms, etc.

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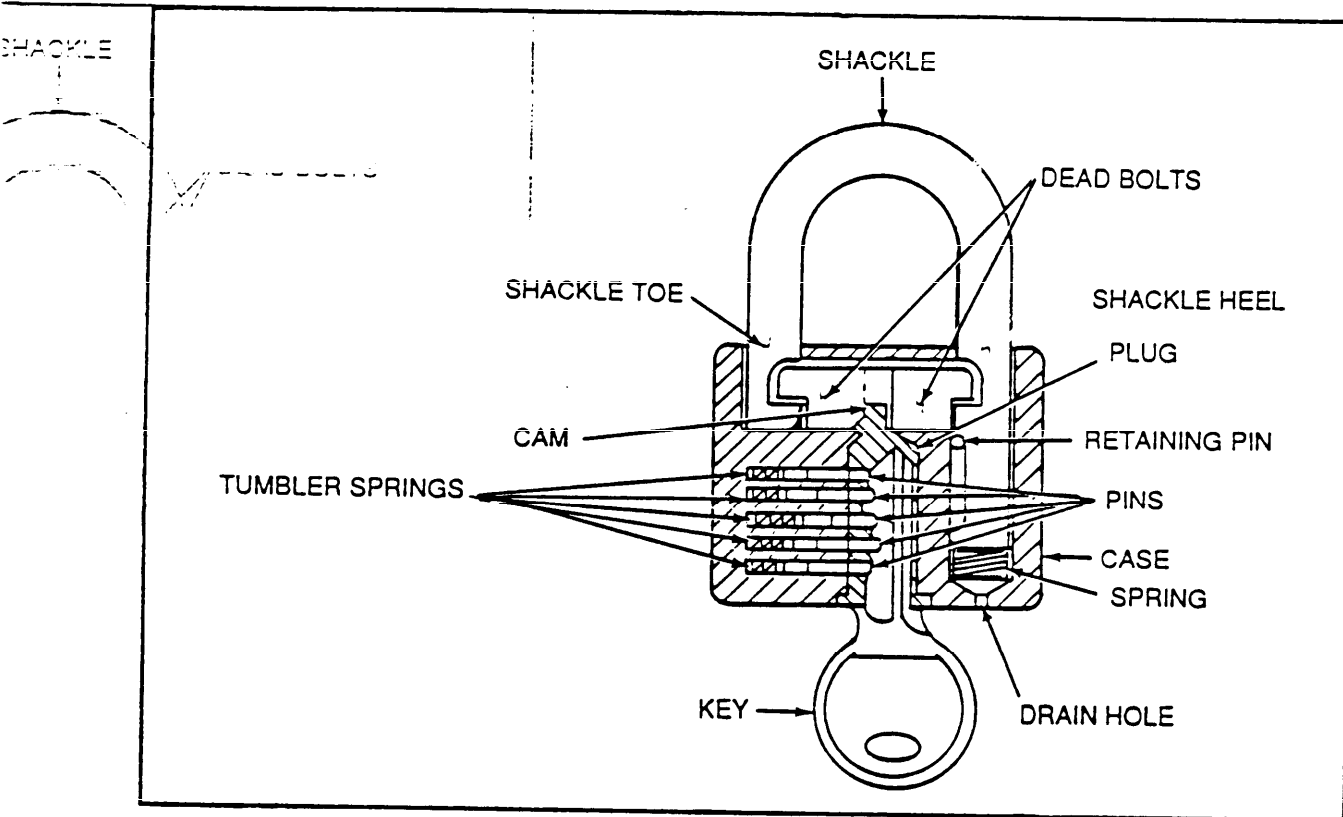


Figure 2
Padlock Component Nomenclature

ll) Shackle. The bow-shaped part of a padlock that is passed through the staple of a hasp and secured closed with the bolt when locked.

mm) Staple. The unhinged portion of a hasp through which the padlock is secured.

nn) Surreptitious Entry. Entry gained through a locking device that is not readily discernible during normal use or operation of the locking unit.

oo) Tumbler. An obstruction of different sizes and configurations in a cylinder or lock that makes direct contact with another tumbler or key. The tumbler prevents an incorrect key from operating the lock.

1.5 Definitions of Acronyms. The following acronyms listed in this military handbook are defined as follows:

- | | |
|---------|-----------------------------|
| a) CCTV | Closed-Circuit Television |
| b) CID | Commercial Item Description |
| c) DCP | Dual-Control Padlock |
| d) DOD | Department of Defense |
| e) MS | Military Standard (sheet) |

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- | | |
|-----------|--|
| f) NAPEC | Naval Ammunition Production Engineering Center |
| g) NATICK | NATICK Laboratories |
| h) NCEL | Naval Civil Engineering Laboratory |
| i) NSN | National Stock Number |
| j) S&G | Sargent and Greenleaf |

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Section 2: LOCKING SYSTEM COMPONENT DESCRIPTION

2.1 General. This section contains a general description of the types and styles of physical security hardware available.

2.2 Padlock Description. Padlocks are classified as low-, medium-, or high-security. Generally, low-security padlocks are commercially designed padlocks. Medium- and high-security padlocks have been developed to meet the need for increased penetration times for valuable and critical military assets. The Department of Defense (DOD) is continuing development of padlocks and locking systems that will have increased penetration times and more efficient designs. Information concerning padlocks and locking system research and development projects can be obtained by contacting the following:

Naval Civil Engineering Laboratory
Security Engineering Division (Code L56)
Port Hueneme, California 93043-5000
AV 360-5927

2.2.1 Low-Security Padlock Description. Low-security padlocks are key operated. There are numerous models procured under MIL-P-17802, "Padlocks and Padlock Sets, Low Security, Key Operated, Regular (Open) Shackle," MS35647, "Padlocks, Key Operated," or MS21313, "Padlock Sets - Individually Keyed and Keyed Alike." Table 1 is a list of low-security padlocks available along with their National Stock Number (NSN), case size, type of keying, and unit of issue. Low-security padlocks can be purchased individually keyed, master keyed, grand-master keyed, or keyed alike and are normally supplied with two operator keys. Figure 1 illustrates these terms. Figure 2 illustrates padlock nomenclature. Examples of low-security padlocks are illustrated in Figure 3.

2.2.2 Medium-Security Padlock Description. Medium-security padlocks are procured under MIL-P-43951, "Padlocks and Padlock Sets, Key Operated, Medium Security, Regular Shackle." Medium-security padlocks currently qualifying under MIL-P-43951 are the Sargent and Greenleaf (S&G) 826 series (Figure 4). Three versions of the 826 series are in use: 826A, 826C, and 826D (the 826C is not currently being manufactured, but is still in use and will be discussed). S&G model 826A is equipped with a 3/8-inch hardened steel shackle and is keyed alike in sets of 10. The 826C has a 1/2-inch hardened steel shackle and is keyed individually. The 826D has a 1/2-inch carbide reinforced steel shackle and is keyed individually. Table 2 provides the NSN, shackle size, type of keying, and unit of issue for the two medium-security padlocks currently available for procurement. Each of these locks is supplied with three keys: one control key and two operator keys.

2.2.3 High-Security Padlock Description. There are two types of high-security padlocks: single control and dual control.

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Table 1
Low-Security Padlocks

Specification Number	National Stock Number	Case Size (in.)	Type of Keying ¹	Unit of Issue	
MS35647 ²	-2	5340-00-582-2742	1-1/8	KI	1 ea
	-3	5340-00-682-1508	1-1/2	KI	1 ea
	-4	5340-00-582-2741	1-1/2	KI	1 ea
	-5	5340-01-004-5180	1-1/2	KI	1 ea
	-6	5340-00-682-1645	1-1/2	KI	1 ea
	-7	5340-00-682-1509	1-1/2	KI	1 ea
	-8	5340-00-582-2740	1-3/4	KI	1 ea
	-9	5340-01-211-4747	1-3/4	KI	1 ea
	-10	5340-00-158-3805	1-3/4	KI	1 ea
	MS21313 ³	-2	5340-00-291-4213	1-1/2	MK
-6		5340-00-292-0902	1-1/2	GMK	13/set
-14		5340-00-291-4212	1-1/2	MK	30/set
-18		5340-00-292-0904	1-1/2	GMK	30/set
-32		5340-00-682-1506	1-3/4	GMK	80/set
-50		5340-01-050-7059	1-1/2	KA	5/set
-51		5340-00-838-5276	1-1/8	KA	5/set
-52		5340-00-682-1505	1-1/2	KA	5/set
-60		5340-01-151-4203	1-1/2	KA	25/set
-103		5340-00-291-4214	1-1/2	MK	10/set
-105		5340-00-291-4211	1-1/2	MK	20/set
-108		5340-00-291-4209	1-1/2	MK	40/set
-111		5340-00-291-4210	1-1/2	MK	50/set
-112		5340-00-292-0906	1-1/2	GMK	50/set
-113		5340-00-292-0907	1-1/2	GMK	50/set
-115	5340-00-291-4207	1-1/2	MK	60/set	

Notes:

1. The abbreviations used in the type of keying column have the following meanings:

- GMK - Grandmaster Keyed
- KA - Keyed Alike
- KI - Keyed Individually
- MK - Master Keyed

2. MS35647 is titled Padlocks, Key Operated. All of the locks procured under this standard are individually keyed. Eight of the ten dash numbers are for brass or bronze locks and the other two are the steel shackle and body padlocks with and without clevis and chains. Dash numbers 9 and 10 are represented by the American Lock Company models 200 and 5200.

3. MS21313 is titled Padlock Sets - Individually Keyed and Keyed Alike. All of the locks procured under this standard are brass or bronze and are procured in sets.

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Table 1
Low-Security Padlocks - Continued

Specification Number	National Stock Number	Case Size (in.)	Type of Keying ¹	Unit of Issue
MS21313 ³ -117	5340-00-291-4208	1-1/2	MK	70/set
-118	5340-00-291-4205	1-1/2	MK	80/set
-121	5340-00-291-4206	1-1/2	MK	90/set
-122	5340-00-291-4204	1-1/2	MK	100/set
-123	5340-00-838-5277	1-1/8	KA	10/set
-124	5340-00-838-5266	1-1/2	KA	10/set
-125	5340-00-838-5278	1-1/8	KA	20/set
-126	5340-00-838-5267	1-1/2	KA	20/set
-127	5340-00-838-5279	1-1/8	KA	30/set
-129	5340-00-838-6986	1-1/8	KA	40/set
-131	5340-00-838-6987	1-1/8	KA	50/set
-137	5340-00-838-5275	1-1/2	KA	100/set
-160	5340-00-912-4086	1-1/2	KA	2/set
-161	5340-00-912-4087	1-1/2	KA	3/set
-162	5340-00-912-4088	1-1/2	KA	4/set
-162	5340-01-052-0671	1-1/2	KA	4/set
-163	5340-00-912-4089	1-1/2	KA	6/set
-200	5340-00-409-3245	1-1/2	GMK	13/set
-201	5340-00-409-3246	1-1/2	GMK	30/set
-202	5340-00-421-9382	1-1/2	GMK	40/set
-203	5340-00-421-9383	1-1/2	GMK	50/set
-204	5340-00-421-9384	1-3/4	GMK	55/set
-205	5340-00-406-6496	1-3/4	GMK	55/set
-206	5340-00-702-5795	1-3/4	GMK	65/set
-207	5340-00-409-3247	1-3/4	GMK	80/set
-208	5340-00-409-3248	1-3/4	GMK	80/set

Notes:

1. The abbreviations used in the type of keying column have the following meanings:

- GMK - Grandmaster Keyed
- KA - Keyed Alike
- KI - Keyed Individually
- MK - Master Keyed

3. MS21313 is titled Padlock Sets - Individually Keyed and Keyed Alike. All of the locks procured under this standard are brass or bronze and are procured in sets.

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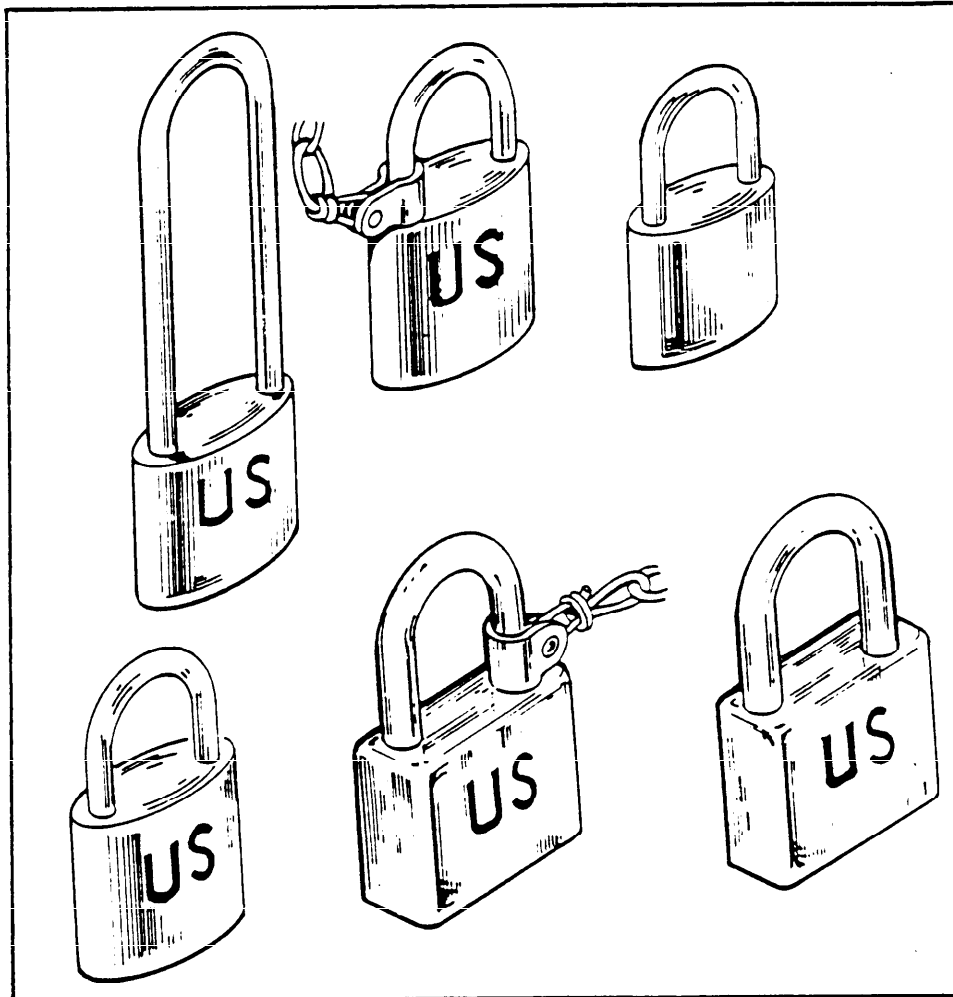


Figure 3
Key-Operated, Low-Security Padlocks

2.2.3.1 Single-Control, High-Security Padlock Description. There are two single-control, high-security padlocks authorized for procurement under MIL-P-43607, "Padlock, Key Operated, High Security, Shrouded Shackle." These padlocks are the S&G model 831B (Figure 5) and the Hi-Shear Model LK1200 (Figure 6). Both of these padlocks are keyed individually and supplied with three keys: one control key and two operator keys. Each padlock has a 1/2-inch shackle. The S&G model 831B padlock has a shrouded shackle. In the locked position on a high-security hasp, the body of the padlock extends high enough to provide a complete protective cover (shroud) around the shackle and hasp, preventing direct attacks on the shackle. The Model LK1200 padlock has a sliding horizontal shackle. In the locked position, the body of the lock fits around the hasp providing protection to the shackle. Table 3 provides the NSN, shackle size, type of keying, and unit of issue for single-control, high-security padlocks.

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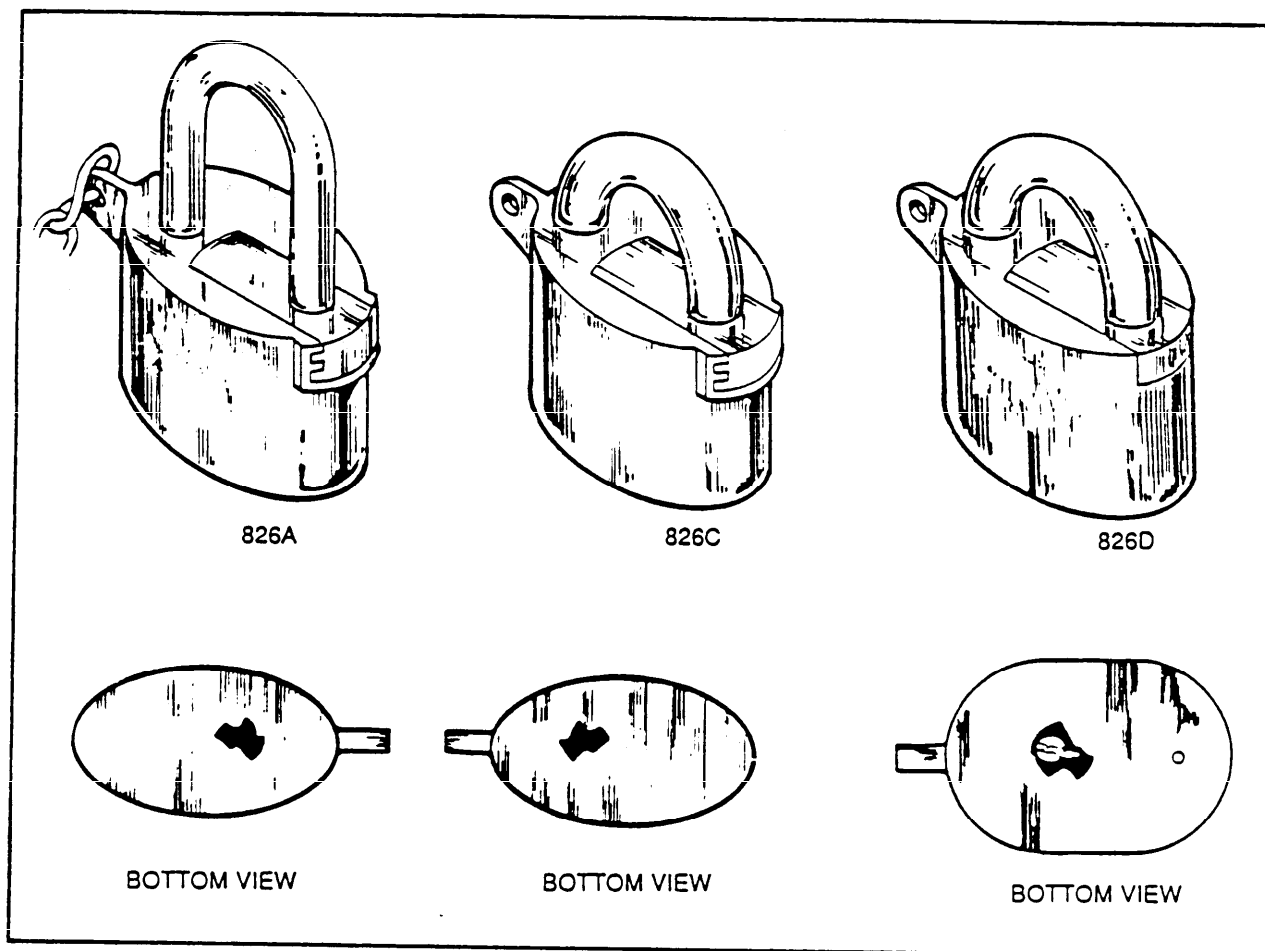


Figure 4
Medium-Security Padlocks

2.2.3.2 Dual-Control, High-Security Padlock Description. This lock is for Navy use only. A dual-control padlock (DCP) offers dual access control in a single lock through the use of two independent locking cylinders. The DCP is keyed individually and supplied with four keys: two A cylinder keys and two B cylinder keys. The Model 1381 DCP is available in three configuration styles as follows (Figure 7):

- a) Style 1 is designed for use with NAPEC Model 1300 Series high-security hasp (generally used by the Navy aboard ship).
- b) Style 2 is designed for use with the NAPEC 0957/0958 (MK 2 MOD 8 and 9) hasp modified by addition of antirotation blocks (Figure 8).
- c) Style 3 is equipped with a raised shoulder and is designed for use with the NAPEC 0957/0958 (MK 2 MOD 8 and 9) hasp without the addition of the antirotation blocks.

Table 4 provides ordering information, shackle size, type of keying, and unit of issue for the three styles of DCP's.

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Table 2
Medium-Security Padlocks, MIL-P-43951

Style	National Stock Number	Shackle Size (in.)	Type of Keying ¹	Unit of Issue
Style 1 (S&G Model 826A)	5340-00-492-1993	3/8	KA	10/set
Style 2 (S&G Model 826D)	5340-00-799-8016	1/2	KI	1 each

Notes:

1. The abbreviations used in the type of keying column have the following meanings:

- KA - Keyed Alike
- KI - Keyed Individually

2.2.4 High-Security Locking Device (TUFLOC) Description. TUFLOC is a precision cast, stainless steel lock procured under MIL-L-29151, "Locks and Lock Sets, Exterior, Ordinance, High Security." Table 5 describes the different types of TUFLOCs and gives an NSN for each type. TUFLOC is a self-contained, low-profile locking device. Its design allows it to be used for outward, doubleswinging, sliding, and roll-up doors. The TUFLOC locking device incorporates a durable interlocking cast construction with an integral hasp and a central bolt assembly. The two interlocking wings mount directly to the closure, either welded or bolted, and are free of hasps, chains, or other loose parts. Since the lock is an integral part of one of the interlocking wings, it cannot be removed for unauthorized use. Repeated realignment of the wings may be required to compensate for door-to-door or door-to-frame misalignment. TUFLOC is keyed individually, and the key-retaining function results in the bolt being either locked in the open or closed position when the key is removed (Figure 9).

2.2.5 Hasp Description. Hasps are available in many sizes, shapes, and descriptions. They are hinged or unhinged, surface-mounted on doors and doorframes, and are designed to be secured in the closed position with a padlock. Hasps are divided into two categories, low and high security.

2.2.5.1 Low-Security Hasp Description. Low-security hasps (Figure 10) are purchased using several CID and MS numbers.

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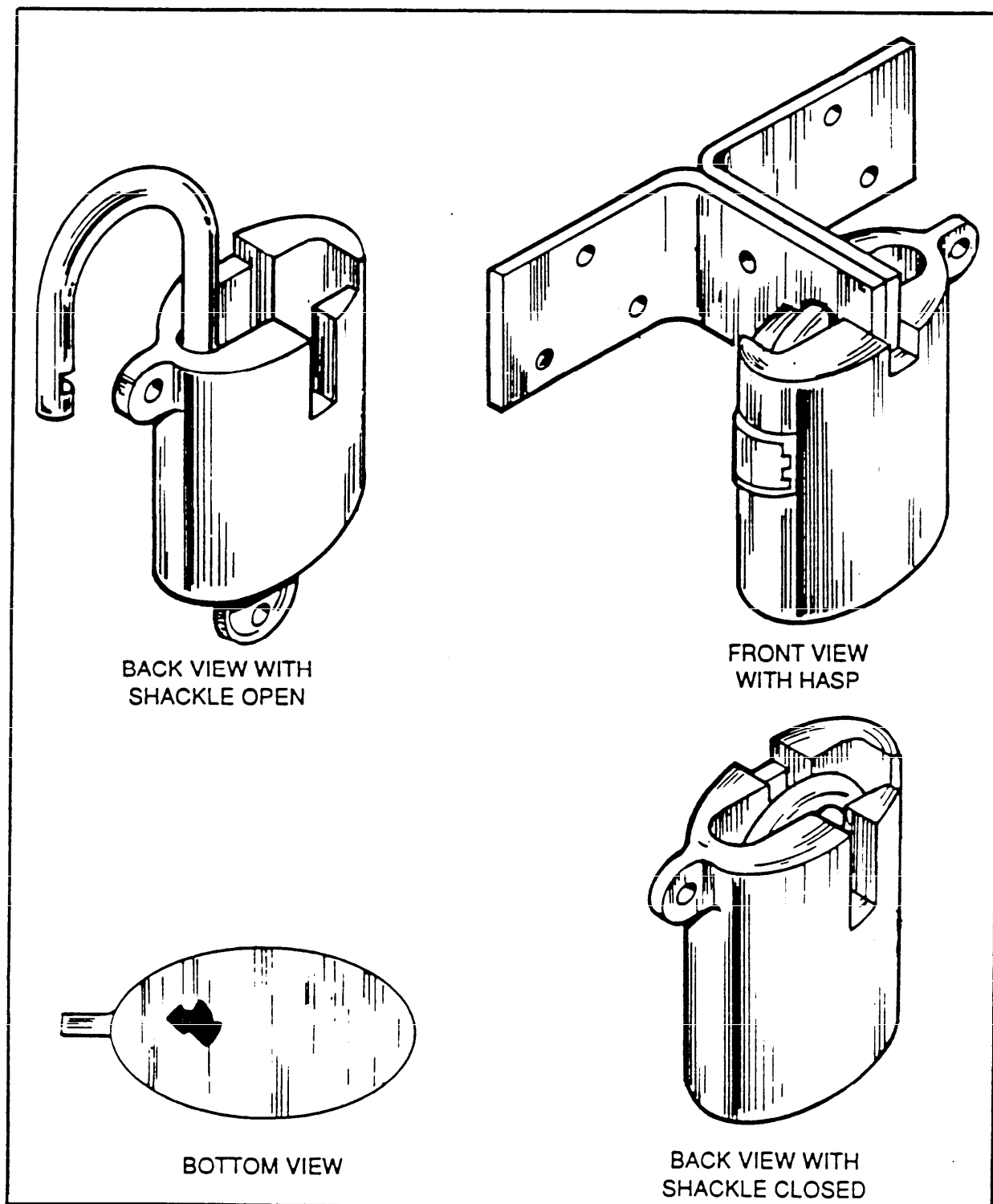
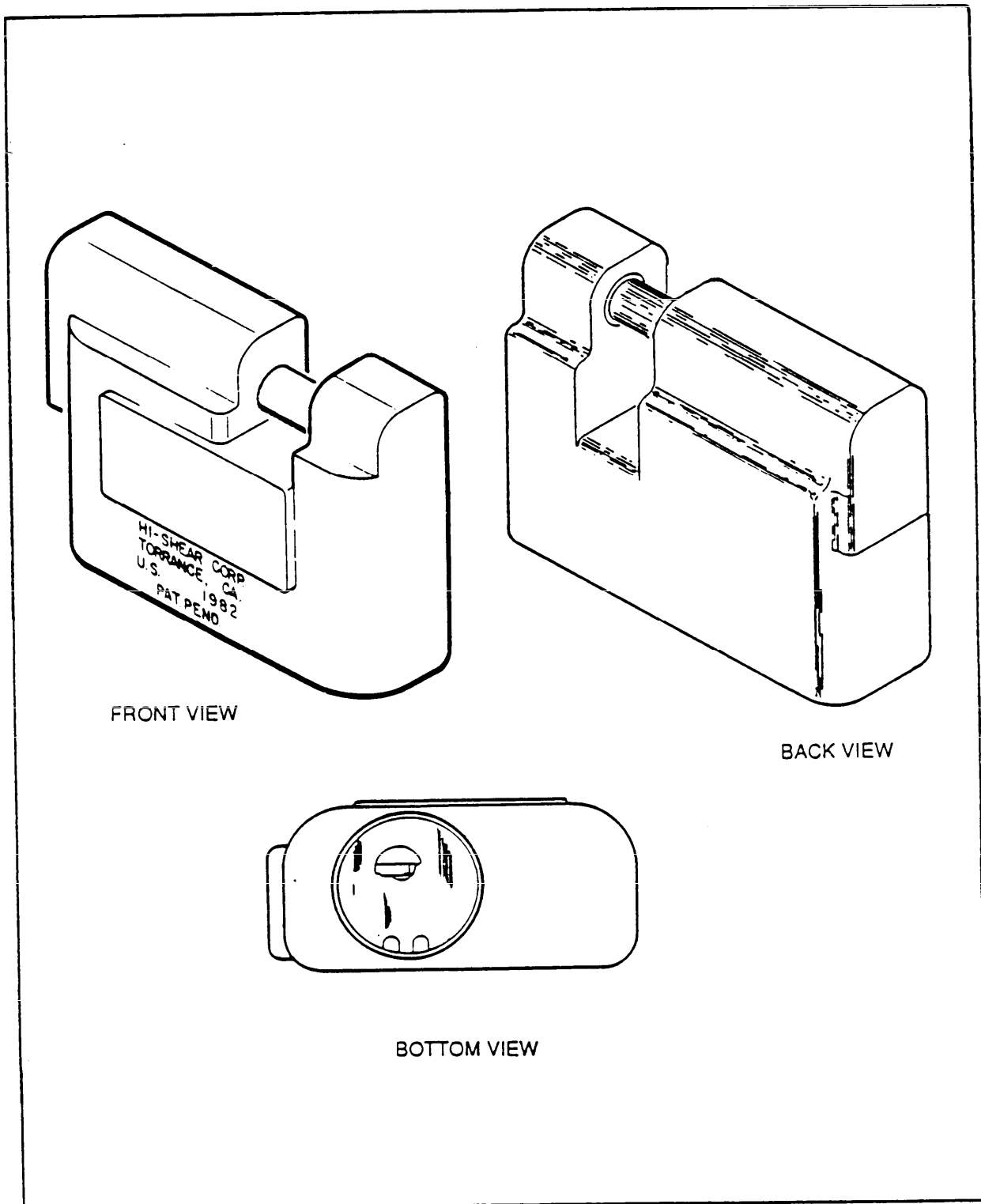


Figure 5
Single-Control, High-Security Shrouded Padlock, S&G Model 831B

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FRONT VIEW

BACK VIEW

BOTTOM VIEW

Figure 6
Single-Control, High-Security Padlock, Hi-Shear Model LK1200

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Table 3
Single-Control, High-Security Padlocks, MIL-P-43607

Decription	National Stock Number	Shackle Size (in.)	Type of Keying ¹	Unit of Issue
Hi-Shear LK1200	5340-00-799-8248	1/2	KI	1 each
S&G 831B	5340-01-188-1560	1/2	KI	1 each

Notes:

1. The abbreviation used in the type of keying column has the following meaning:

KI - Keyed Individually

2.2.5.2 High-Security Hasp Description. There are 10 high-security hasps used by DOD: the NATICK hasp (styles 1 through 6, 8, and 9) procured under MIL-H-43905, "Hasps, High Security Padlocks" (Figure 11) and the NAPEC 0957 and 0958 (MK 2 MOD 8 and 9) shrouded hasps procured under MIL-H-29181 (Figure 12). The NATICK hasps consist of two unhinged, carbon-steel parts and have a carbide wire on the inside face of each part to prevent sawing attacks. Table 6 provides type of steel, application, and NSN for the various style NATICK hasps. The NAPEC hasps consist of a shrouded hardened stainless-steel hasp designed for use on left or right in-swing, out-swing, and sliding doors. The NAPEC hasps are designed to be welded onto metal doors. Table 7 provides the type of steel, application, and NSN for the NAPEC hasps.

2.2.6 Anti-Intrusion Barrier Description. The anti-intrusion barrier (AIB), (Figure 13) is used in conjunction with the NAPEC high-security, shrouded hasp. The AIB consists of a stainless-steel cover designed to enclose the hasp and high-security padlock. The cover has two jackscrews that hold the cover in place; one into the inactive door leaf, the other into the active door leaf. The jackscrew in the active door leaf activates an alarm sensor if it is disturbed.

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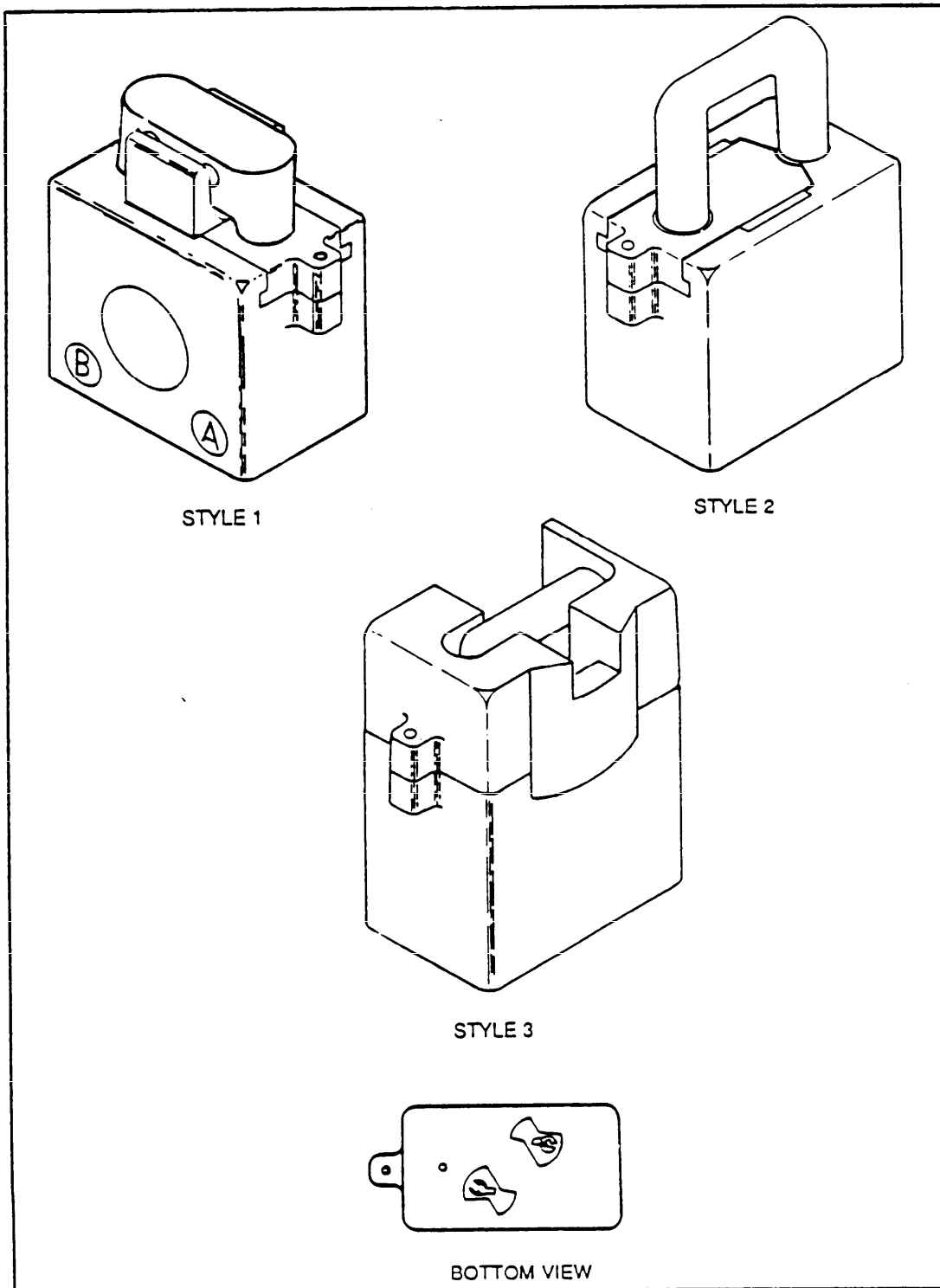


Figure 7
Dual-Control, High-Security Padlock, Model 1381, Style 1, 2, and 3

MIL-HBK-1013/7

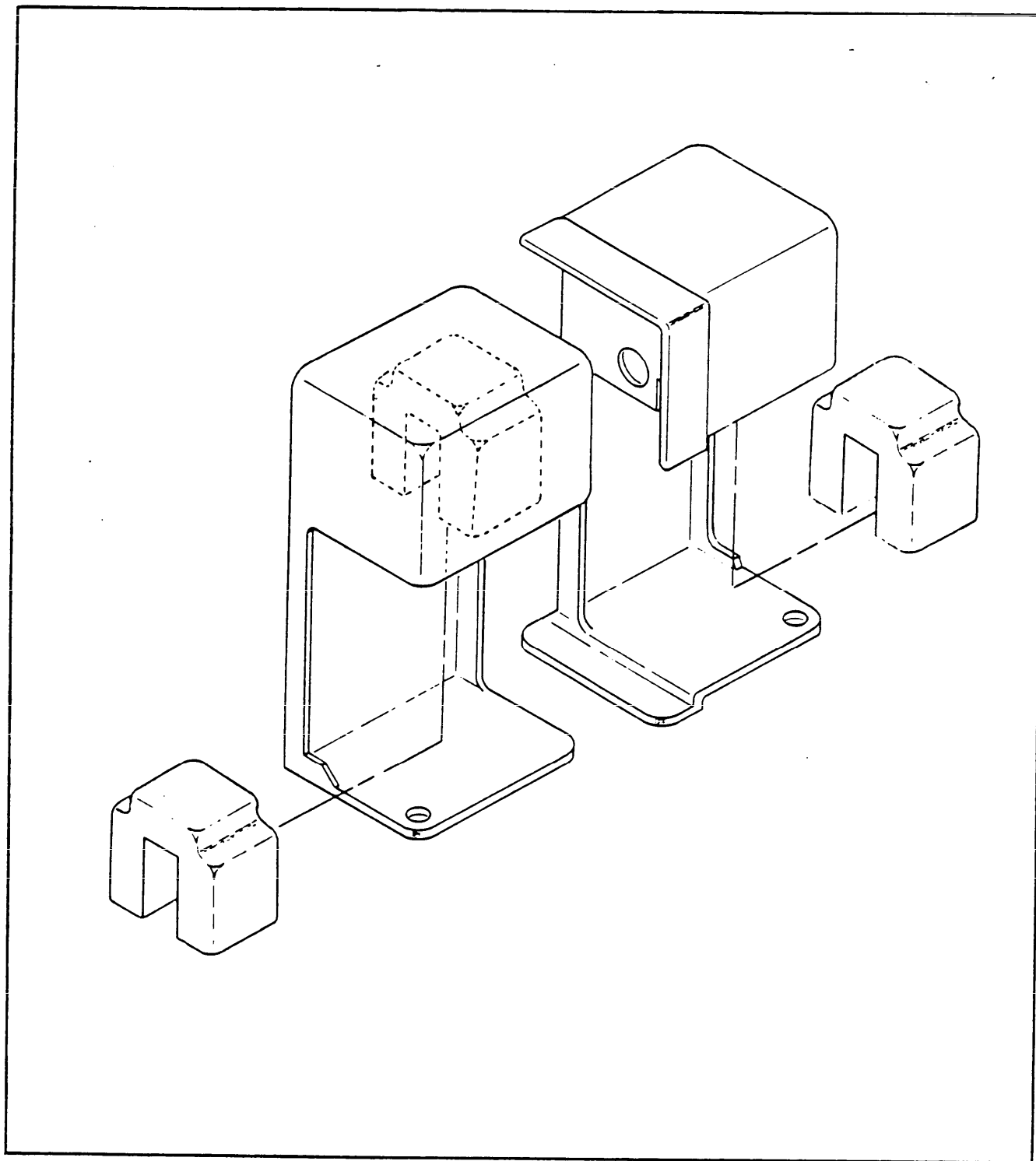


Figure 8
Antirootation Blocks

MIL-HBK-1013/7

Table 4
Dual-Control, High-Security Padlocks (No MILSPEC Number¹)

Style	NSN ²	Shackle Size (in.)	Type of Keying ³	Unit of Issue
Style 1 (with center ears)	Not assigned	1/2	KI	1 each
Style 2 (without ears)	Not assigned	1/2	KI	1 each
Style 3 (with antirotation blocks)	Not assigned	1/2	KI	1 each

Notes:

1. Meets or exceeds criteria of MIL-P-43607
2. Ordering information may be obtained by contacting:

Naval Weapons Support Center
Weapons Department (Code 208)
Crane, Indiana 47522
AV 482-1879/1882

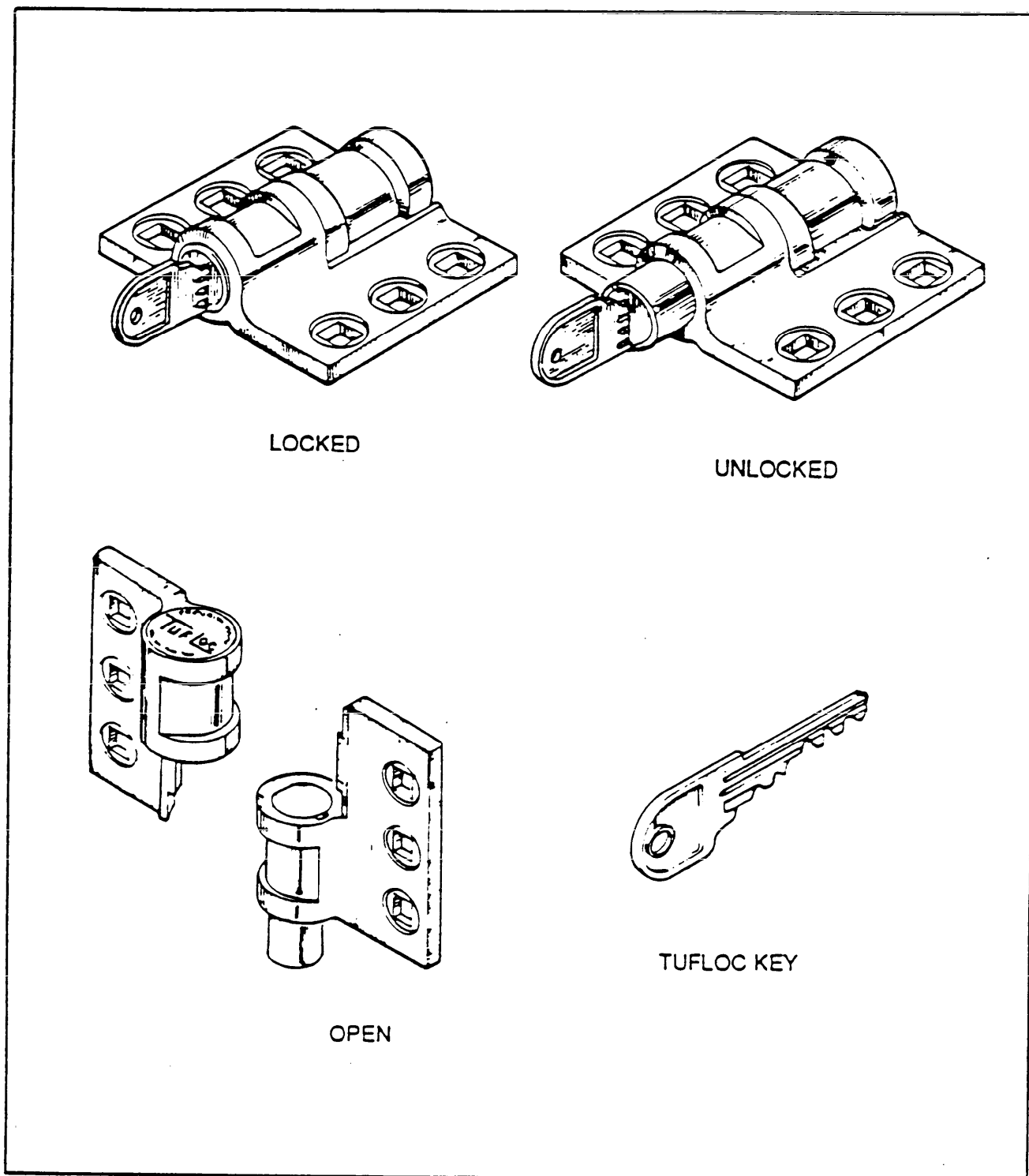
3. The abbreviation used in the type of keying column has the following meaning:

KI = Keyed Individually

Table 5
High-Security Locking Device (TUFLOC), MIL-L-29151

Type	Description	NSN
TUFLOC, Model 60-1XR	4-1/2 inches wide x 3 inches high.	5340-00-144-7310
TUFLOC, Model 60-2XR, right hand	Left side - 2-1/4 inches right side - 4-3/16 inches wide x 3 inches high.	5340-00-144-7311
TUFLOC, Model 60-2XR, left hand	Right side - 2-1/4 inches left side - 4-3/16 inches wide x 3 inches high.	5340-00-145-0293
TUFLOC, Model 60-3XR	8-3/8 inches wide x 3 inches high.	5340-00-144-7359

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LOCKED

UNLOCKED

OPEN

TUFLOC KEY

Figure 9
TUFLOC High-Security Locking Device

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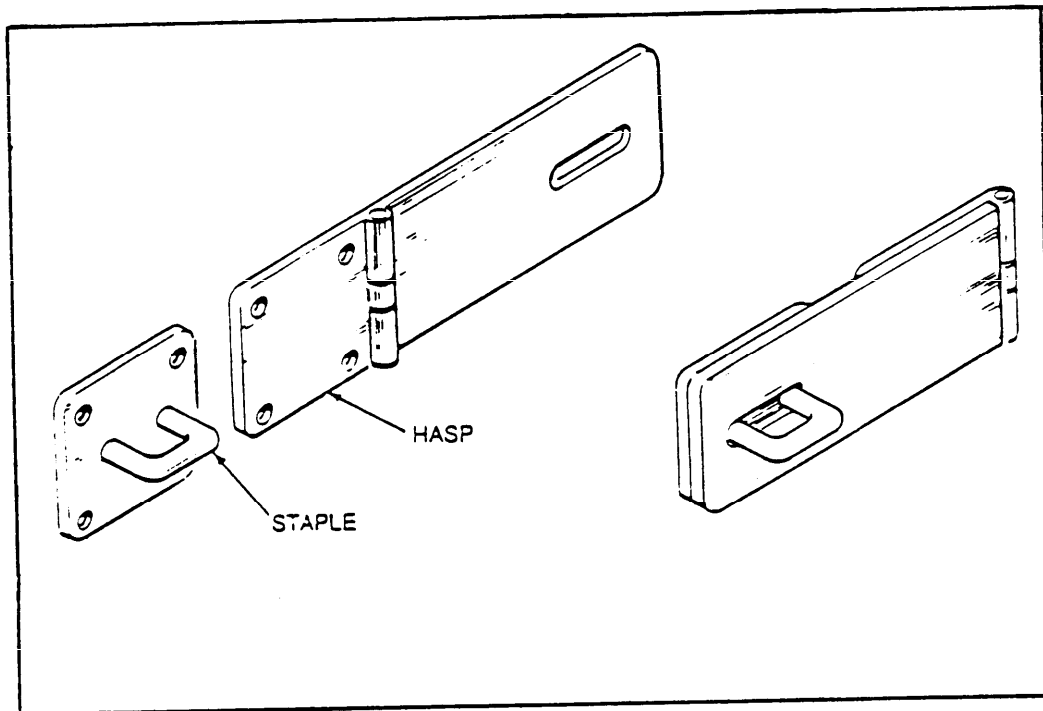


Figure 10
Low-Security Hasp

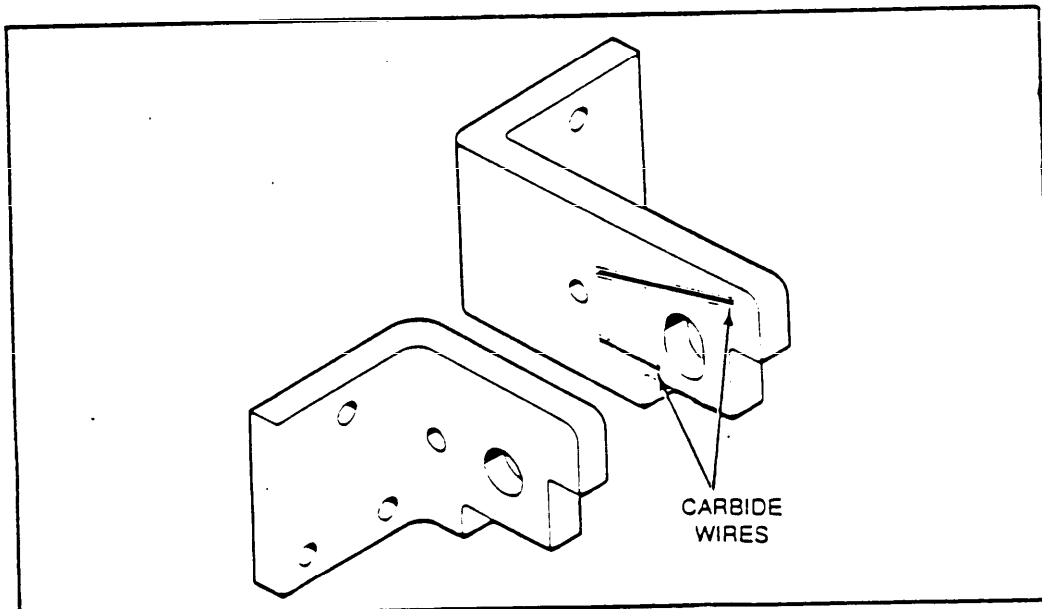


Figure 11
Sample NATICK High-Security Hasp

MIL-HBK-1013/7

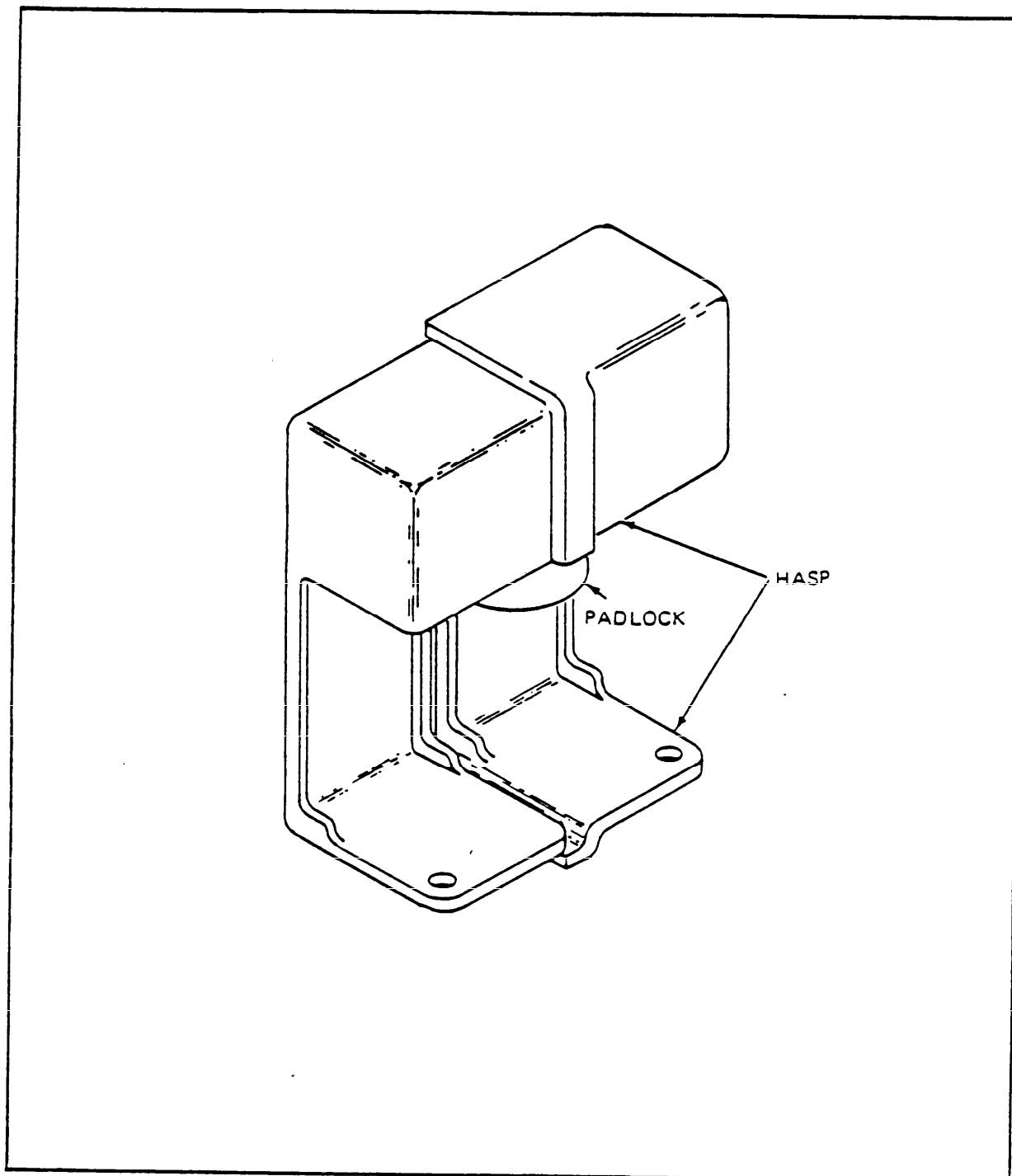


Figure 12
Sample NAPEC High-Security Hasp

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Table 6
NATICK Hasps, MIL-H-43905

Style	Type of Steel	Application	NSN
NATICK Style 1	Carbon	Single door, right-hand, flat wall installation	5340-00-178-7872
NATICK Style 2	Carbon	Single door, right-hand offset wall installation	5340-00-178-7873
NATICK Style 3	Carbon	Double standing or open-out doors	5340-00-178-7875
NATICK Style 4	Carbon	Single door, left-hand offset wall installation	5340-00-178-7880
NATICK Style 5	Carbon	Single door, left-hand flat wall installation	5340-00-178-7881
NATICK Style 6	Carbon	Universal (bend to fit requirements)	5340-00-158-0019
NATICK Style 8	Stainless	Corrosive environment	5340-01-040-9676
NATICK Style 9	Stainless	Corrosive environment	5340-01-040-9675

Table 7
NATICK Hasps, MIL-H-43905

Style	Type of Steel	Application	NSN
NAPEC 0957 Style 1 (Shrouded)	ASTM A296 Grade CA-6NM	Right-hand style for sliding and hinged doors	5340-01-196-2547
NAPEC 0958 Style 2 (Shrouded)	ASTM A296 Grade CA-6NM	Left-hand style for sliding and hinged doors	5340-01-235-6907

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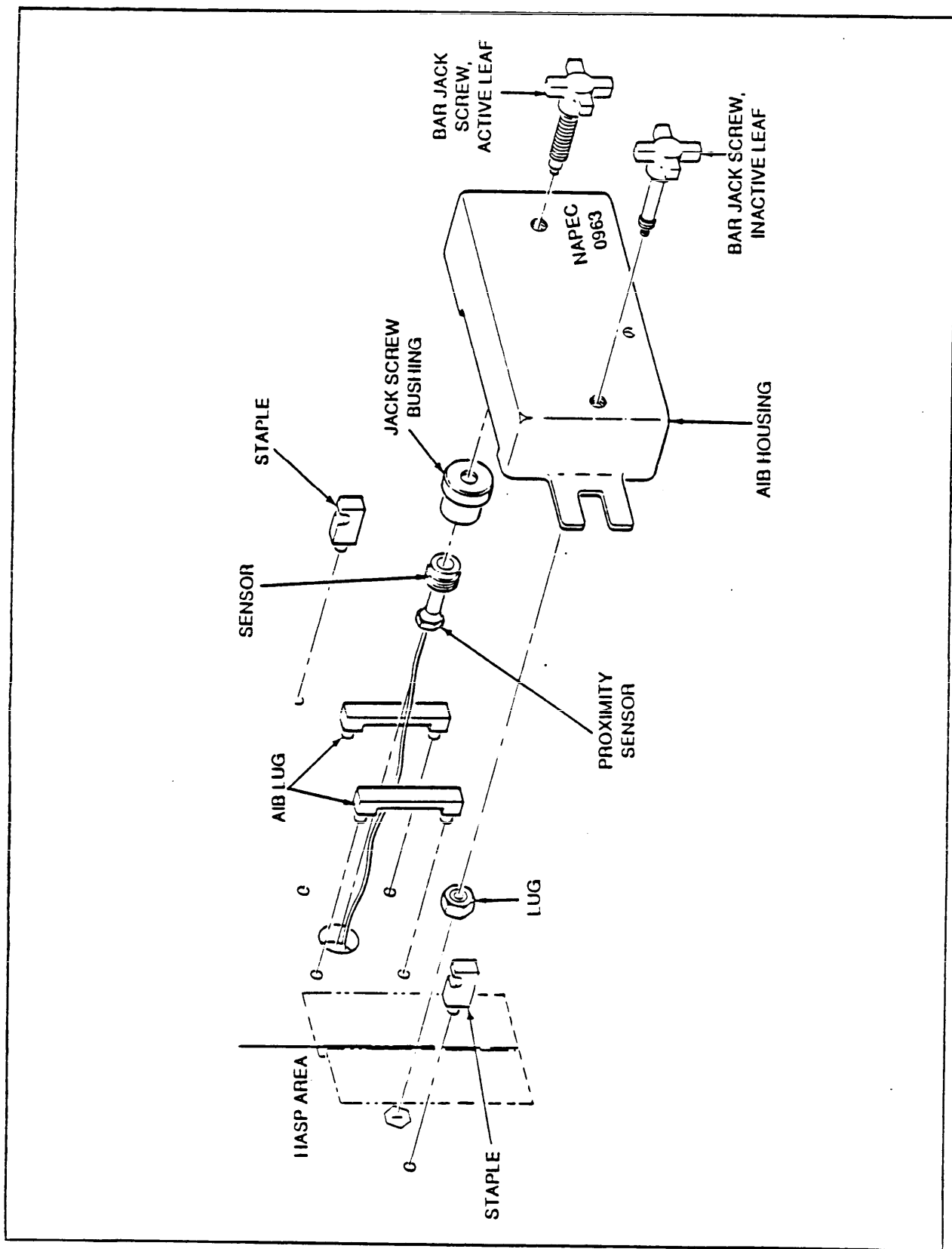


Figure 13
Anti-Intrusion Barrier

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Section 3: INSTALLATION

3.1 General. Proper installation of physical security hardware is essential to ensure that the hardware will provide the level of security for which it was designed. The introduction of specially configured hasps and stainless steel has created problems with the installation of this hardware, specifically in the areas of welding and alignment.

3.2 High-Security Locking Device (TUFLOC) Installation. The alignment of the TUFLOC halves (wings) is critical for the proper operation of the unit after it is installed. Spacers may be required to achieve proper alignment of the two wings during installation. The TUFLOC shall be installed with its keyway pointed down when mounted on vertical surfaces.

3.2.1 Bolted Installation. When the TUFLOC is installed with bolts (Figure 14), the specially hardened 3/8-inch-steel carriage bolts and nuts supplied with the TUFLOC shall be used. The TUFLOC or attaching members may require frequent realignment to compensate for door-to-door or door-to-frame misalignment.

CAUTION

Before welding TUFLOC in place, remove central bolt from lock as heat may damage it.

3.2.2 Welded Installation. When the TUFLOC is welded in place, the central bolt assembly must be removed and an alignment plug (Figure 15) inserted to hold the two halves of the TUFLOC together and ensure proper alignment prior to and during welding. The alignment plug can be made as shown in Figure 15 or ordered from the following manufacturer:

Unimet Corp., Electroline Division
1406 Fifth Street, S.W.
Canton, Ohio 44711
Telephone: (216) 452-9132

It is essential that the two halves be in perfect alignment since the only adjustments that can be made after welding must be made by door-to-door or door-to-frame adjustments.

3.3 Hasp Installation.

3.3.1 Low-Security Hasp Installation. The low-security hasp and staple (Figure 16) is installed with bolts, washers, and nuts. Bolts that attach the hasp or staple should extend all the way through the material and be secured

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on the inside with a washer and nut. The ends of the bolts should be peened to prevent unauthorized removal. When properly installed and secured, the bolts holding the hasp and staple are not visible (Figure 16).

3.3.2 High-Security Hasp Installation. High-security hasps must be carefully aligned during installation to ensure that the proper tolerances are maintained. Installation procedures are provided with the hasps and discussed in the following paragraphs.

3.3.2.1 Style 1 through 6, 8, and 9 NATICK Hasp Installation. There are six styles of NATICK hasps shown in Figure 17; five designed to fit most construction situations that will be encountered, and one universal style that allows the hasp to be bent to fit unique situations. When the proper style is selected, it is obtained by using the associated National Stock Number (NSN) indicated in the figure. The Style 6 NATICK hasp is intended to be bent on-site. When bending the Style 6 hasp, it is recommended that the bend be made with a minimum inside bend radius of 1/2 inch. Style 8 and 9 NATICK high-security hasps are specifically designed for corrosive environment use on hatches, manholes, scuttles, and their frames. When the NATICK hasp is welded, the alignment shim (Figure 18) supplied with the hasp should be used between the two parts of the hasp. The door should be fully closed during the alignment procedure. The hasp should be tack-welded in place, the tape or bolt holding the hasp parts together removed, the door opened, and the operation checked. In order to obtain the maximum amount of protection, each hasp part shall be fully welded on all four sides with proper penetration to prevent it from being peeled off the surface to which it is attached. When installed on a vertical surface, the hasp shall be placed so that the lock keyway points straight down.

3.3.2.2 NAPEC 0957 and 0958 (MK 2 MOD 8 and 9) Hasp Installation. Installation instructions for the NAPEC hasps are packaged and shipped with the hasp. Instructions for the NAPEC 0957 and 0958 (MK 2 MOD 8 and MOD 9) hasps are provided in Figures 19 and 20. When these hasps are to be used with the Style 2 model 1381 high-security lock, the antirotation block shall be installed as shown in Figure 8. Further installation guidance can be obtained from Naval Weapons Support Center (NWSC) (Code 902), Crane, Indiana 47522, Autovon 482-1879/1882.

3.3.3 Anti-Intrusion Barrier Installation. Installation instructions for the Anti-Intrusion Barrier (AIB) are packaged and shipped with the AIB. These instructions cover right-hand active doors, left-hand active doors, single right-hand sliding doors, and single left-hand sliding doors. Instructions for right-hand active doors are provided in Figure 21. Further installation guidance can be obtained from the NWSC Weapons Department (Code 208), Crane, Indiana 47522, Autovon 482-1879/1882.

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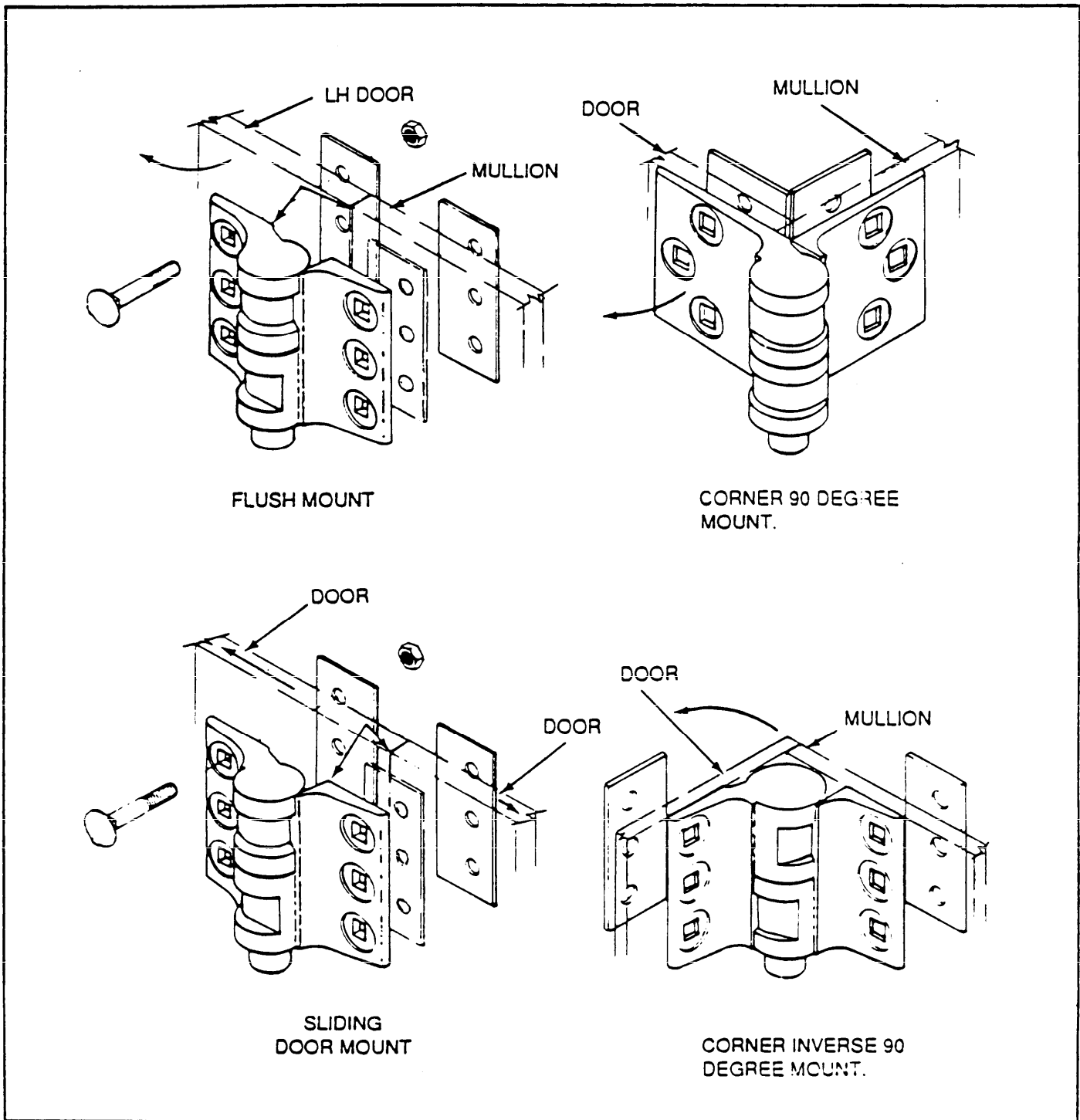


Figure 14
TUFLOC Installation

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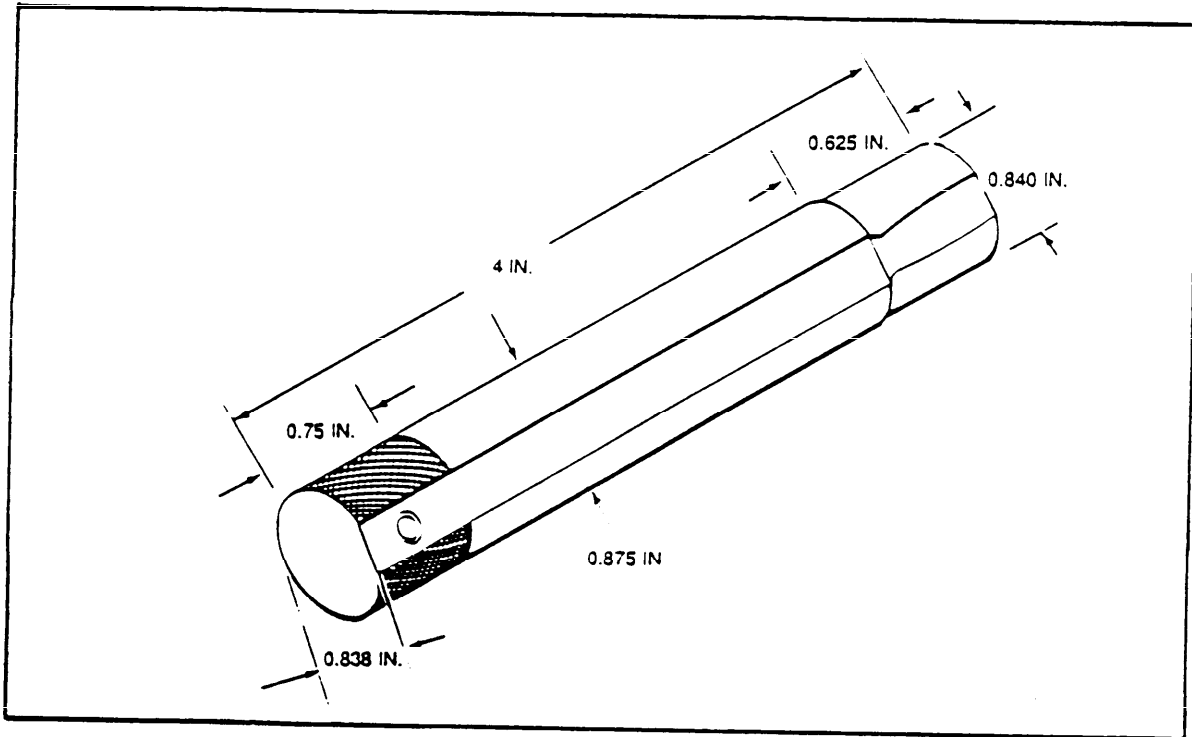


Figure 15
TUFLOC Alignment Plug

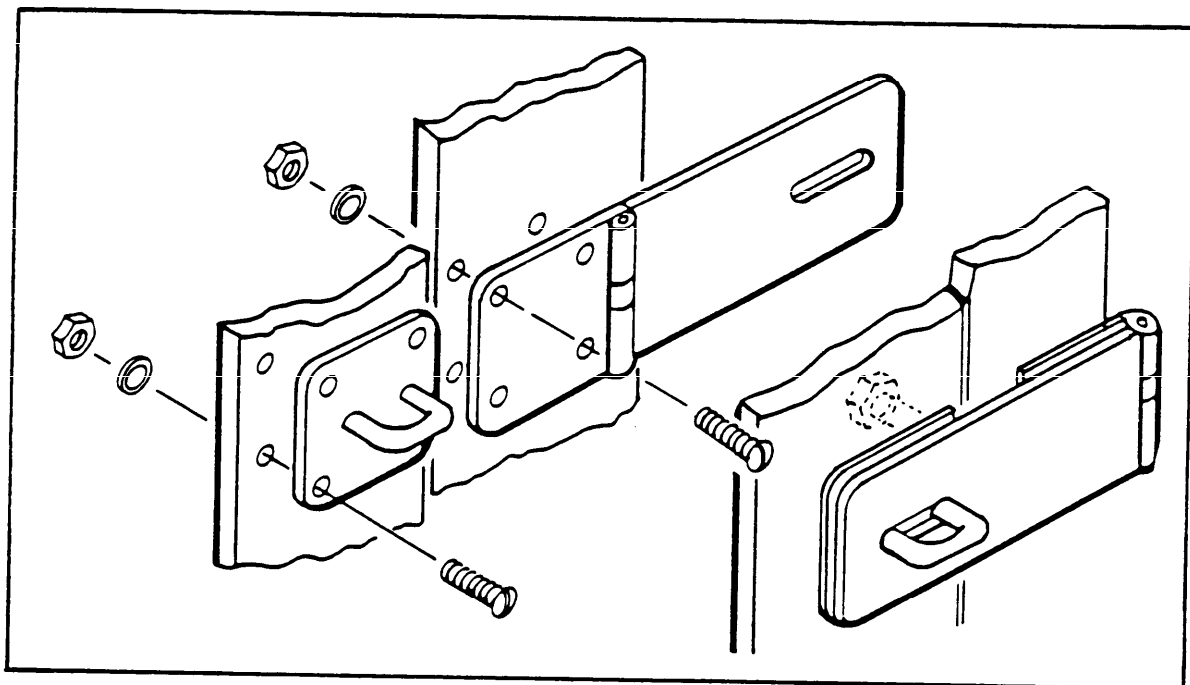


Figure 16
Low-Security Hasp and Staple Installation

MIL-HBK-1013/7

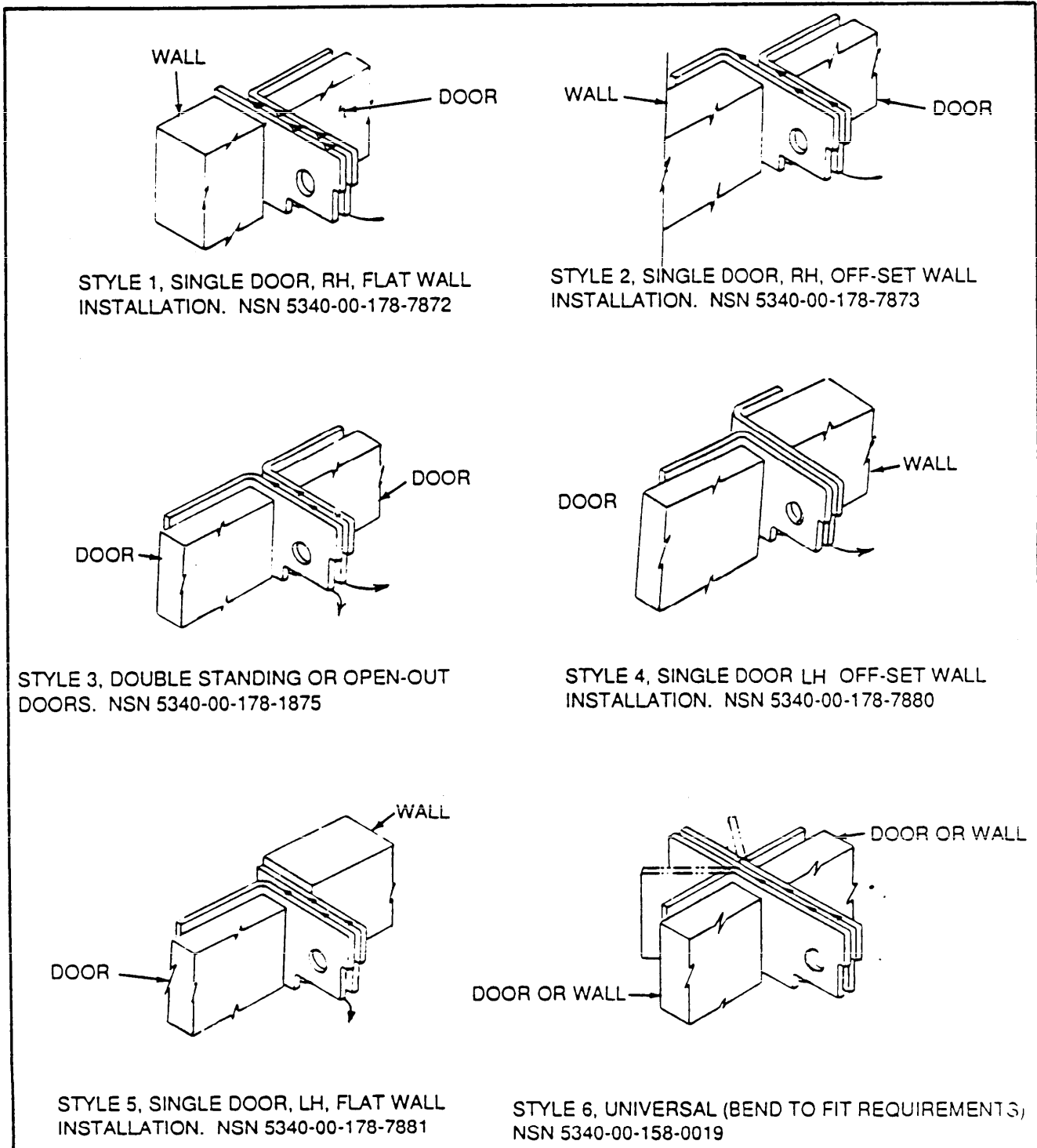


Figure 17
NATICK Hasp Installation, Style 1 Through 6

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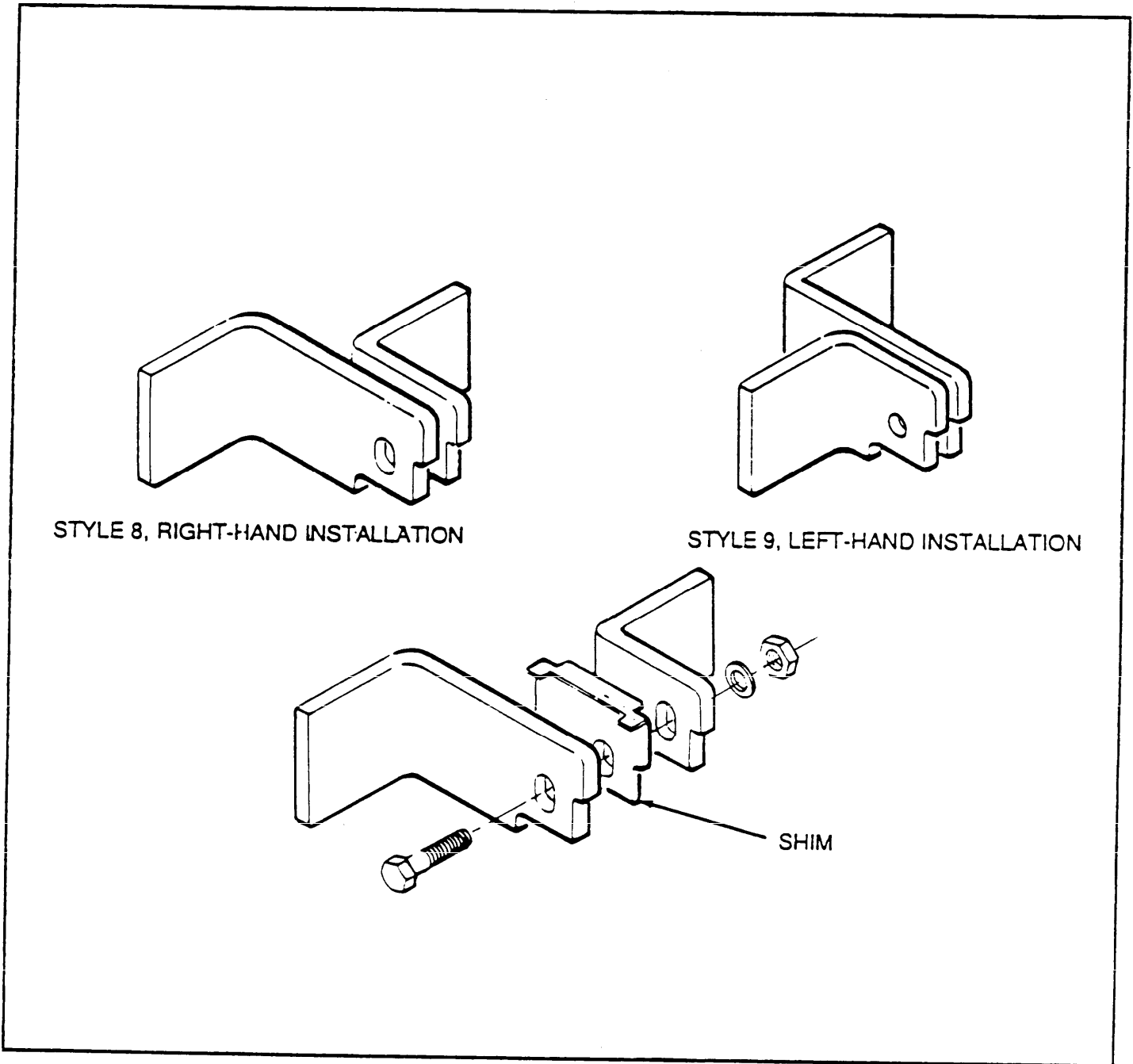


Figure 18
NATICK Hasp Installation, Style 8 and 9

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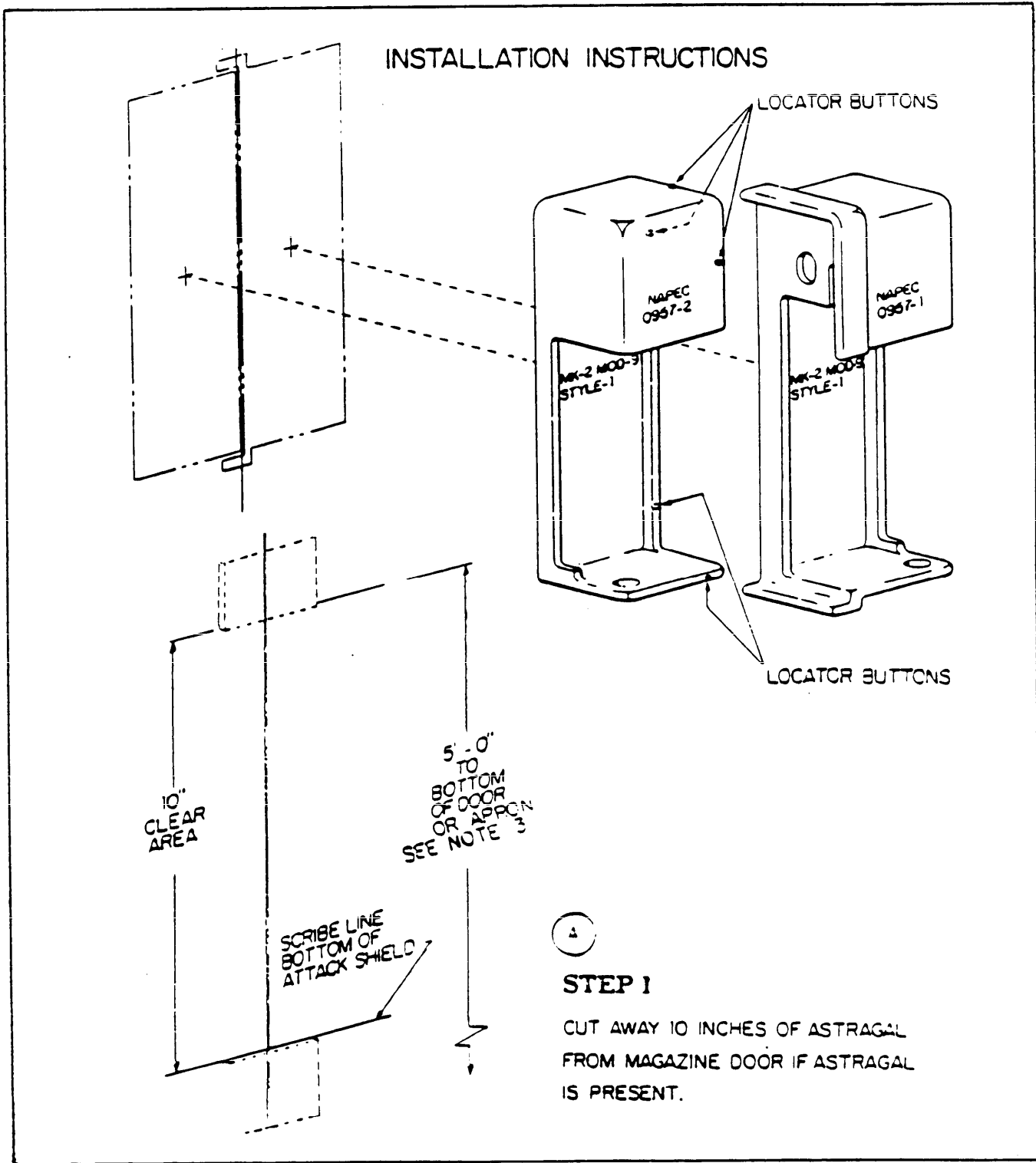
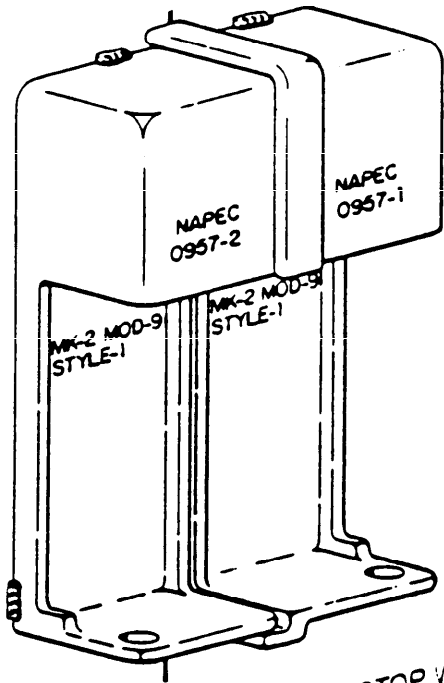


Figure 19
NAPEC 0957 High-Security Hasp Installation (Sheet 1 of 4)

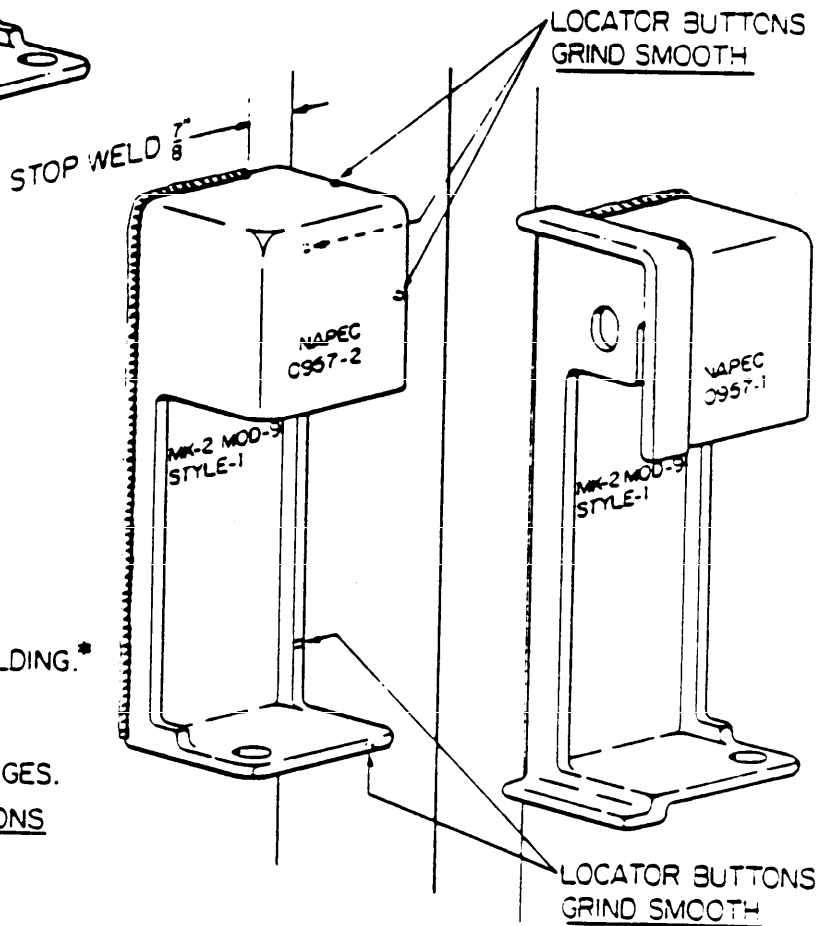
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* NOTE: USE WELDING ELECTRODE
310-15 OR 310-16, $\frac{3}{32}$ DIA. A

STEP 2

NOTE: LOCATOR BUTTONS HAVE BEEN CAST ONTO THE HASP TO AID INSTALLATION. POSITION HASP ON DOORS USING THE BUTTONS TO ESTABLISH CLEARANCE. TACK WELD HASP ONTO DOORS.



STEP 3

OPEN DOOR AND FINISH WELDING.*

CAUTION

DO NOT WELD ON DOOR EDGES.
GRIND OFF LOCATOR BUTTONS
CLOSE DOORS.

Figure 19
NAPEC 0957 High-Security Hasp Installation (Sheet 2 of 4)

MIL-HBK-1013/7

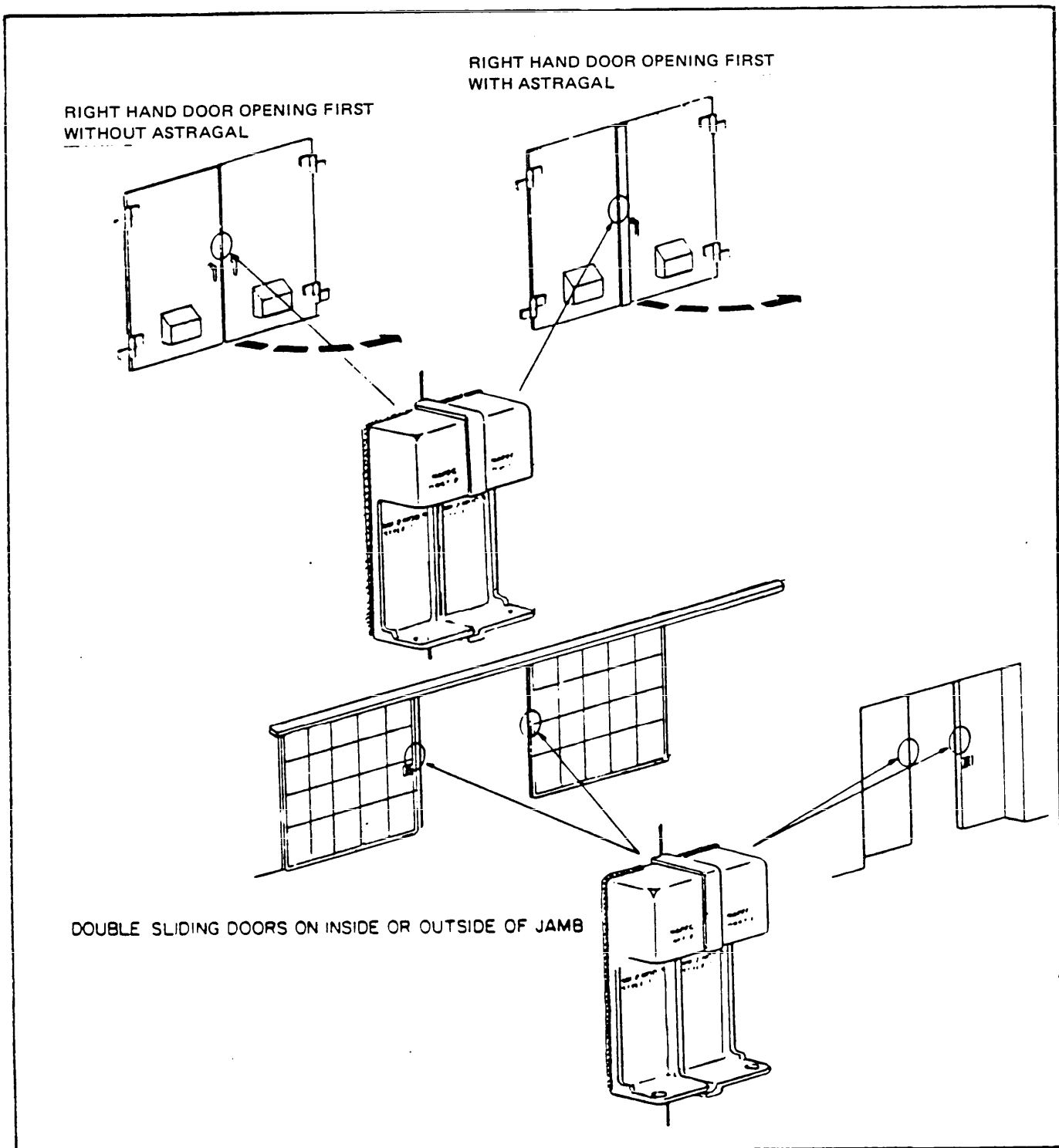


Figure 19
NAPEC 0957 High-Security Hasp Installation (Sheet 3 of 4)

MIL-HBK-1013/7

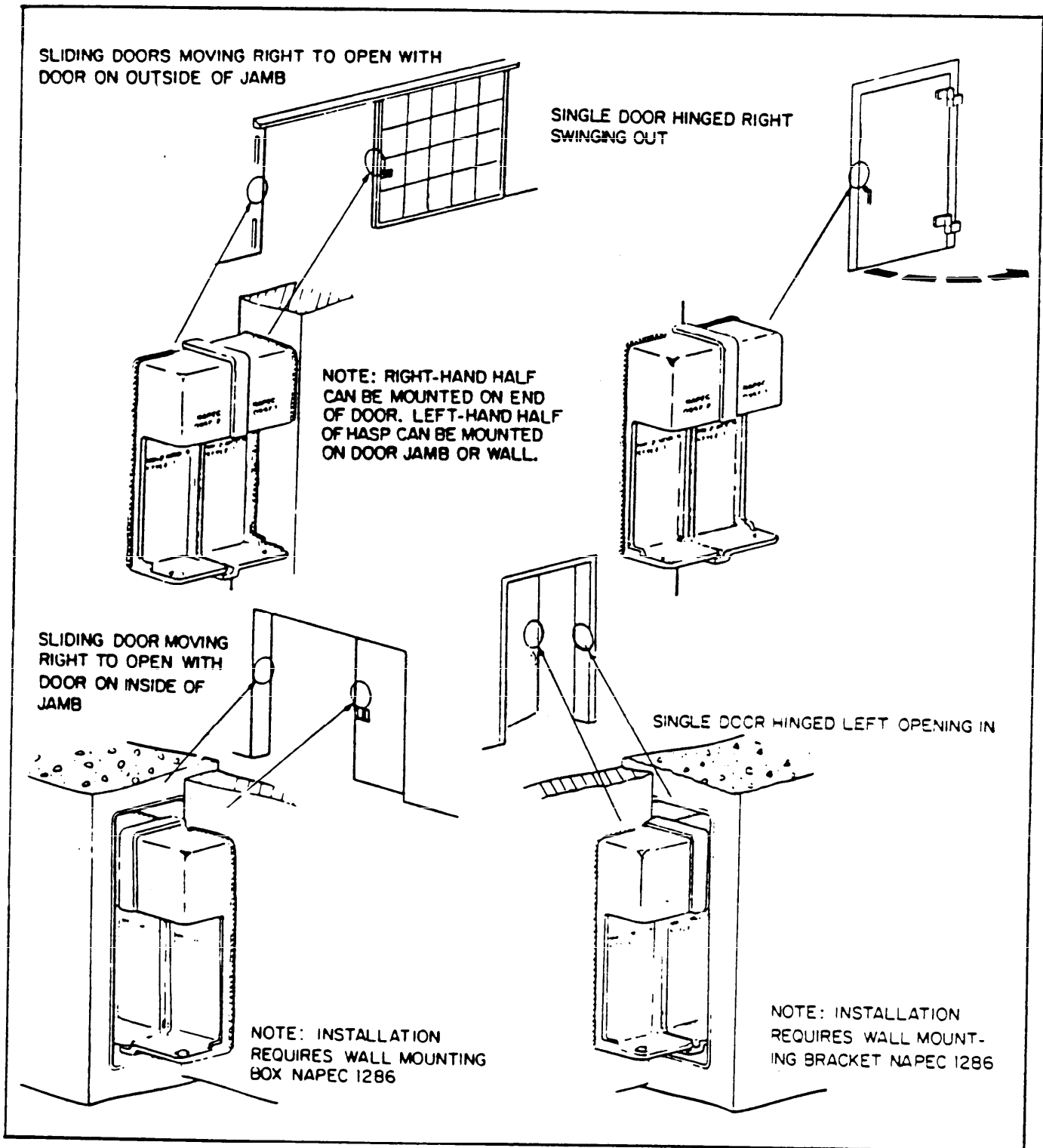


Figure 19
NAPEC 0957 High-Security Hasp Installation (Sheet 4 of 4)

MIL-HBK-1013/7

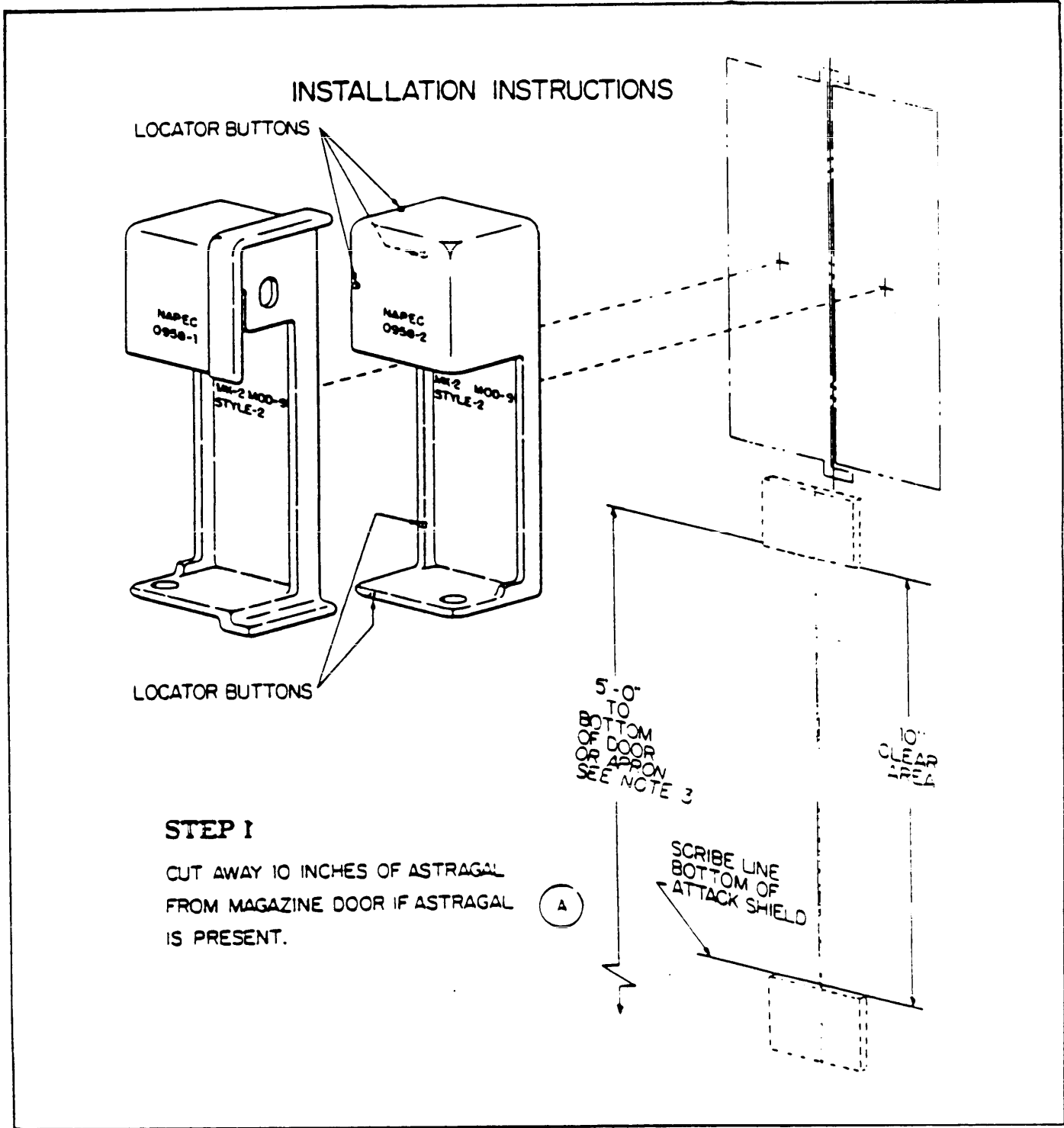


Figure 20
NAPEC 0958 High-Security Hasp Installation (Sheet 1 of 4)

MIL-HBK-1013/7

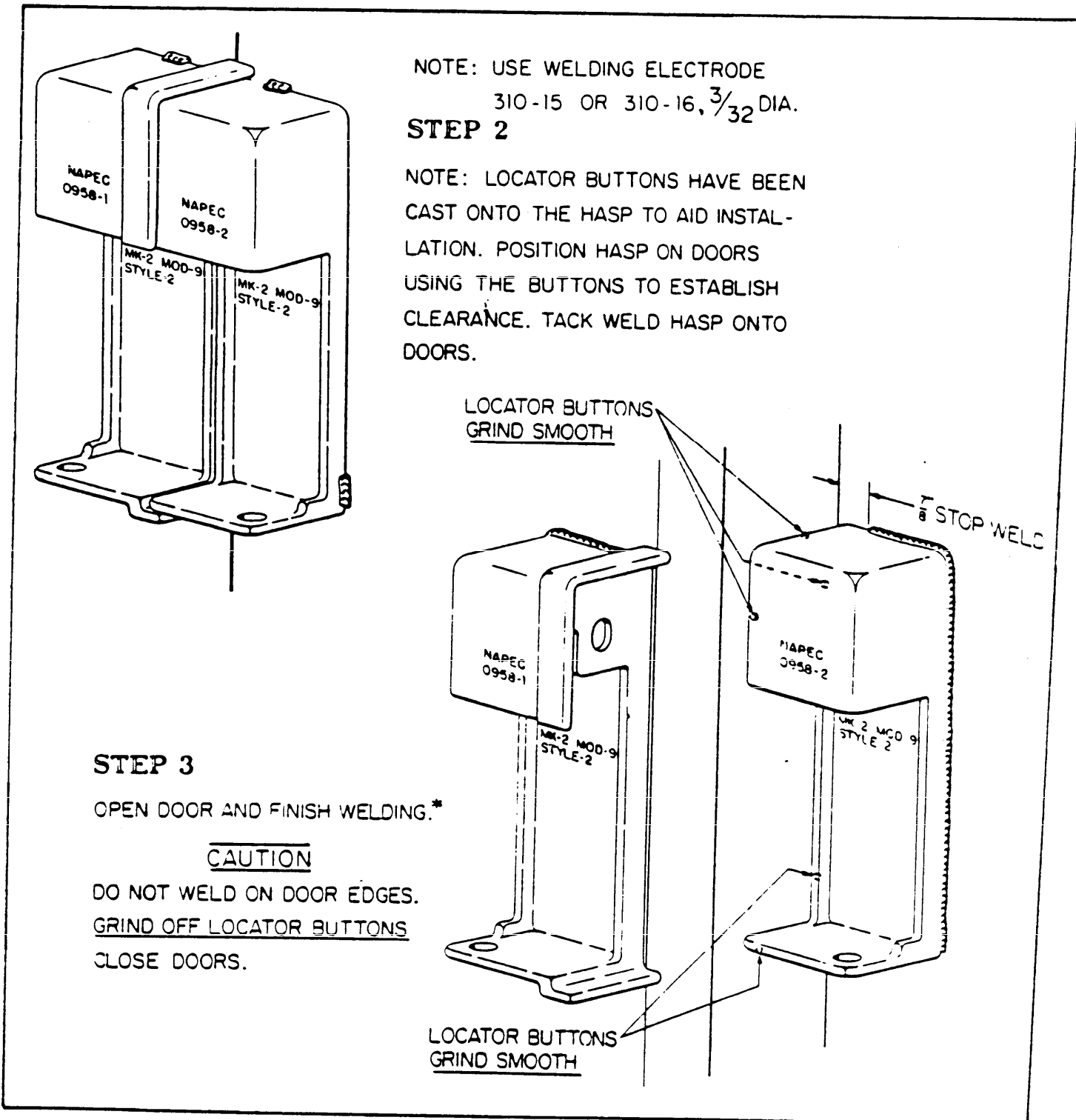


Figure 20
NAPEC 0958 High-Security Hasp Installation (Sheet 2 of 4)

MIL-HBK-1013/7

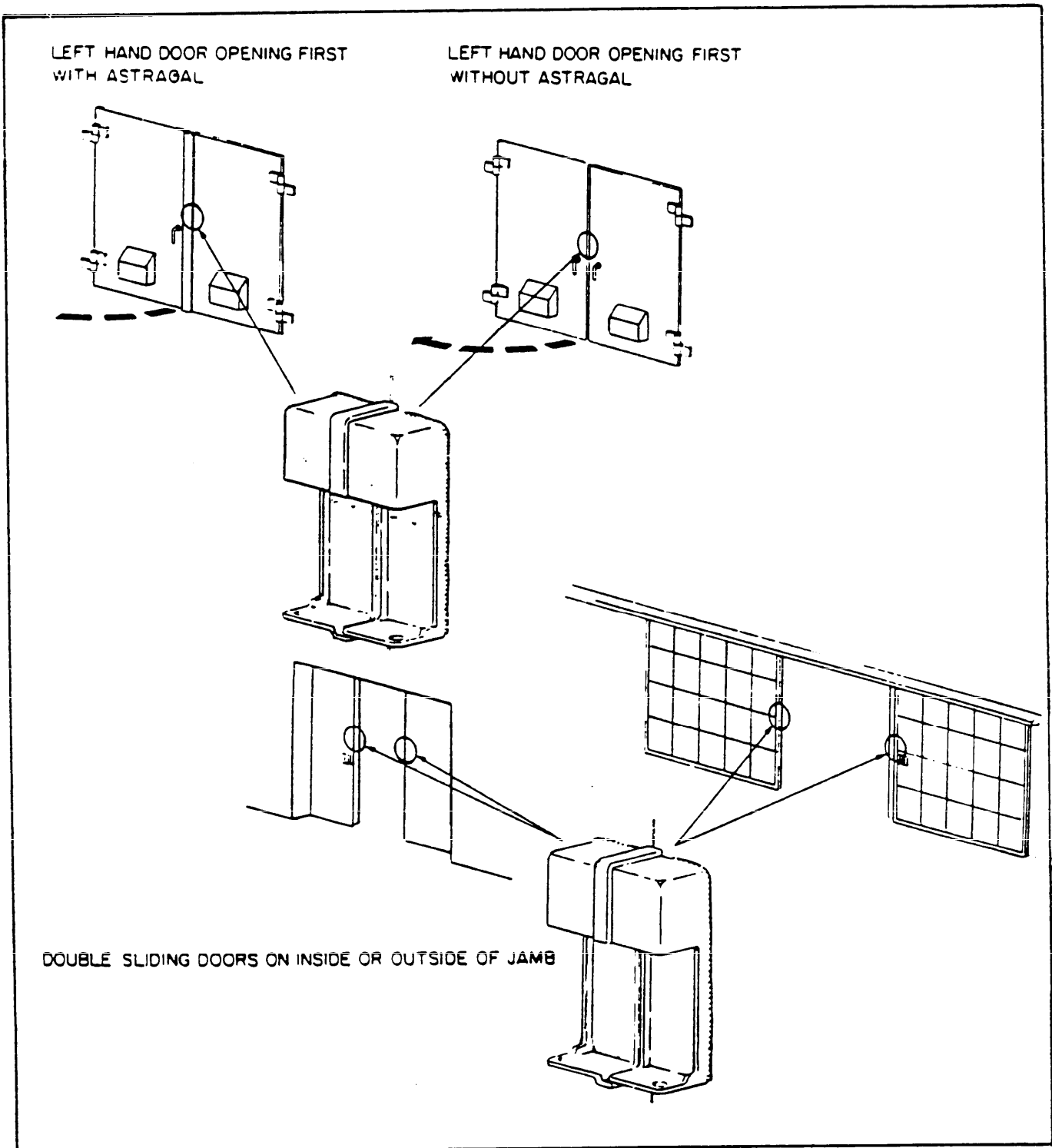


Figure 20
NAPEC 0958 High-Security Hasp Installation (Sheet 3 of 4)

MIL-HBK-1013/7

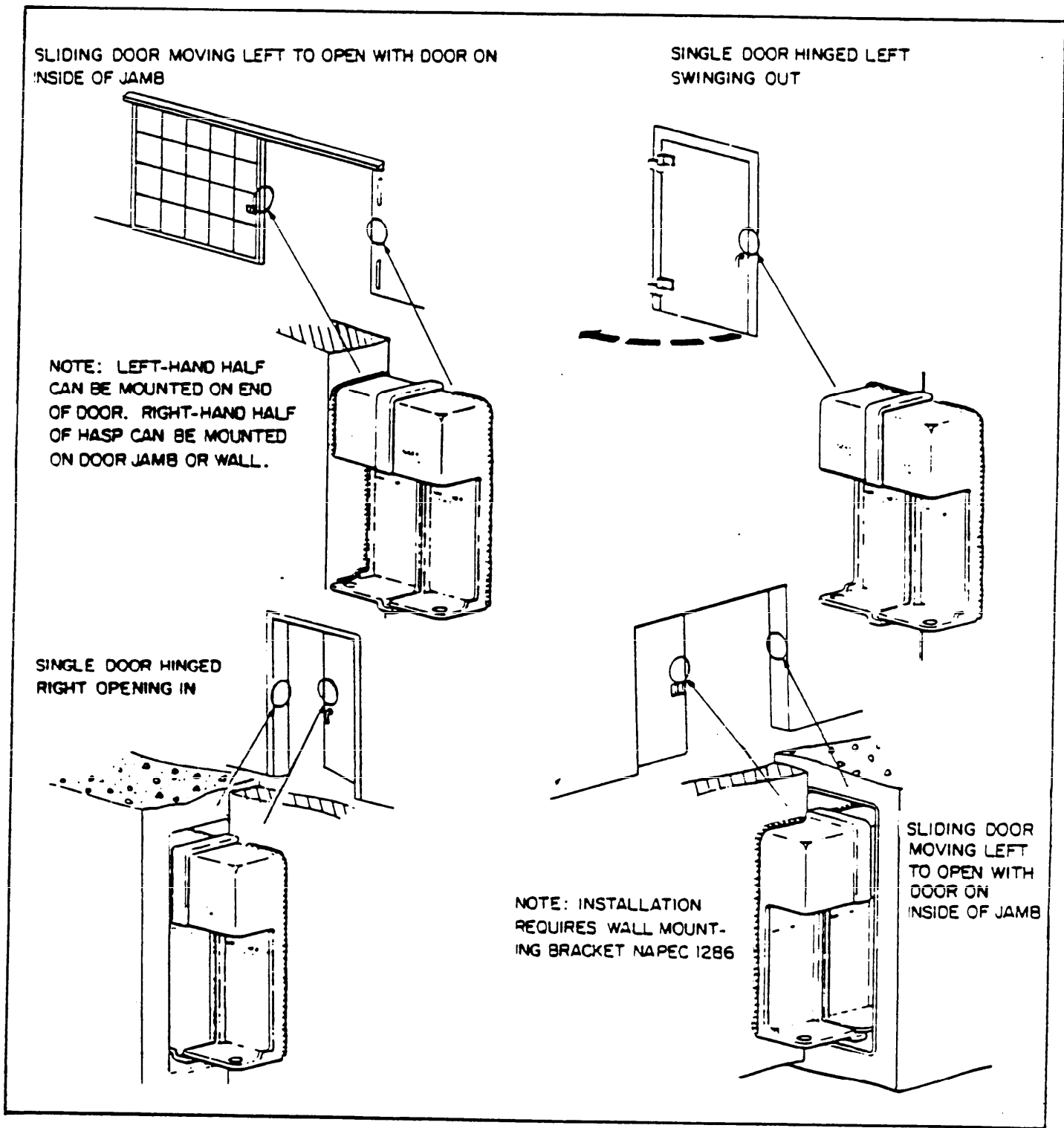


Figure 20
NAPEC 0958 High-Security Hasp Installation (Sheet 4 of 4)

MIL-HBK-1013/7

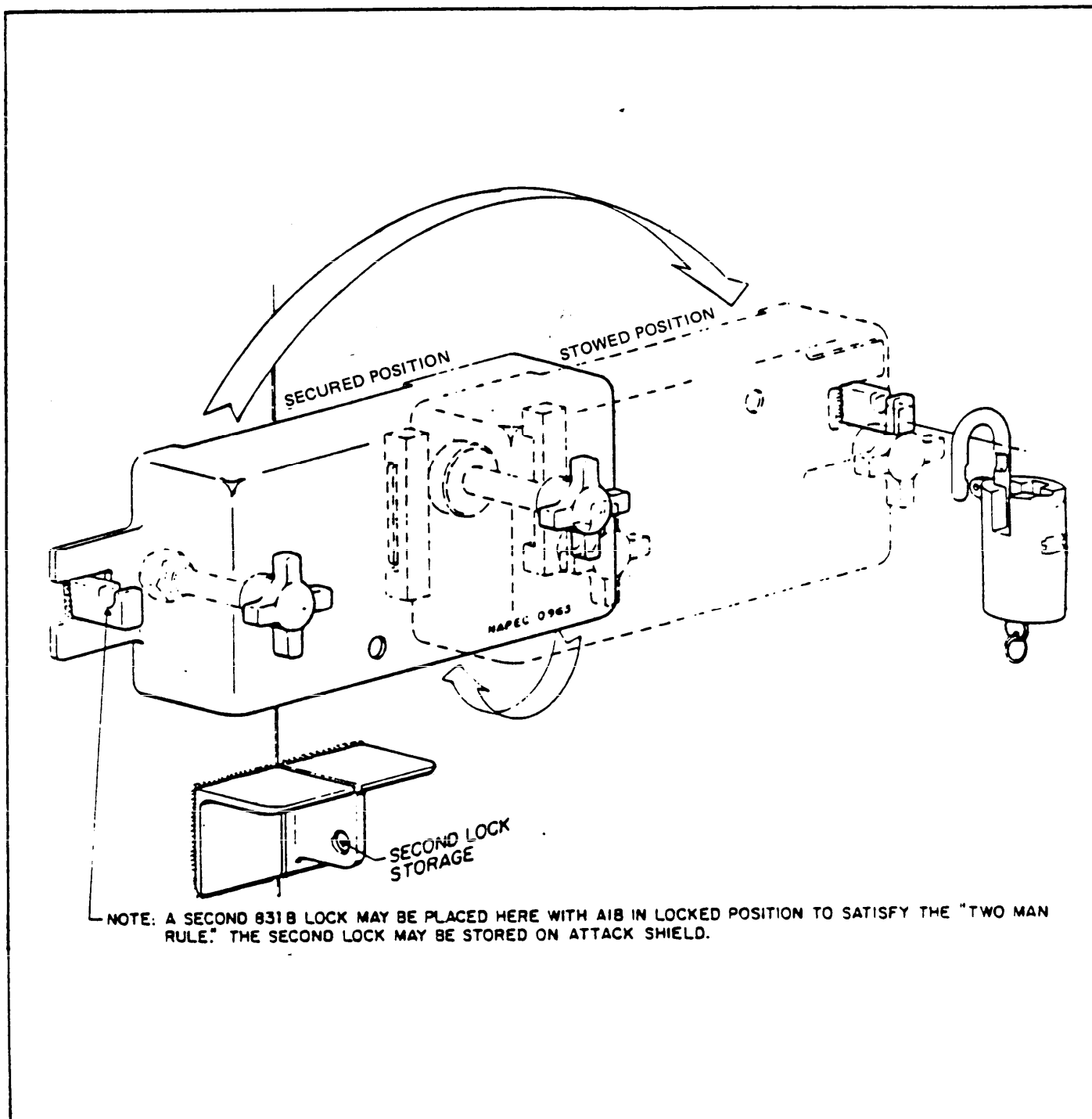


Figure 21
Anti-Intrusion Barrier Installation for Right-Hand Active Doors,
Using NAPEC 0957 High-Security Hasp (Sheet 1 of 3)

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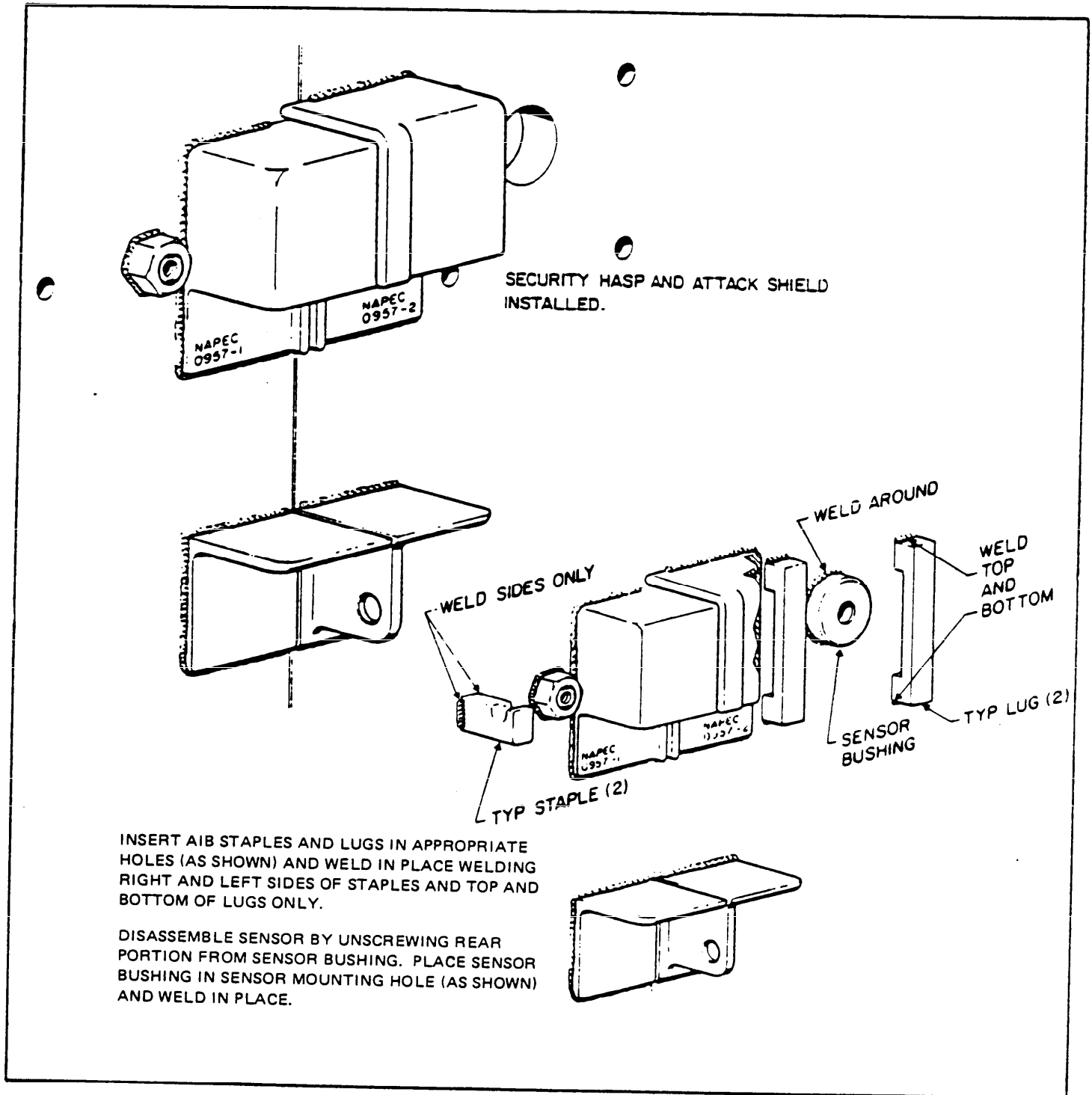


Figure 21
 Anti-Intrusion Barrier Installation for Right-Hand Active Doors,
 Using NAPEC 0957 High-Security Hasp (Sheet 2 of 3)

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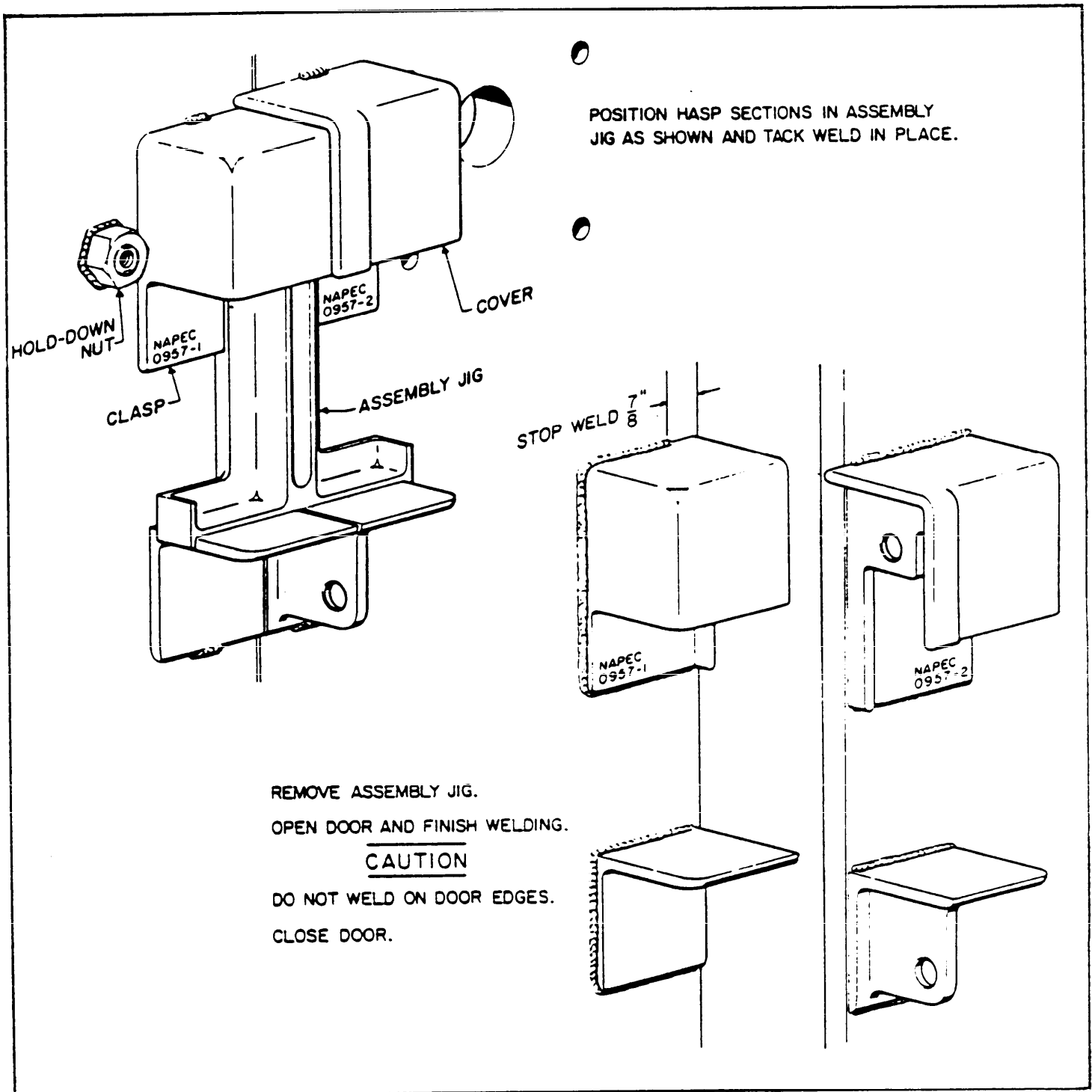


Figure 21
Anti-Intrusion Barrier Installation for Right-Hand Active Doors,
Using NAPEC 0957 High-Security Hasp (Sheet 3 of 3)

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Section 4: OPERATION

4.1 General. Operation of a locking device consists of one complete cycle, unlocking, and locking.

4.2 Padlock Operation. The operational procedures for padlocks differ based on the type: low, medium, or high security.

4.2.1 Low-Security Padlock Operation. Operational steps common to all key-operated, low-security padlocks are as follows.

- a) Ensure that keyway is not obstructed with foreign material.
- b) Ensure that key is not bent or cracked.
- c) Insert key completely into keyway.

CAUTION

Do not attempt to turn key if it is not fully inserted into keyway. If key does not turn when firm pressure is applied, do not force it as this may bend, crack, or break key.

- d) Use firm pressure when turning key.

CAUTION

Do not turn key while pulling it out.

- e) When removing key from keyway, pull key straight out.

If problems occur in operating the low-security padlocks, refer to the instructions in Paragraph 6.2.

4.2.2 Medium-Security Padlock Operation. These padlocks are supplied with two operator keys and one control key. For normal operation, the operator key is used. To operate these padlocks refer to Figure 22 and proceed as follows.

- a) Ensure that correct key for particular lock is used. Fully insert operator key into lock keyway.

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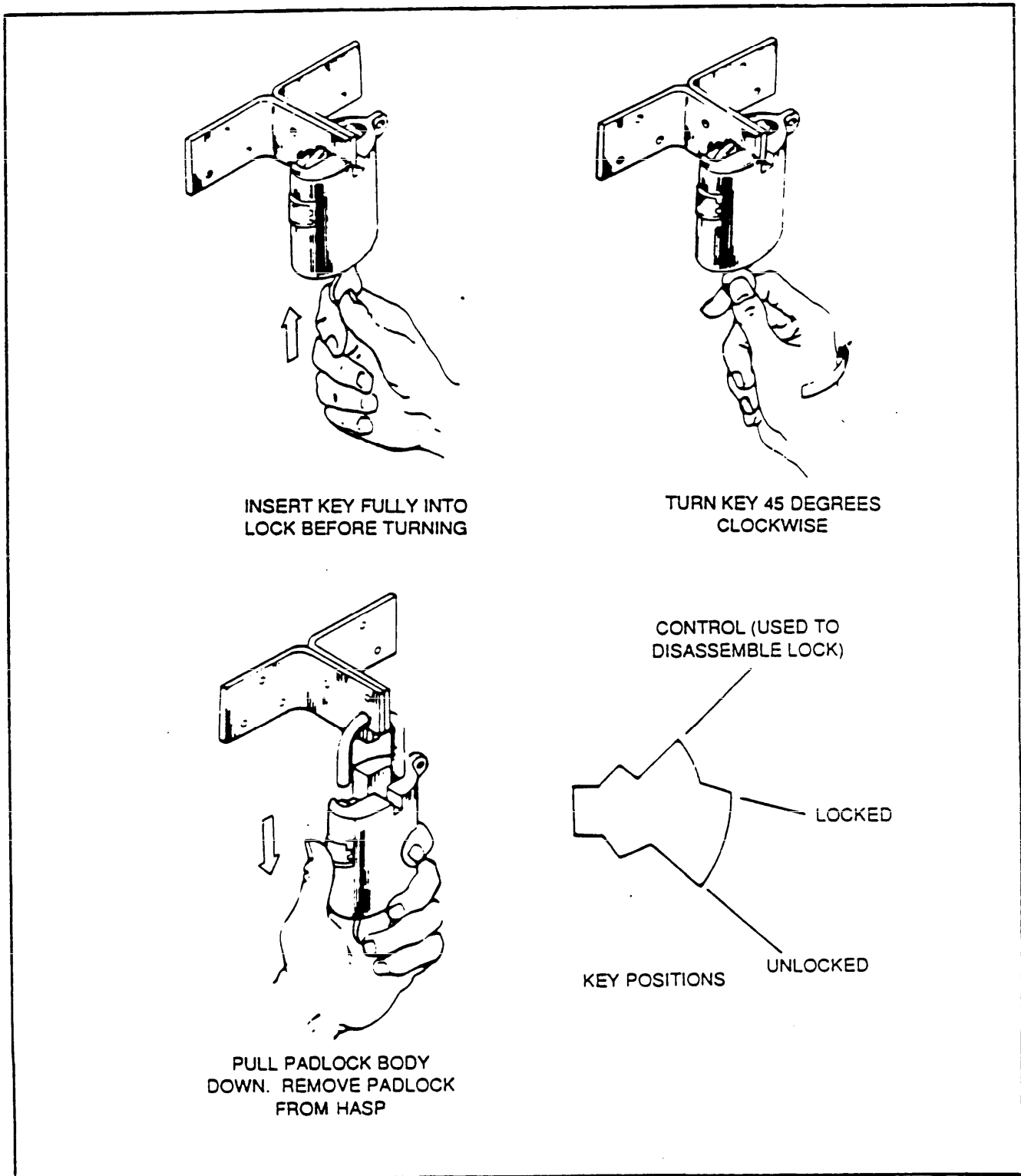


Figure 22
Medium- and High-Security Padlock Operation

MIL-HBK-1013/7

CAUTION

Do not attempt to turn key if it is not fully inserted into keyway. If key does not turn when firm pressure is applied, do not force it as this may bend, crack, or break key.

- b) Turn key 45 degrees clockwise and pull down on lock body. This opens shackle. Key cannot be removed with shackle open.
- c) To lock, close shackle and return key to locked position.

CAUTION

Do not turn key while pulling it out.

- d) Pull key straight out of keyway to remove it.

4.2.3 High-Security Padlock Operation. High-security padlocks are either single or dual control.

4.2.3.1 Single-Control, High-Security Padlock Operation. Single-control, high-security padlocks are provided with two operator keys and one control key. For normal operation, the operator key is used. The high-security padlocks operate in the same manner as the medium-security padlocks discussed in Paragraph 4.2.2 with the exception of the Hi-Shear Model LK1200 padlock. To operate the Hi-Shear Model LK1200 high-security padlock, refer to Figure 23 and proceed as follows.

NOTE

Before inserting key into padlock, ensure that ceramic slider is properly aligned with keyway.

- a) Ensure operator key is used.

CAUTION

Do not attempt to turn key if it is not fully inserted in keyway. If key does not turn when firm pressure is applied, do not force it as this may bend, crack, or break key.

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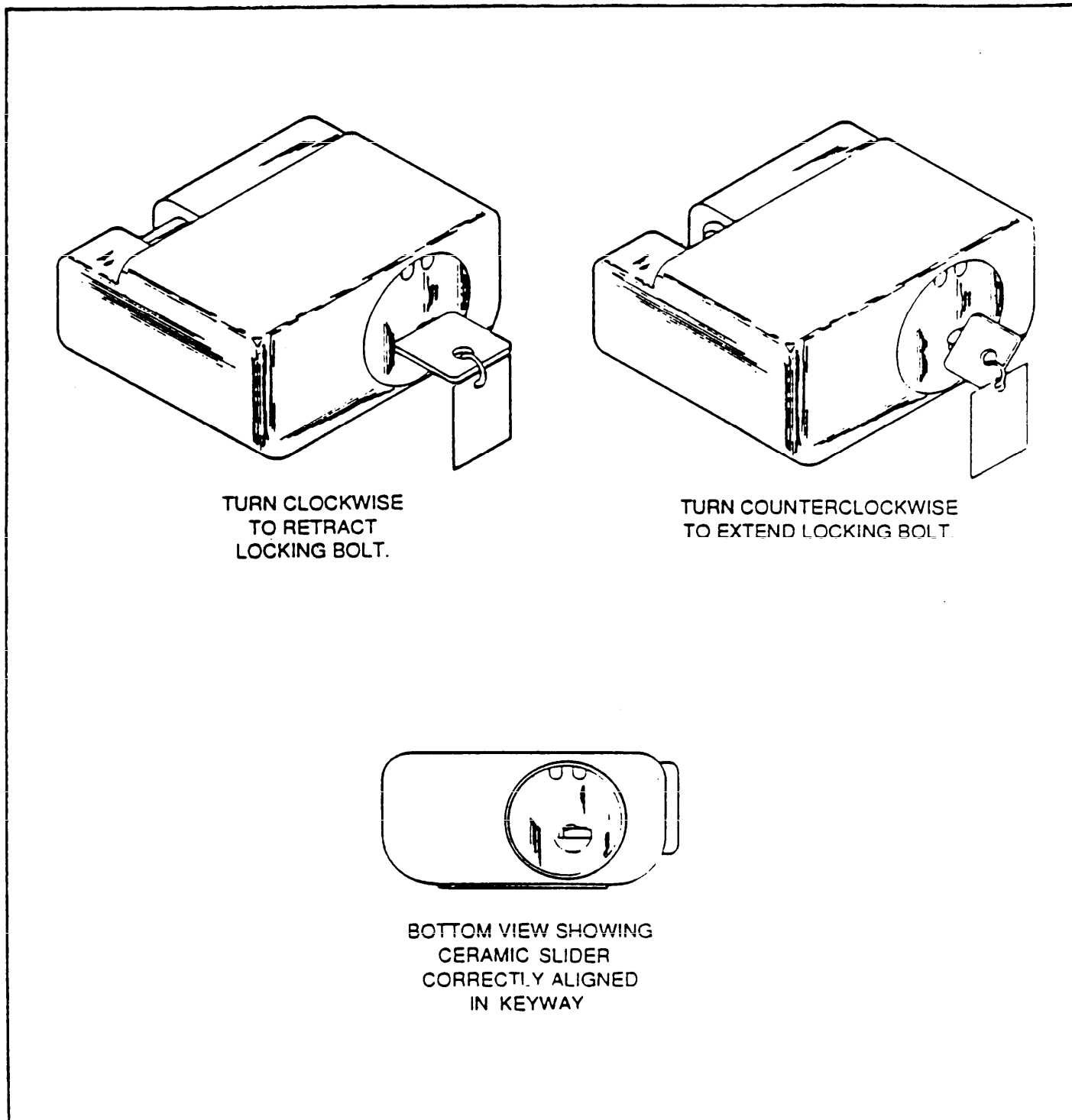


Figure 23
Hi-Shear Model LK1200 High-Security Padlock Operation

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NOTE

Hi-Shear Model LK 1200 padlock opens by sliding horizontal retracting locking bolt. Key cannot be removed when padlock is unlocked.

b) Fully insert key into lock keyway and turn 45 degrees clockwise with firm pressure.

c) To lock, rotate key counterclockwise to extend sliding locking bolt.

4.2.3.2 Dual-Control, High-Security Padlock Operation. This lock is for Navy use only. The Model 1381 dual-control, high-security padlock requires two operator keys (A and B) to open the lock. To operate the padlock, refer to Figure 24 and proceed as follows:

CAUTION

Do not attempt to turn key if it is not fully inserted into keyway. If key does not turn when firm pressure is applied, do not force it as this may bend, crack, or break key.

- a) Insert key A fully into keyway A.
- b) Turn key A clockwise approximately 30 degrees.
- c) Insert key B fully into keyway B.
- d) Turn key B clockwise approximately 30 degrees.

NOTE

Keys cannot be removed when padlock is unlocked.

- e) Pull down on lock body and remove from hasp.
- f) Push up on lock body to lock.
- g) Turn key A or B counterclockwise to locked position and remove key.
- h) Turn other key counterclockwise to locked position and remove key.

MIL-HBK-1013/7

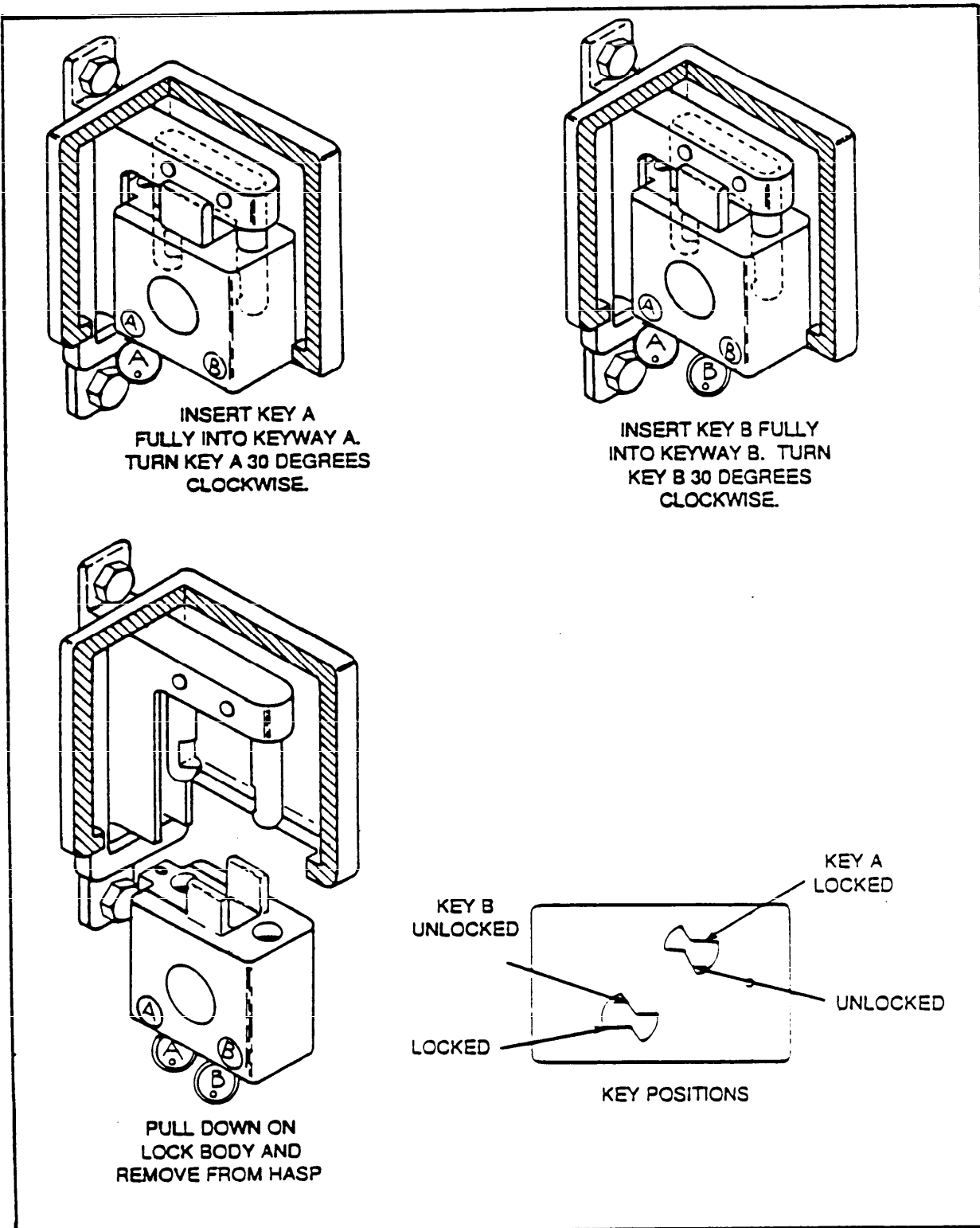


Figure 24
Model 1381 Dual-Control, High-Security Padlock Operation

MIL-HBK-1013/7

4.3 High-Security Locking Device (TUFLOC) Operation. To operate the TUFLOC, refer to Figure 25 and proceed as follows:

a) Ensure that correct key for particular lock is used. Fully insert key into lock keyway.

CAUTION

Do not attempt to turn key if it is not fully inserted into keyway. If key does not turn when firm pressure is applied, do not force it as this may bend, crack, or break key.

CAUTION

Do not use excessive force. If difficulty is encountered in drawing central bolt out after key has been turned to unlocked position, push or pull on door while gently pulling on key.

b) Turn key approximately 40 degrees counterclockwise and gently pull on key to draw central bolt out approximately 5/8 inch.

CAUTION

Do not turn key while pulling it out.

c) With central bolt out, return key to locked position. Remove key from keyway by pulling key straight out.

d) To lock, insert key fully into keyway and turn 40 degrees counterclockwise. Push in on central bolt, then rotate key clockwise to locked position.

e) Remove key from keyway by pulling key straight out.

4.4 Anti-Intrusion Barrier Operation. To remove the anti-intrusion barrier, loosen the active jackscrew, loosen the inactive jackscrew, and remove the cover.

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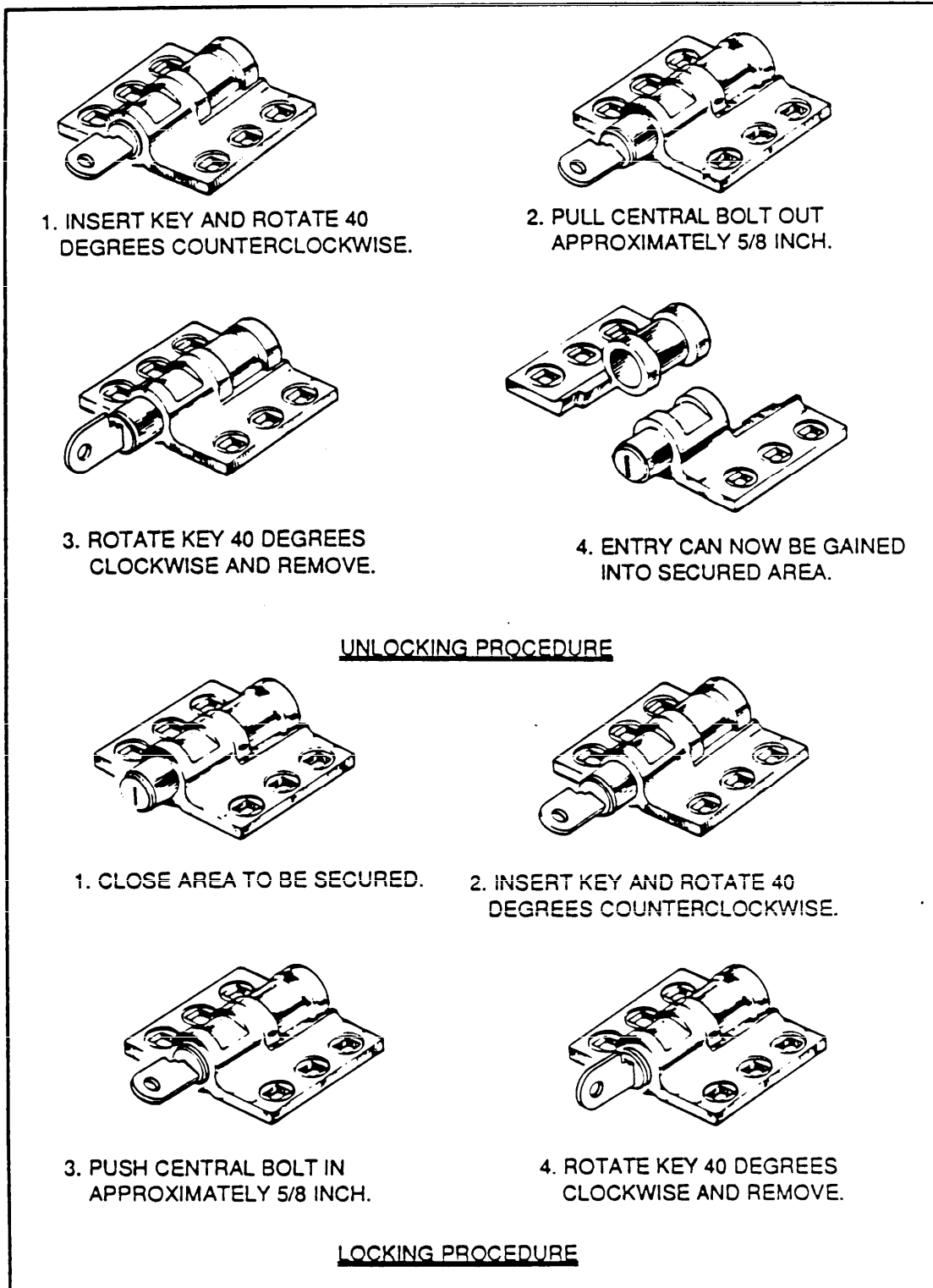


Figure 25
High-Security Locking Device (TUFLOC) Operation

MIL-HBK-1013/7

Section 5: MAINTENANCE

5.1 General. Locks providing physical security are subjected not only to normal wear, but also to the corrosive effects of the elements. Even a solid brass lock left unused and unattended will corrode to the point of becoming unserviceable. The maintenance procedures recommended in this section help prevent lockouts that result from lock failure. Preventive maintenance, including schedules for test, inspection, and lubrication, shall be conducted in accordance with local directives and shall not exceed 6 months between lubrications.

5.2 Padlock Maintenance. Padlock maintenance varies with the type: low, medium, or high security. Recommended lock solvents and lubricants are listed in Table 8.

5.2.1 Low-Security Padlock Maintenance. Low-security padlocks require very little maintenance. An occasional cleaning with trichloroethane cleaning solvent and lubrication with molybdenum disulfide powder will keep these locks operating indefinitely.

5.2.2 Medium-Security Padlock Maintenance. Maintenance of mediumsecurity padlocks should be performed on a periodic basis to keep locks in working order and to detect potential problems. S&G Model 826A, 826C, and 826D require maintenance at least once every 6 months. The maintenance procedures for the S&G Model 826A, 826C, and 826D (Figure 26) are as follows:

CAUTION

Do not attempt to turn key if it is not fully inserted into keyway. If key does not turn when firm pressure is applied, do not force it as this may bend, crack, or break key.

- a) Insert control key into lock and turn approximately 45 degrees counterclockwise to control position.
- b) Pull shackle up and slide cover off.
- c) Turn shackle from locked position approximately half way around until shackle drops completely. Turn shackle clockwise until shackle touches outside of case.
- d) Turn key approximately 30 degrees clockwise between control and locked position.

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Table 8
Recommended Padlock Lubricants and Solvents

Item	Specification Number	National Stock Number
Trichloroethane (solvent)	MIL-T-81533*	6810-00-292-9625 (quart) 6810-00-664-0387 (gallon)
Molybdenum disulfide (powder), type II	MIL-M-7866**	6810-00-264-2715
Molybdenum disulfide (grease)	MIL-G-21164***	

*MIL-T-81533, "Trichloroethane 1,1,1 (Methyl Chloroform) Inhibited, Vapor Degreasing."

**MIL-M-7866, "Molybdenum Disulfide."

***MIL-G-21164, "Grease, Molybdenum Disulfide, for Low and High Temperatures, NATO Code Number G-353."

NOTE

Screwdriver may be needed to remove deadbolt.

- e) Turn case upside down and shake. Deadbolt should fall out.

CAUTION

Do not turn key while pulling it out.

- f) Turn key to locked position and remove key.
g) Turn case upside down and cylinder will fall out.
h) Remove any corrosion from lock components with wire brush.

WARNING

Avoid prolonged contact with, or inhalation of, cleaning solvents. Avoid use near heat or open flame, and provide adequate ventilation.

- i) Clean case, cover, deadbolt, and shackle with an approved solvent. Clean cylinder by vigorously flushing with solvent to remove any foreign particles. Place cylinder aside and allow solvent to evaporate completely.

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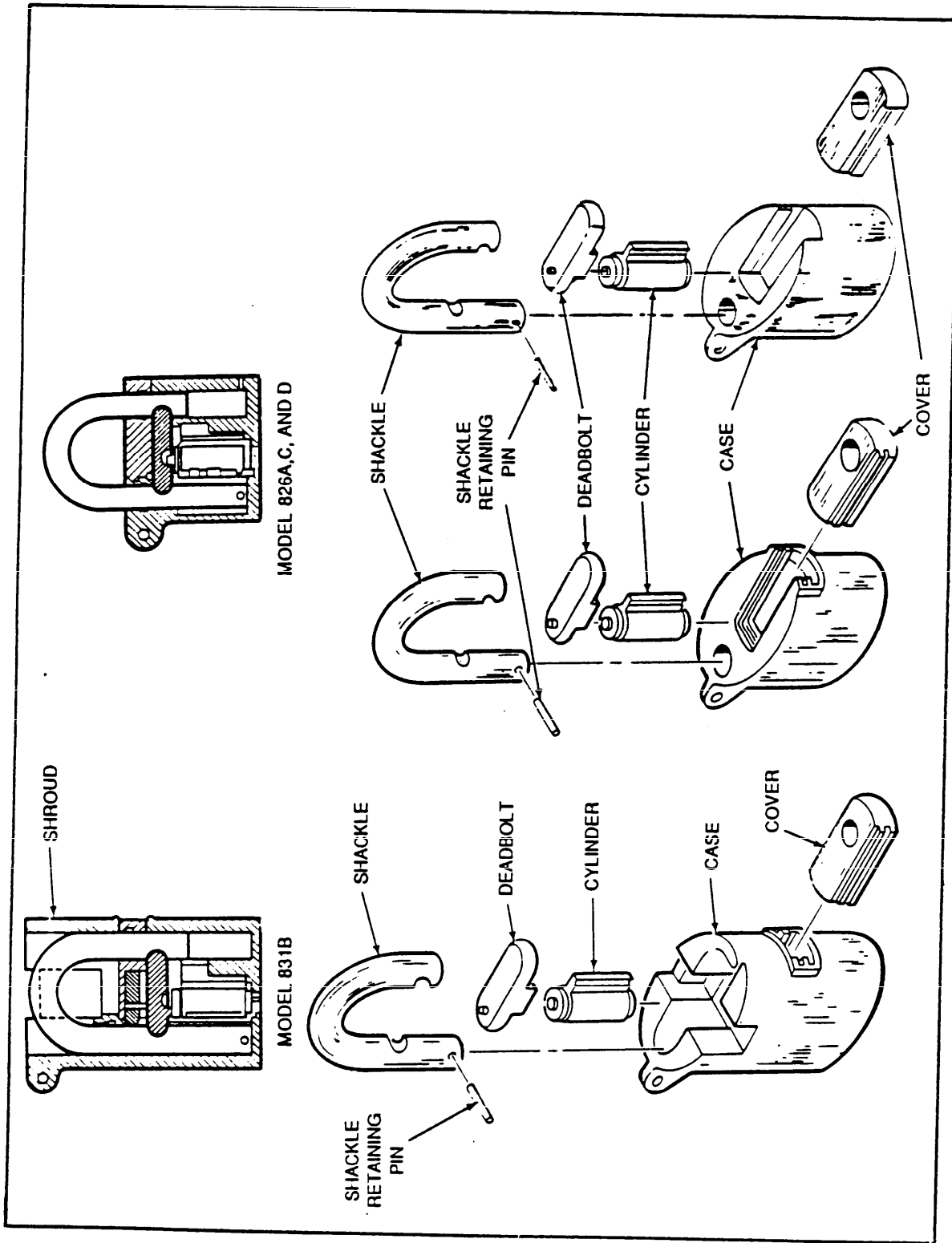


Figure 26
S&G Model 826A, 826C, 826D, and 831B Medium- and High-Security
Padlock Disassembly (Maintenance)

MIL-HBK-1013/7

- j) Inspect all components for wear.
- k) Inspect all keys for wear and cracks. For Army, any cracked or worn key is replaced using replacement keys in accordance with Army Regulation 190-11 and Major Command Policies. For Navy, any worn or cracked key should be replaced in accordance with Paragraph 5.5. For Air Force, any worn or cracked key is removed along with its appropriate cylinder and destroyed in accordance with local security instructions.
- l) Lubricate deadbolt by coating with thin film of molybdenum disulfide grease.

CAUTION

Petroleum based products should never be used
for lock maintenance.

- m) If powder lubricant is used to lubricate cylinder, key may be used to apply lubricant. Dip key into lubricant, then tap key on edge of can to remove excess lubricant. Insert key into keyway and operate cylinder several times.
- n) Insert cylinder fully into case.
- o) Insert control key while using one finger to apply slight downward pressure on cylinder.
- p) Turn key counterclockwise approximately one eighth of a turn between control and locked position.
- q) Insert deadbolt making sure shackle is touching outside of case.
- r) Turn key to control position.
- s) Slide cover onto case.
- t) Turn shackle from locked position approximately half way around and lift shackle completely. Turn shackle back to locked position and drop shackle in place.
- u) Turn key clockwise to locked position.
- v) Remove key. Lock is now ready for use with operator key.

5.2.3 High-Security Padlock Maintenance. Maintenance procedures for high-security padlocks are dependent on type of padlock, either single control or dual control.

5.2.3.1 Single-Control, High-Security Padlock Maintenance. The frequency and instructions for maintenance of the S&G Model 831B are the same as for the S&G Model 826 in Paragraph 5.2.2. The maintenance procedures for the Hi-Shear Model LK1200 high-security padlock are illustrated in Figure 27 and discussed in the following paragraph.

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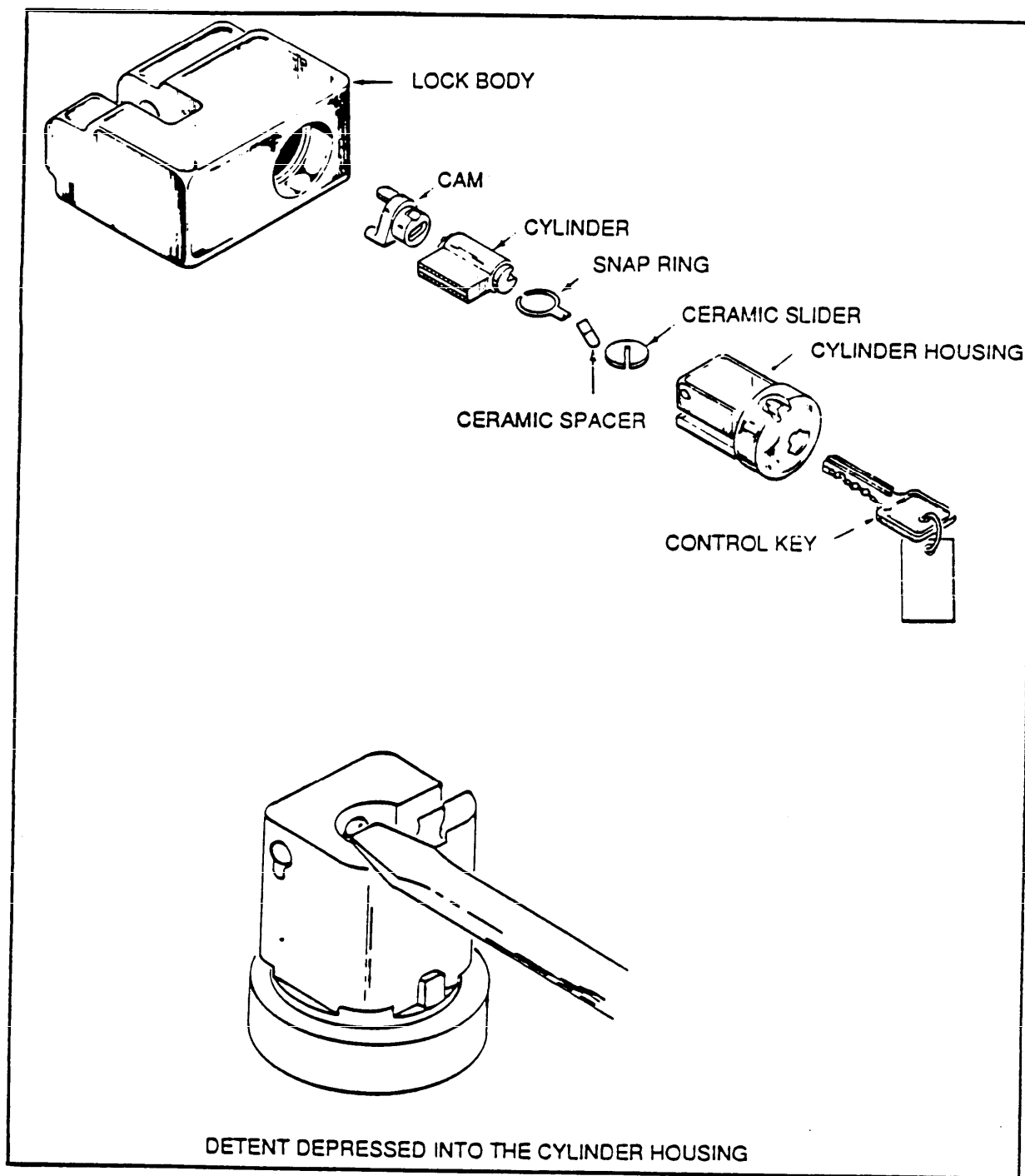


Figure 27
Hi-Shear Model LK1200 High-Security Padlock Disassembly (Sheet 1 of 2)

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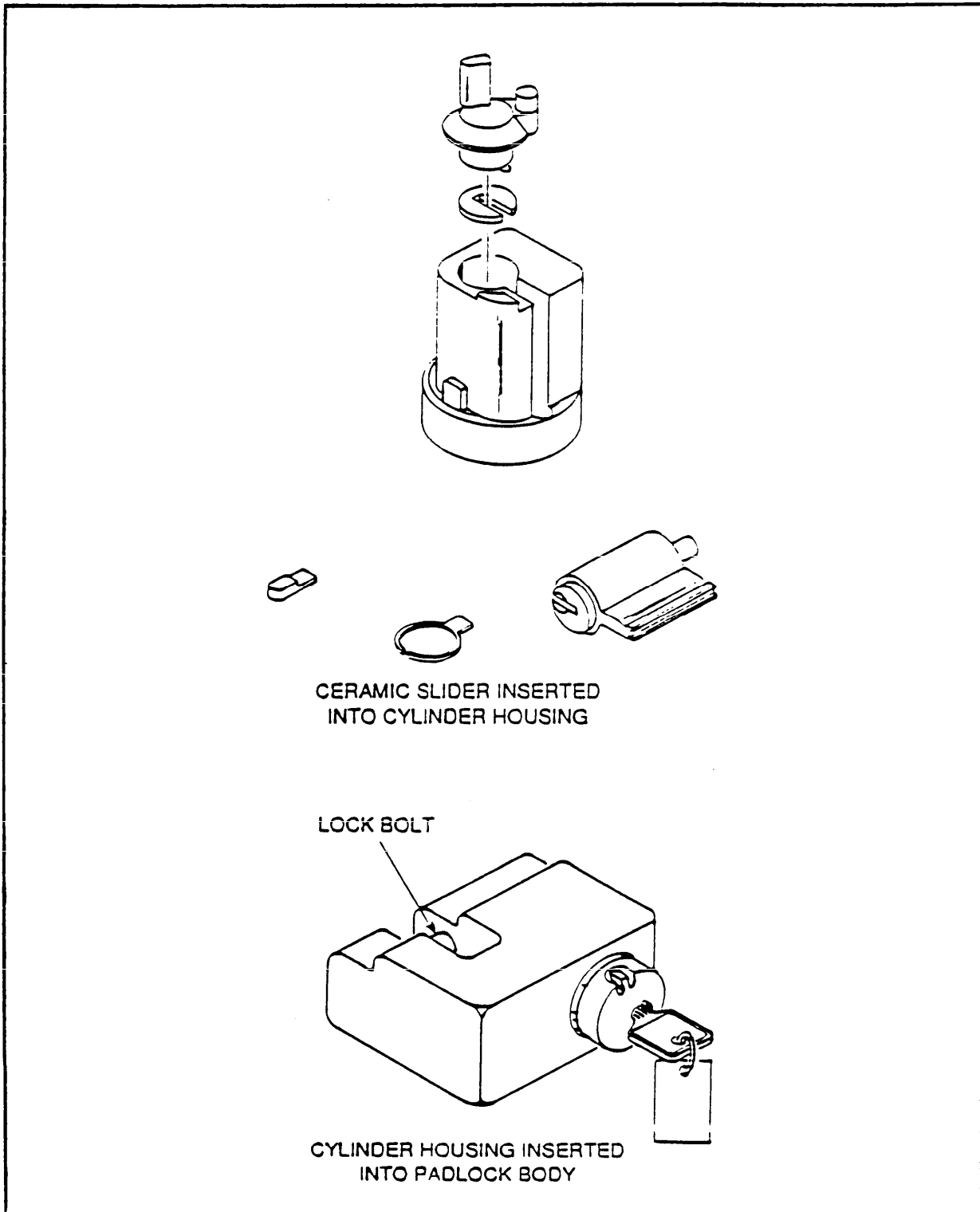


Figure 27
Hi-Shear Model LK1200 High-Security Padlock Disassembly (Sheet 2 of 2)

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CAUTION

Do not attempt to turn key if it is not fully inserted into keyway. If key does not turn when firm pressure is applied, do not force it as this may bend, crack, or break key.

a) Holding padlock in one hand, insert control key fully into keyway and turn it 7 degrees counterclockwise. This action will allow cylinder housing to be removed from lock body.

CAUTION

Do not turn key while pulling it out.

b) After removing cylinder housing, rotate key 7 degrees clockwise to lock position and remove key.

c) Remove cam from end of plug.

d) Use flat 1/4-inch screwdriver to depress ball detent into cylinder housing.

e) Remove cylinder from cylinder housing.

f) Inspect all padlock components for corrosion. If any signs of corrosion are evident, remove with wire brush.

WARNING

Avoid prolonged contact with, or inhalation of, cleaning solvents. Avoid use near heat or open flame, and provide adequate ventilation.

g) Clean all padlock components and cavity of padlock body with approved solvent (Table 8).

h) If powder lubricant is used, dip locking cam in can of lubricant and remove excess lubricant by tapping cam against interior rim of can. Dip key in lubricant in same manner, and insert key into keyway. Move key in and out several times, turning from lock to unlock each time.

i) Insert cylinder into cylinder housing.

j) Insert control key while using one finger to hold cylinder in place.

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k) Rotate control key 7 degrees counterclockwise to control position.

l) Depress housing retaining pins to seat detent.

NOTE

Ensure that lock bolt is fully extended into locked position.

m) Place cam on end of cylinder and insert cylinder housing into padlock body.

n) Turn control key clockwise to locked position and remove.

o) Operate padlock several times with operator key to ensure padlock is functioning properly.

If problems such as those identified in Table 9 occur during normal operation or maintenance of the Hi-Shear Model LK1200 padlock, try the recommended solutions before attempting any other procedures that may damage the padlock assembly. If the padlock still does not operate properly, disassemble the padlock and reassemble it according to the instructions above.

5.2.3.2 Dual-Control, High-Security Padlock Maintenance. Maintenance procedures (disassembly, cleaning, inspection, lubrication, and reassembly) should be performed on the Model 1381 dual-control padlock at 6-month intervals. Under extreme conditions (excessive dust, dirt, or salt spray), shorter maintenance intervals should be established. To perform maintenance procedures on the Model 1381 dual-control padlock, refer to Figure 28 and proceed as follows:

CAUTION

Do not attempt to turn key if it is not fully inserted into keyway. If key does not turn when firm pressure is applied, do not force it as this may bend, crack, or break key.

a) Inspect both keys for cracks, bends, or other irregularities.

b) To unlock padlock, insert key A fully into keyway A. Turn key A clockwise approximately 30 degrees. Insert key B into keyway B. Turn key B clockwise approximately 30 degrees.

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Table 9
Hi-Shear Model LK1200 Padlock Troubleshooting

Problem	Possible Cause	Corrective Action
1. Cannot insert key into keyway to open padlock.	1. Slider has rotated out of alignment with keyway.	1. Use thin blade of screwdriver or similar object to rotate slider so slot is properly aligned with keyway.
2. Cannot replace cylinder completely into cylinder housing cavity.	1. Spacer and/or snap ring have become dislodged preventing cylinder from seating properly.	1. Remove cylinder and reposition spacer and/or snap ring.
3. Cannot rotate control key to control position.	1. Spacer and/or snap ring have become dislodged preventing cylinder from seating properly.	1. Remove cam and cylinder, and reposition spacer and/or snap ring.
4. Cannot remove key.	1. Control key has been rotated past removal position.	1. Rotate control key 180 degrees counterclockwise and remove.
5. Cannot insert cylinder housing into cavity of padlock body.	1. Improper alignment of locating boss on cylinder housing and cavity of padlock body.	1. Rotate cylinder housing until locating boss is aligned with cavity of lock body.
	2. Key not in control position.	1. Turn key to control position.
	3. Lock bolt not fully extended.	1. Extend lock bolt fully.

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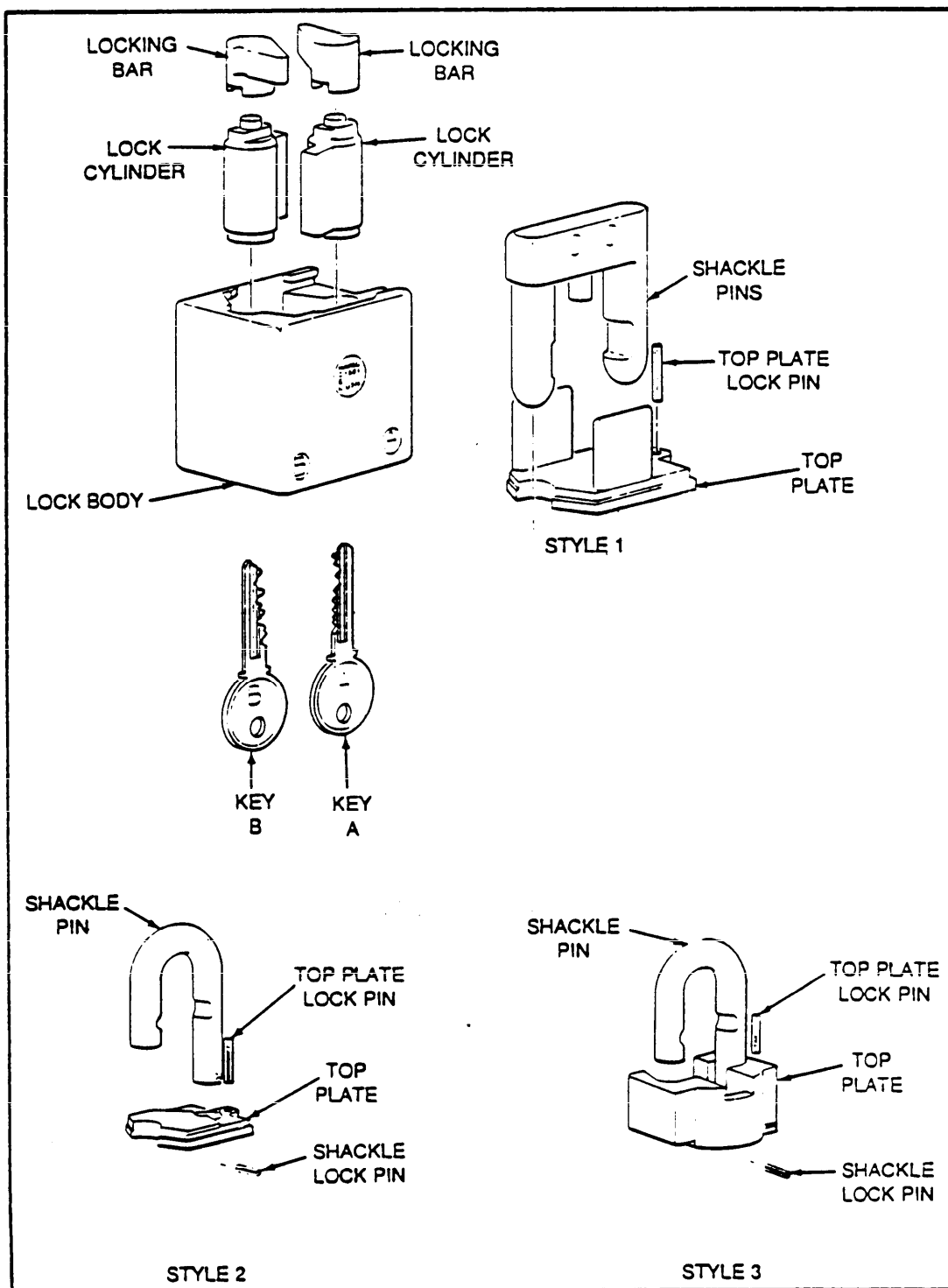


Figure 28
Model 1381 Dual-Control, High-Security Padlock Disassembly (Maintenance)

MIL-HBK-1013/7

NOTE

Keys cannot be removed when padlock is unlocked.

- c) Use 8-ounce ball peen hammer and 3/32-inch pin punch to drive out top plate lock pin.
- d) Remove top plate by sliding it out of body.

CAUTION

Do not turn key while pulling it out.

e) To lock padlock, turn key A or B counterclockwise to locked position and remove key. Turn other key counterclockwise to locked position and remove key.

f) Remove two locking bars and locking cylinders by turning lock body upside down and shaking them out into hand.

WARNING

Avoid prolonged contact with, or inhalation of, cleaning solvents. Avoid use near heat or open flame, and provide adequate ventilation.

g) Clean all padlock components and cavity of padlock body with approved solvent.

h) Insert keys into cylinders, turning from lock to unlock several times. Clean cylinder and key with solvent each time key is removed.

i) Dry all components.

j) Lubricate padlock by spraying locking bars with dry film lubricant (MIL-L-23398B, "Lubricant, Solid Film, Air-Cured, Corrosion Inhibiting, NATO Code Number 50749"). Allow to dry before reassembling padlock. Needle-nose spray head may be used to lubricate keyway, or key may be sprayed and inserted into keyway before drying. If powder is used, dip locking cam in can of lubricant, and remove excess lubricant by tapping cam against interior rim of can. Dip key in lubricant in same manner, and insert key into keyway. Move key in and out several times, turning from lock to unlock each time.

k) Reassemble lock by placing locking cylinders into appropriate cavity.

l) Place locking bars on top of locking cylinders. Ensure that locking bar is in locked position and is fully seated on end of locking cylinder.

m) Slide top plate in place.

n) Check operation of lock by inserting keys and unlocking locking bars several times. Withdraw key between each lock/unlock cycle.

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NOTE

Top plate lock pin can be replaced with standard 1/8- x 5/8-inch roll pin, if necessary.

o) Drive top plate lock pin in until top of pin is flush with top of cover.

5.3 High-Security Locking Device (TUFLOC) Maintenance. Although the TUFLOC is a self-contained locking device and is considered by the manufacturer to be lifetime lubricated, experience has indicated the need for routine maintenance to ensure an effective service life. The disassembly of the TUFLOC is shown in Figure 29.

5.4 Key Identification. Two methods of key identification are used for medium- and high-security padlocks and TUFLOC locking systems. In one method, keys to new padlocks or cylinders have a metal tag with an alphanumeric number stamped on the tag. This number shall be recorded in a key control log. After the number is recorded, the tag shall be destroyed. The second method consists of an alphanumeric number stamped on the bow of the key. This number shall be recorded in a key control log. It is not necessary, nor recommended, to remove this number from the key.

5.5 Key Replacement. For the Army, keys are replaced using replacement keys in accordance with Army Regulation 190-11 and Major Command Policies. For the Navy, requests for key replacements and for additional keys shall be authorized by the Commanding Officer or Officer in Charge of the requesting activity. All letters requesting key replacements, additional keys, or containing keys to be replaced shall be sent by certified or registered mail to the following address.

Commanding Officer
Naval Weapons Support Center (Code 102) (Lock Shop)
Crane, Indiana 47522-5020
Autovon: 482-1354
Commercial: (812) 854-1354

For the Air Force, keys are destroyed in accordance with local security instructions, and the cylinder is retired.

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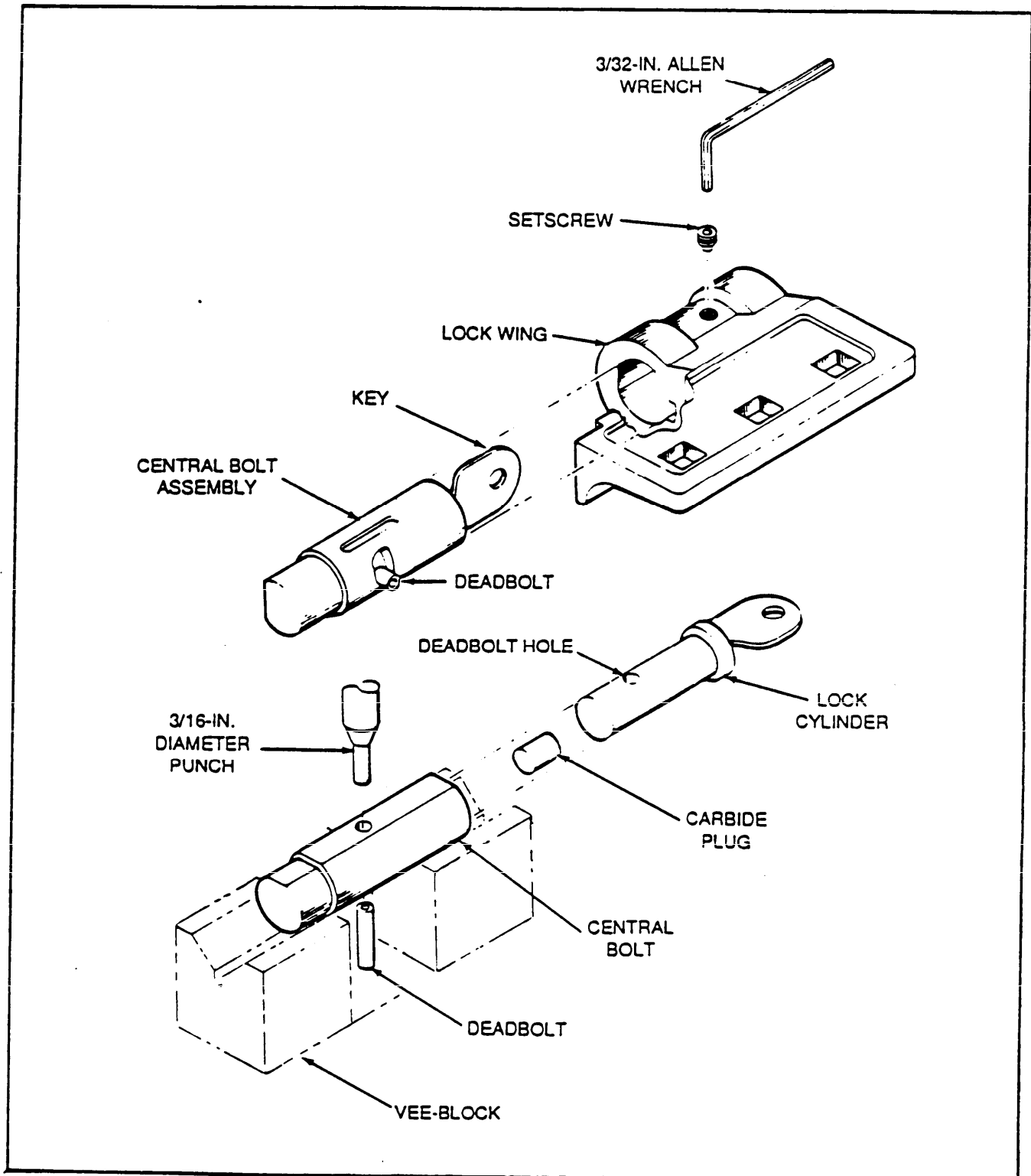


Figure 29
High-Security Locking Device (TUFLOC) Disassembly (Maintenance)

MIL-HBK-1013/7

Section 6: REPAIR

6.1 General. Repairs at the user level are held to a minimum to help preserve the integrity of physical security hardware. Recommended solvents and lubricants to be used during repairs are listed in Table 8.

6.2 Opening Difficult-to-Open Padlocks. The following steps may be helpful in opening difficult-to-open padlocks.

a) Ensure that the correct key is being used and that it is fully inserted. Attempts to turn a key that is not completely inserted into the lock may cause cracking and breakage.

b) If keyway in cylinder is plugged with dirt, salt, or other inorganic matter, flush cylinder with hot water.

c) If keyway in cylinder is plugged with grease, oil, or other organic matter, spray, pour, or brush solvent into cylinder.

d) After keyway is dry and clear of obstructions, place small amount of lubricant on key. Slip key in and out of keyway several times to lubricate interior parts of cylinder.

e) When parts (pin tumblers) are working freely, insert key completely and try opening lock with gentle but firm pressure. If lock does not open, repeat cleaning procedures.

f) Before trying to open lock again, rap lock casing with rawhide or lead mallet. This sometimes loosens bolt and allows lock to open.

g) After employing procedures covered by preceding instructions, and if completely inserted key will still not turn, apply pressure back and forth between locked and open positions. Do not twist key off in cylinder. If necessary, repeat steps b or c, then d, e, and f in sequence.

6.3 Low-Security Padlock Repairs. Repair procedures are not considered practical for low-security padlocks because repair time and cost would exceed lock replacement cost. However, the American 5200 Series padlock shown in Figure 30 has some features that make repair cost effective. With the American 5200 Series, users can set up a custom master or grandmaster key system, change lock cylinders, and replace cut shackles quickly and easily. The cylinder is held in place by a screw which is accessible through the open shackle hole. By removing the screw, the cylinder and shackle can be replaced in a matter of seconds. Replacement cylinders and shackles are available from locksmith supply wholesalers at considerably less than the cost of replacing locks.

6.4 Medium- and High-Security Padlock and TUFLOC Repairs. Specific guidance for troubleshooting the Hi-Shear Model LK1200 padlock is contained in Table 9. The steps in Paragraph 6.2 for opening difficult-to-open locks may prove helpful for medium- and high-security padlocks.

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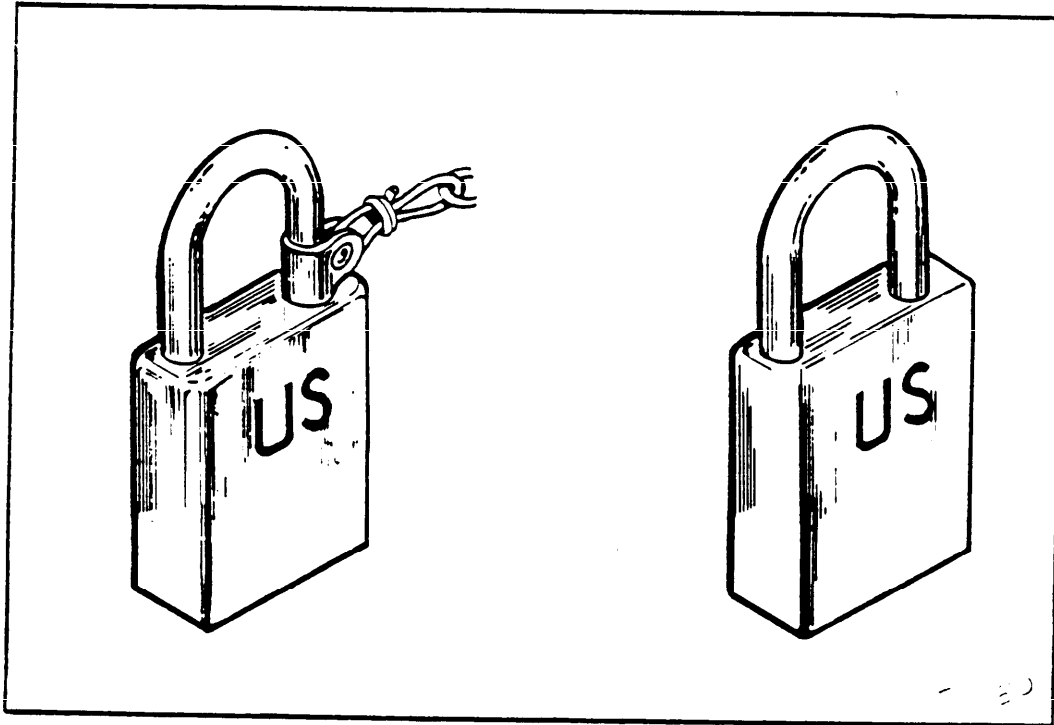


Figure 30
American 5200 Series Padlock

6.5 Army and Air Force Medium- and High-Security Padlock and TUFLOC Failures. For Army and Air Force use, any medium- or high-security padlock or TUFLOC that fails to operate shall be reported to the Defense Industrial Supply Center on an SF 368, Quality Deficiency Report. Defective locks will be retained until disposition instructions have been received.

6.6 Navy and Marine Corps Medium- and High-Security Padlock and TUFLOC Failures. Any medium- or high-security padlock or TUFLOC that fails to operate shall be sent to the following address:

Commanding Officer
Naval Civil Engineering Laboratory (Code L56)
Port Hueneme, California 93043-5000
Autovon: 360-5927
Commercial (805) 982-5927

The Naval Civil Engineering Laboratory will perform a problem analysis, forward the repairable lock for repair, and return it to the user. In the case of the TUFLOC (if the upper and lower wings are not damaged), only the central bolt assembly, with keys, shall be sent. A brief statement detailing the reasons for opening the lock, the procedure used, and all keys (complete or broken) shall be included with the lock or central bolt assembly.

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6.7 Broken Key Extraction. One problem common to all key-operated locks is a key broken off with part of it still in the cylinder. The method for key extraction is dependent on the type of lock.

6.7.1 Low-Security Padlock Key Extraction. The broken portion of the key can be pulled out of low-security padlocks with a key extractor (Figure 31). The barbed end should be inserted into the keyway past the broken key, and the broken key gently pulled out. If a key extractor is not available, one can be made as shown in Figure 32. Often, a broken key can be extracted by gently rapping the side or tip of the lock with a soft hammer or block of wood and gripping the key with needle-nose pliers to remove it, using gentle but firm pressure.

6.7.2 Medium- and High-Security Padlock and TUFLOC Broken Key Extraction. Because of their design, medium- and high-security padlocks and the TUFLOC require keys with deep cuts having sharp angles. Although the keys are made of high-grade material, the deep cuts and sharp angles make the keys subject to cracking. Each time a key is used, it should be inspected for cracks. Any key found to have cracks shall be removed from service and destroyed in accordance with directives. If a key is broken off inside of a cylinder, incorrect attempts to extract the broken key may result in unrepairable damage to the cylinder. The procedure illustrated in Figure 33 shall be followed when extracting a key from medium- and high-security padlocks and TUFLOC's. If available, a skilled locksmith shall be contacted. The necessary tools to be used when extracting a broken key are shown in Figures 31 and 32.

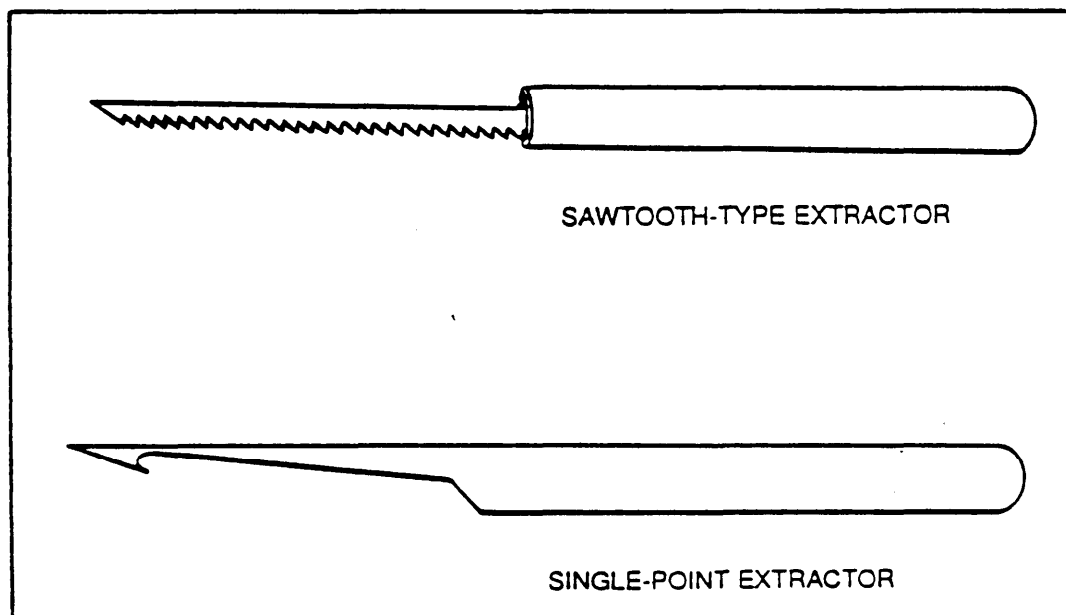


Figure 31
Key Extractor

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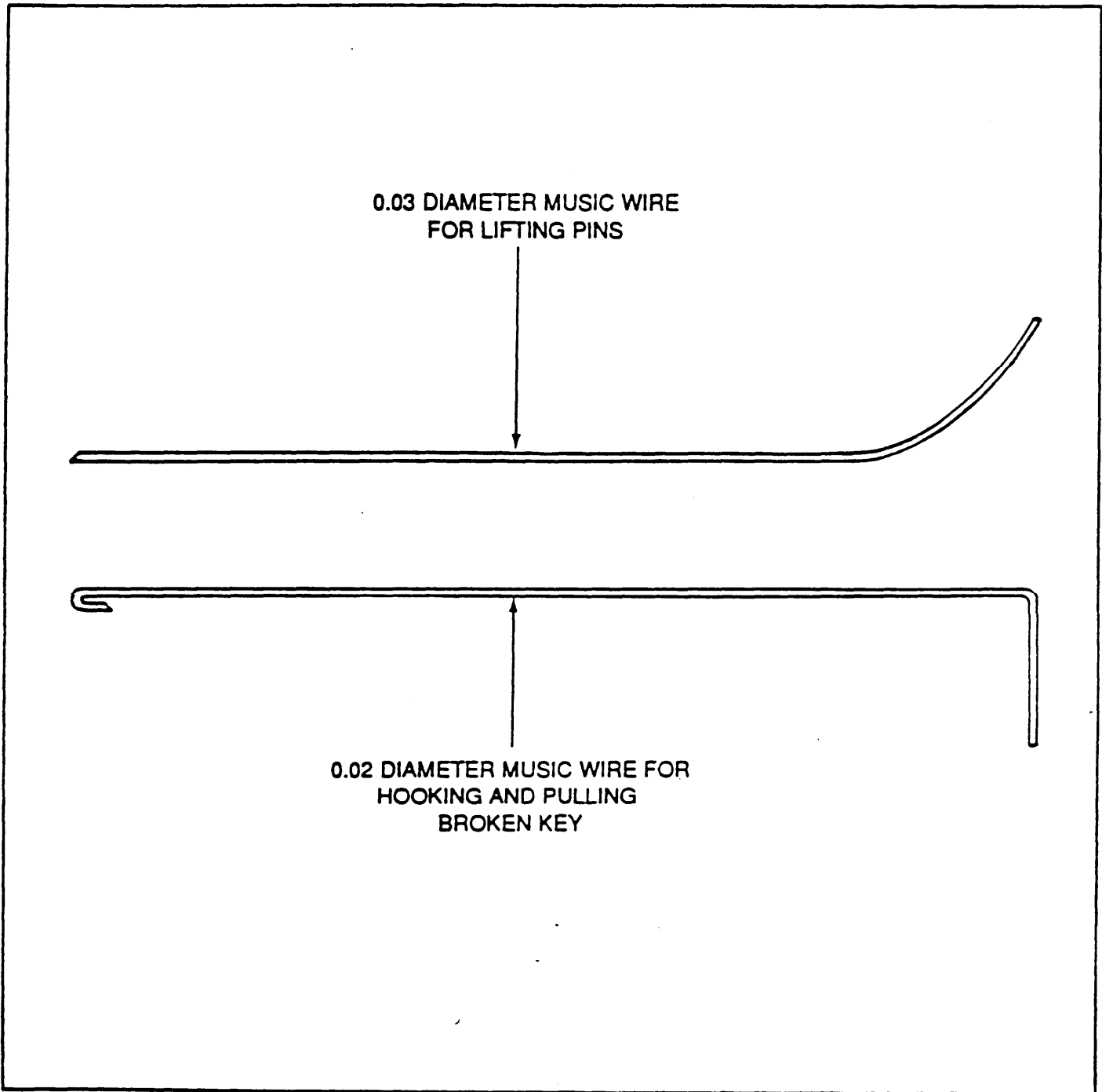


Figure 32
Key Extraction Tool

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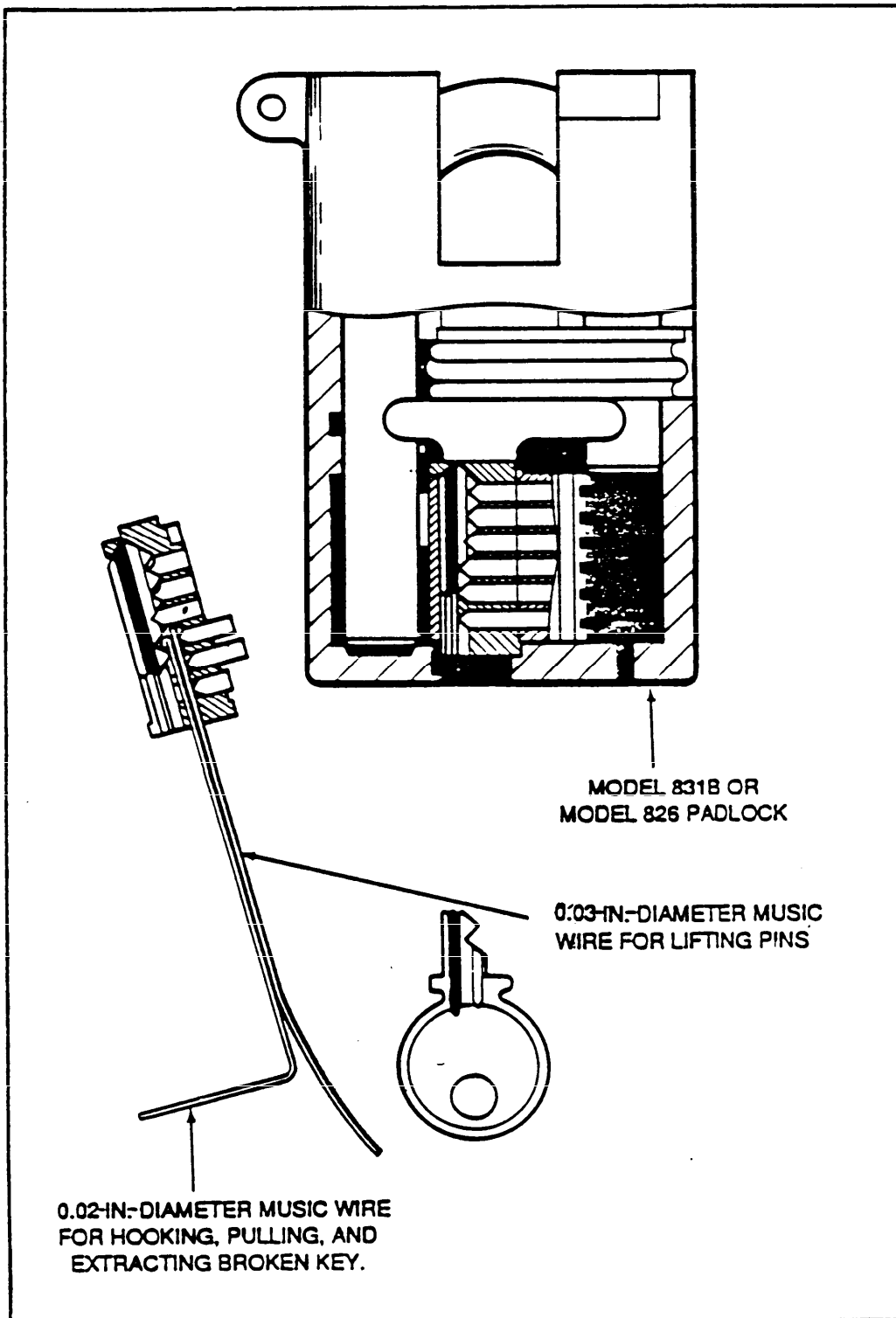


Figure 33
Broken Key Extraction

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Commercial Item Descriptions, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

A-A-472	Hasp, Hinged
A-A-1927	Padlock (Pin Tumbler Mechanism)
A-A-1930	Padlock (Disk or Blade Tumbler)
A-A-1951	Padlock (High Security)

Federal Specification FF-P-101, Padlocks, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

Military Standards, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

MS27965	Hasp, Hinged, Safety, with Swivel Staple Steel
MS27967	Hasp, Hinged-Safety, with Fixed Staple, Hardware, Builder's Miscellaneous, Steel
MS27969	Hasp, Hinged, Open with Fixed Staple, Steel
MS27971	Hasp, Hinged, Double Safety, with Fixed Staple, Steel

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REFERENCES

Military Specifications. Department of Defense activities may obtain copies from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

MIL-G-21164	Grease, Molybdenum Disulfide, for Low and High Temperatures, NATO Code Number G-353
MIL-H-24653	Hasp, High Security, Shrouded for Shipboard Doors and Hatches Using High and Medium Security Padlock, General Specification for
MIL-H-29181	Hasp, High Security, Shrouded, for High and Medium Security Padlock, General Specification for
MIL-H-43905	Hasps, High Security Padlocks
MIL-L-23398	Lubricant, Solid Film, Air-Cured, Corrosion Inhibiting, NATO Code Number 50749
MIL-L-29151	Locks and Lock Sets, Exterior, Ordinance, High Security
MIL-M-7866	Molybdenum Disulfide
MIL-P-17802	Padlocks and Padlock Sets, Low Security, Key Operated, Regular (Open) Shackle
MIL-P-43607	Padlock, Key Operated, High Security, Shrouded Shackle
MIL-P-43951	Padlocks and Padlock Sets, Key Operated, Medium Security, Regular Shackle
MIL-T-81533	Trichloroethane 1,1,1, (Methyl Chloroform) Inhibited, Vapor Degreasing

Military Standards, available from Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

MS21313	Padlock Sets - Individually Keyed and Keyed Alike
MS35647	Padlocks, Key Operated

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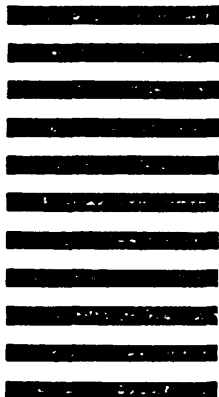
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