Lock picking

A traditional set of pin/tumbler lock lock picks. The two tools on the left are torsion (tension) wrenches. The picks from left to right are: hook pick, half diamond (steep angles), snake rake, half diamond (shallow angles), S-rake pick, double round pick and long double ended pick.

CYL2, device used by former Czechoslovakian State Security StB for lock picking and creating duplicates of common pin tumbler locks

A deadbolt lock that has been picked, showing that the plug has been turned without the key.

Lock picking is the craft of unlocking a lock by analyzing and manipulating the components of the lock device without the original key. In addition, ideal lock picking should not damage the lock itself, allowing it to be rekeyed for later use, which is especially important with antique locks that would be impossible to replace if destructive entry methods were used. Although lock picking can be associated with criminal intent, it is an essential skill for the legal profession of locksmithing, and is often pursued by law abiding citizens as a useful skill to learn or simply a hobby. The move towards combination locks for high security items such as safes was intended to remove the weakest part of the lock: its keyhole.

In normal situations, it is almost always easier to gain access by some means other than lock picking. Most common locks can be quickly and easily opened using a drill, bolt cutters, padlock shim, a bump key, or a hydraulic jack. The hasp, door, or fixture they are attached to can be cut, broken, unscrewed or otherwise removed, windows can be broken, etc. Therefore a lock that offers high resistance to picking does not necessarily make unauthorized access more difficult, but will make surreptitious unauthorized access more difficult. Locks are often used in combination with alarms to provide layered security.

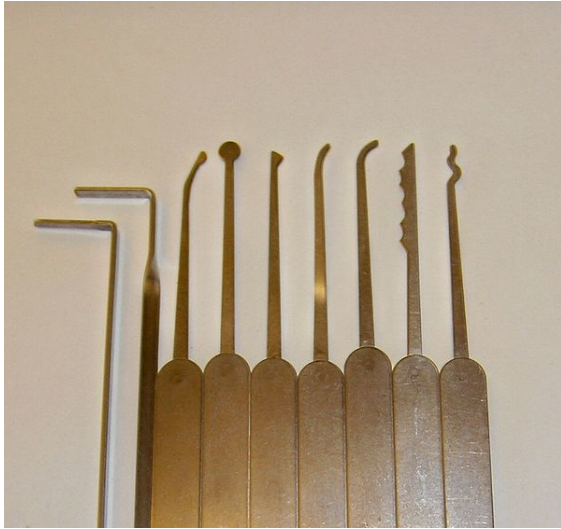Some people enjoy picking locks recreationally, which may be referred to as *locksport*. Lock pick kits can be purchased openly via the Internet. Many different selections are present. Nine-piece sets and a 32-piece set equipped with a *pick gun* (an automated bump key) for example differ in value and price greatly. However, many lock pickers state that for most simple locks, a basic set of five picks (or even a single pick) is enough; therefore it is unnecessary to carry around a wide variety of professional lock picks. Lock picks can also be improvised from common items, or machined at home with relative ease, which is also the case with warded locks.

The process of picking pin/tumbler and wafer locks is concerned with causing the two sets of pins, driver (or top) pins and key (or bottom) pins to separate such that the cylinder will turn. The point at which the pins properly separate when the lock is unlocked is called the shear line. This type represents the vast majority of American and European domestic locks. A different tool set (such as the Hobbs pick) is required for more complex locks
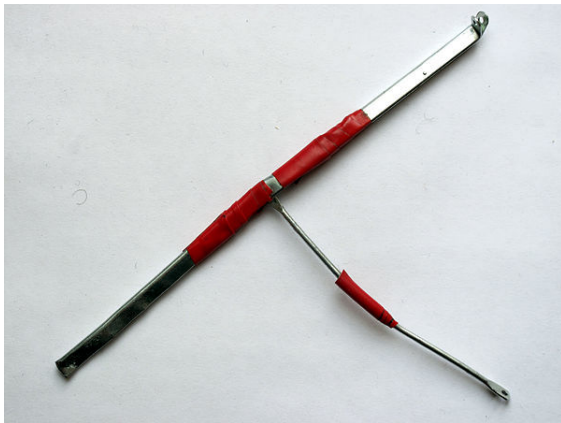
which are not easily fabricated.

1   Tools

1.1   Torsion wrench

A traditional pickset. From left to right: torsion wrench, "twist-flex" torsion wrench, offset diamond pick, ball pick, half-diamond pick, short hook, medium hook, saw (or "L") rake, snake (or "C") rake.

A lock pick made of an umbrella hinge. Used in a car robbery in Helsinki.

The torsion wrench, also known as a tension wrench, is used to apply torque to the plug of a lock in order to hold any picked pins in place. Once all pins are picked, the torsion wrench is then used to turn the plug and open the lock. It is typically shaped like a letter "L", although the vertical part of the letter is elongated in comparison to the horizontal part.

Some torsion wrenches, called "feather-touch" wrenches, are coiled into a spring at the bend in the "L", which helps the user apply constant torque, although this reduces torque control, and thus the feedback available to "feel" the plug rotate.

Other torsion tools, especially those for use with cars, resemble a pair of tweezers and allow the user to apply torque to both the top and the bottom of the lock. These are commonly used with double-sided wafer locks.

High-tech torsion tools exist which sit over the lock face allowing the user to see a display of the amount of torque applied. This aids with the process of feeling when a pin has set, since the torque level will drop suddenly and then spike again as the next pin binds.

The torsion tool is equally important to any other tool in a set, but is rarely represented in fiction. It is not possible to pick a pin/tumbler or wafer lock without a torsion tool, even with the use of a pick gun.

1.2   Half-diamond pick

This versatile pick is included in nearly all kits and is mainly used for picking individual pins, but can also be used for raking and for wafer and disk locks. The triangular-shaped half-diamond is usually 2.5 to 12.2 millimeters (0.098 to 0.480 inches) long. The angles that form the base of the half-diamond can be either steep or shallow, depending on the need for picking without affecting neighboring pins, or raking as appropriate. A normal set comprises around three half-diamond picks and a full-diamond pick.

1.3   Hook pick

The hook pick is similar to the half-diamond pick, but has a hook-shaped tip rather than a half-diamond shape. The hook pick is sometimes referred to as a "feeler" or "finger" and is not used for raking. This is the most basic lockpicking tool and is all that a professional will usually need if the lock is to be picked in the traditional sense rather than opened by raking or using a pick gun. A variety of differently sized and shaped hooks are available in a normal set.

1.4   Ball pick

The ball pick is similar to the half-diamond pick, except the end of the pick has a Half or full circle shape. This pick is commonly used to open wafer locks.

1.5   Rake picks

These picks, such as the common snake rake, are designed to *rake* pins by rapidly sliding the pick past all the pins, repeatedly, in order to bounce the pins until they reach the shear line. This method requires much less skill than

picking pins individually, and generally works well on cheaper locks.

When the pins are excited, they bounce all around the shear line and with the skillful application of a torsion tool this is the easiest way to pick a lock. This is also how beginners start. Advanced rakes are available which are shaped to mimic various different pin height key positions and are considerably easier to use than traditional rakes. Such rakes are typically machined from a template of common key configurations, since not all permutations of pin heights for adjacent pins are possible given the process by which keys are manufactured.

1.6   Slagel pick

The rarely used Slagel pick is mainly used for opening electronic locks. It is often made with small magnetic regions. The Slagel pick is named after James Slagel, a leading security technician for IBM. The Slagel pick works by selectively pulling internal parts of the lock to the correct positions.

1.7   Decoder pick

The decoder pick is a key which has been adapted such that the height of its notches can be changed, either by screwing them into the blade base or by adjusting them from the handle while the key is in the lock. This will allow not only access to the lock but also a template for cutting a replacement key.

1.8   Bump keys

The simplest way to open the majority of pin locks is to insert a key (or variety of keys) which have been cut so that each peak of the key is equal and has been cut down to the lowest groove of the key. This key is then struck sharply with a hammer whilst applying torque. The force of the blow is carried down the length of the key and (operating as does a Newton's cradle) will force the top pins only to jump above the shear line leaving the bottom pins in place. Some modern high security locks include bumping protection such as false setting pins and impact absorbent foam.

Master Lock's "Bump Stop" technology is based upon changing the shape of at least one driver pin to create a gap and prevent it from resting on the key pin below. The resultant gap prevents the transfer of energy from key pin to driver pin during a bump attack.

Ilco's "Bump Halt" technology is centered around changing the mass of at least one driver pin (along with accompanying higher strength spring). The change in mass causes the driver pin to move at a different speed than the others, making it very unlikely that all driver pins can be forced above the shear line at the same time.

1.9   Warded pick

The warded pick, also known as a skeleton key, is used for opening warded locks. It is generally made to conform to a generalized key shape relatively simpler than the actual key used to open the lock; this simpler shape allows for internal manipulations. The keys for warded locks only require the end section which is the one which actually open the locks. The other parts are there to distinguish between different variation of their locks. I.e if you have a chest of drawers with a warded lock you can make a skeleton key for that type of warded lock by filing away all but the last one or two teeth or bittings on both sides of the blade. Additionally, a series of grooves on either side of the key's blade limit the type of lock the key can slide into. As the key slides into the lock through the keyway, the wards align with the grooves in the key's profile to allow or deny entry into the lock cylinder.

2   Pick guns

Main article: Snap gun

Often seen in movies and in the tool box of locksmiths, manual and electronic pick guns are a popular method used today for quick and easy ways of opening doors. The higher-end electric pick guns are usually made of aircraft aluminum and hard steel. The pick is operated by simply pressing a button that vibrates while the normal torsion wrench is being used. A manual pick gun (or Snap gun) is used in a similar way but usually has a *trigger* that creates a movement which (like bump keys) operates on the same principle as Newton's cradle. It transfers sudden energy to the key pins which communicate this to the driver pins causing those pins only to jump, allowing the cylinder to turn freely for a brief moment, until the pin springs return the pins to their locking position. A pick gun is used in conjunction with a torsion tool and the only skill required here is learning the timing.

Manual pick guns come in both *up* and *down* varieties and were patented in the 1920s making them a staple of the film noir and detective fiction generally.

3   Anti-picking methods

To prevent picking of locks, numerous methods have been employed throughout history, in addition to locks which must be reset using a master key if they have been tampered with e.g. the Chubb detector lock. There are many sophisticated methods to break most locking systems.[1]

Today, anti-picking methods include the use of side wards which obstruct the key way and security pins. Security pins are pins which are shaped like a spool, mushroom,

or barrel with the effect that they feel as though they have set when in fact they have not.

One method of overcoming security pins involves reverse picking: the process of first setting all pins above the shear line and gradually reducing torque. Another method is to pick the lock normally, until a security pin gets caught at the sheer line. Once caught, the plug will rotate partially before being stopped by the pin. By pressing up on individual pins with the pick while slightly reducing torque applied to the plug, the binding pin can be located as it will tend to counter-rotate the plug as the pin is being pressed. The pin may be pressed past the sheer line by continuing to push the pin while slowly decreasing torque, careful not to overset the pin, until it pops up.

4   Legal status

4.1   United States

In the United States, laws concerning possession of lock picks vary from state to state. Generally, possession and use of lock picks is considered equivalent to the possession of a crowbar or any other tool that may or may not be used in a burglary. Illegal possession of lock picks is generally prosecuted as a felony under the category of possession of burglary tools or similar statutes. In many states, simple possession is completely legal as their statutes require proof of intent.

In California, locksmiths must be licensed by the state.[2] However possession by laymen may be legal in most states. This is the case because illegal possession must be coupled with felonious or malicious intent.[3] This is also the case in Arizona,[4] Utah,[5] Maine, Massachusetts, New Hampshire, Washington D.C., Washington State, and New York.

4.2   Japan

Japan's law prohibits possession of any lock picking tools and carries a penalty of one year imprisonment or a 500,000 yen fine.[6]

4.3   Canada

In Canada, possession of lock picking tools, with the exception of key duplication tools, is legal. Lock pick tools fit in the same category as crowbars or hammers, meaning they are legal to possess and use unless they are used to commit a crime or if it is shown there was intention to commit a crime. Section 351 of the Canadian Criminal Code criminalizes the "possession any instrument suitable for the purpose of breaking into any place, motor vehicle, vault or safe under circumstances that give rise to a reasonable inference that the instrument has been used or is

or was intended to be used for such a purpose", and carries a maximum penalty of 10 years in prison.[7] Some provinces require a license to carry lock picks.[8] Unlike most laws in Canada, the onus is on the defendant to prove that they have a legal purpose to use the lock picks. The Government is not required to prove that the defendant has an unlawful or malicious intent.[7]

4.4   European Union and Switzerland

Most countries of the European Union do not regulate the possession of lock picks. All responsibility concerning criminal or legal acts using the picks is taken by the user of the lock picks, while the owner of the lock picks may be involved in the jurisdiction or legal process as an accomplice or witness.

4.4.1   Netherlands

In the Netherlands, owning lock picks is legal, but using them on someone else's locks without permission is not. There is a lock picking championship, the Dutch Open (organized by TOOOL), which started in 2002 and features competitors from around the world. The competition is held during LockCon, an annual conference about locks.[9][10]

4.4.2   Poland

In Poland according to Article 129/1 of the Criminal Code:

1. possessing, producing or obtaining a lock pick by a person whose profession and occupation does not require it;

2. delivering a lock pick to a person whose profession and occupation does not require it;

is punishable with arrest, freedom limitation or fine. Paragraph 3 says that a lock pick is forfeited even if it was not the property of the principal.

4.4.3   Hungary

Unusually for a European Union country, ownership of lock picks in Hungary is completely prohibited, even for professional locksmiths. Lock picks are classified as military equipment, and may only be legally obtained or used by Hungary's armed forces.

4.4.4   United Kingdom

In the United Kingdom, a person who carries anything at all with the intent to commit burglary or theft can potentially be prosecuted.[11] The penalty for this can be up to

3 years imprisonment. In the case of items specifically made or altered to be usable in burglary or theft, such as lock-picks, mere possession presumes intent – there is no need to prove it.

4.5 New Zealand

In New Zealand lock picking tools are not illegal, but possession with the intent to use them for burglary carries a potential penalty of three years in prison.[12]

4.6 Australia

In Australia possession of lock picking equipment is legal as long as a reasonable explanation can be demonstrated for such.[13][14]

5 See also

- Hot-wiring
- Physical security
- Safe-cracking
- Security
- Snap gun
- Locksport
- Lock bumping

6 References

[1] Phillips, Bill. The complete book of locks and locksmithing. 6th ed. New York: McGraw-Hill, 2005. Print

[2] "Locksmith Companies and Employees". California Department of Consumer Affairs.

[3] "California Penal Codes, Sections 466–469". California Legislative Information.

[4] "Arizona Revised Statutes Title 13 - Chapter 13 - Section 13-1505". Arizona State Legislature. Retrieved July 10, 2010.

[5] http://le.utah.gov/~{}code/TITLE76/htm/76_06_020500.htm Utah Criminal Code: Title 76 - Chapter 06 - Section 205

[6] "Japan Possession of Lock-picking Tools Act".

[7] "laws.justice.gc.ca/PDF/Statute/C/C-46.pdf" (PDF).

[8] "lockpickcanada.com".

[9] "Lockpicking". Retrieved 7 February 2013.

[10] "Lock pickers hebben slot in paar seconden open", the *Leeuwarder Courant*, 2002-12-02

- "Vito Tieke", *Even Vragen Aan*, the *Algemeen Dagblad*, 2002-12-02
- "Duitser kampioen sloten openen", the *Sp!ts*, probably 2002-12-02
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- "Sloten openen als nieuwe sport", *Dagblad de Limburger*, probably 2002-12-02

Note: the dates of some articles were not available, but considering the fact that newspapers generally report promptly, it can be assumed the given dates are correct. It was also documented on television, in the programs *Hart van Nederland* and on Omproep Friesland.

[11] "Legislation index". Retrieved 2013-06-28.

[12] "New Zealand Crimes Act (1961), Section 223, subsection 1 - Being disguised or in possession of instrument for burglary". Retrieved 2008-03-26.

[13] http://www.austlii.edu.au/au/legis/qld/bill_en/sob2004199/sob2004199.html

[14] https://www.sentencingcouncil.vic.gov.au/sites/default/files/publication-documents/Review%20of%20Maximum%20Penalties%20for%20Preparatory%20Offences%20Report.pdf p18

7 External links

- Map detailing locksmith legislation in different states in the U.S.
- MIT Guide to Lock Picking
- Simple Lock Picking Guide at the Wayback Machine (archived January 6, 2012)
- Guide detailing lock picking legislation in different states in the U.S., includes references

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