Best Practices *for* Preventing Cash Trapping

International minimum security guidelines and best practices

Produced by the ATM Industry Association

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Foreword

Due in part to the success in addressing many types of ATM fraud, cash trapping, a type of ATM crime that goes back many years, has been reinvented and is currently on the rise again in some parts of the world. Cash trapping is a high occurrence, low severity attack vector which normally defrauds customers, one transaction at a time. It is one of the more rudimentary kinds of attack on ATMs. Nevertheless, cash trapping incidents can cause significant inconvenience, disruption to ATM services and dent consumer confidence.

The ATMIA believes this manual will help to reinforce the ATM's Trusted Environment as well as the reputation of the ATM as a safe and convenient self-service banking device.

This manual sets out international minimum security guidelines and best practices for preventing cash trapping at ATMs.

To combat fraud, it is imperative that all ATM deployers in all regions and countries take best practices very seriously and implement all guidelines and best practices contained herein to the greatest extent possible.

ATMIA

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Executive Summary

Please note that this Executive Summary cannot replace reading the whole manual. The summary is merely a guide to the content and main principles of prevention of cash trapping at ATMs.

1. Cash trapping can be defined as any method or device used to deliberately prevent a consumer from receiving all, or some of the cash requested at an ATM.
2. In most cases, consumers are unaware that their cash has been trapped and will often consider that a technical fault has occurred which has prevented them from completing the transaction and withdrawing cash.
3. In addition to the risk of direct financial loss for both consumer and ATM deployer, additional impact can include damage to the ATM itself, negative consumer confidence, significant difficulties in correctly responding to consumer disputes and reputational risk.
4. Cash trapping devices range from those made from simple materials, through basic, but carefully designed traps, to sophisticated electro-mechanical devices.
5. Cash trapping devices and techniques include those attached externally to the ATM and those that are inserted through the shutter of the ATM into the dispensing mechanism, referred to in this document as internal cash trapping.
6. Different cash trapping devices are used to target ATMs with spray dispensers and those which have bunch note presenters. Whether or not a bunch note presenter allows cash to be retracted also influences the type of cash trap used by a perpetrator
7. There are many different designs of cash trapping devices. Each of the main types of trap has different characteristics. Differences include how they are installed, whether they are likely to be visually detected and whether they prevent some or all of the cash from being presented or retracted.
8. Given that there are a large number of different designs of cash trap, constructed from various materials and installed both externally and internally, no single technical solution is likely to address every scenario.
9. Best practices should be adopted to deter, detect and respond effectively to cash trapping in the ATM channel.

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- Author: Douglas Russell, Director, DFR Risk Management Ltd
- Contributor: Dave Lewis, Director, ATM Security, Diebold, Incorporated
- Contributor: David Devine, Global Investigations Manager, NCR

Chapter 1. Definition and Impact of Cash Trapping

Cash trapping can be defined as any method or device used to deliberately prevent a consumer from receiving all or some of the cash requested at an ATM. The person causing the cash to be trapped will normally then remove the trap and the cash, once the consumer leaves the vicinity of the ATM.

In most cases, consumers are unaware that their cash has been trapped and will often consider that a technical fault has occurred which has prevented them from completing the transaction and withdrawing cash.

Different cash trapping devices and methods can cause the ATM system to interpret the event in one of the following ways:

- No cash delivered to the consumer
- Partial amount of the cash requested delivered to the consumer
- All of the cash requested delivered to the consumer

The impact on the ATM deployer and on the consumer being targeted is highly dependent upon how the ATM system interprets the cash trapping event.

In situations where no cash was deemed to have been delivered to the consumer, the system will normally generate a transaction reversal such that the consumer's account is effectively not charged for the transaction. In this scenario, the consumer does not suffer financial loss and is not hindered from performing a subsequent transaction at another ATM. The ATM deployer, however, will suffer financial loss when the cash is removed by the perpetrator.

Cash trapping events that are interpreted as if some of the cash was delivered to the consumer can result in a full or partial transaction reversal which can limit but not necessarily eliminate the financial impact to the consumer. The ATM deployer suffers financial loss when the cash is removed by the perpetrator.

When cash trapping occurs, but the system deems that either there was no such cash trapping event or that the consumer did receive the full amount requested, then the consumer is likely to suffer the full financial loss. The ATM deployer will likely subsequently receive a consumer dispute claim. In this instance, cash trapping is reported by the ATM deployer as an over/under incident.

In addition to the risk of direct financial loss for both consumer and ATM deployer, additional impact can include:

- Brand damage to the ATM deployer
- Direct financial loss for consumer
- Direct financial loss for ATM deployer
- Damage to the ATM
- Negative consumer confidence
- Complex consumer disputes
- Reputational risk

Chapter 2. Types of Cash Trapping Device

Cash trapping devices range from those made from simple materials, through basic, but carefully designed traps, to sophisticated electro-mechanical devices.

Cash trapping devices and techniques include those attached externally to the ATM and those that are inserted through the shutter of the ATM into the dispensing mechanism, referred to in this document as internal cash trapping to distinguish this attack from devices placed in front of the dispenser shutter or cash gate.

Different cash trapping devices are used to target ATMs with spray dispensers and those which have bunch note presenters. Whether or not a bunch note presenter allows cash to be retracted also influences the type of cash trap used by a perpetrator.

2.1. Spray Dispenser Cash Traps

Spray dispensers work by picking and delivering one note at a time, in rapid succession, to the ATM cash tray for a consumer to remove. Spray dispensers have no facility to retract cash and can be targeted using cash traps made from very simple materials. The cash trapping methods used include:

- Hiding the cash from the consumer
- Causing some or all of the cash to jam, out of sight from the consumer

Cash can be hidden from the consumer using simple materials, such as paper, cardboard or plastic, coloured to appear to be part of the ATM cash tray. As the cash is hidden behind the cash trap or fake cash tray, the consumer is unable to view and remove their cash.

Figure 1 Cash Trap for Spray Dispenser (front)

Figure 2 Cash Trap for Spray Dispenser (rear)

The cash trap for spay dispensers shown in Figures 1 and 2 (above) is placed in the cash tray of an ATM in such a way that the consumer sees the grey front of the device while the cash dispensed is hidden from view behind the device.

Cash traps for spray dispensers that cause some or all of the cash to jam before reaching the cash tray include the use of adhesives, such as double sided sticky tape, paper clips and other materials placed into the cash delivery channel.

A secondary attack vector to cash trapping in spray dispensers is glue attacks. Gluing the pocket door closed presents the same outcome, but uses the ATM as the cash trap.

2.2. External Cash Traps for Bunch Note Dispensers

Bunch note dispensers deliver the requested amount of cash in a single presentation after opening the shutter or cash gate. Bunch note dispensers usually have an option to also retract the cash back into the ATM should a consumer not remove the bunch from the presenter.

ATMs that do not retract cash if not removed by a consumer within a period of time are targeted with cash traps of a very similar design as those used to target spray dispensers. In order to successfully prevent the cash from being taken by a consumer, the cash trap is only required to hide the cash from the consumer.

Figure 3 Metal External Cash Trap (front)

Figure 4 Metal External Cash Trap (rear)

Figure 5 Plastic External Cash Trap

Figure 6 Plastic External Cash Trap

The cash traps shown in Figures 3, 4, 5 and 6 are placed in front of the ATM's genuine shutter or cash gate. When the cash is presented to the consumer, the traps prevent the consumer from observing and removing the cash.

As some ATMs are configured to never retract the cash, the perpetrators have an extended time period before having to remove their traps and steal the cash.

ATMs with bunch note dispensers are, however, often configured to retract the cash if not removed by a consumer within a reasonably short period of time following the cash being presented.

In such cases, the perpetrators have limited opportunity to remove their trap and steal the cash before the cash is retracted. In order to extend the time period, the perpetrators need to prevent the retraction of some or all of the notes.

One method used to prevent some (or all) of the notes being successfully retracted once presented is the addition of adhesive to the rear of the cash trapping device.

Figure 7 Adhesive External Cash Trap

Figure 8 Adhesive External Cash Trap

Different types of adhesive are used, including double sided sticky tape and non-hardening 'rat glue'. When the cash is presented, some (or all) of the cash comes into contact with the adhesive substance. As the cash is hidden from the consumer and not removed, the ATM attempts to retract the cash. The adhesive causes at least some of the cash to remain stuck to the cash trap. The perpetrators have an extended time period to return to the ATM and remove their trap and steal the cash.

An alternative method of preventing some or all of the notes from being retracted is to physically 'grab' the cash in a similar way to the operation of a traditional spring loaded mouse trap.

Figure 9 Spring External Cash Trap (rear)

Figure 10 Spring External Cash Trap (rear)

Figure 11 Spring External Trap

Figure 12 Spring External Cash Trap (rear)

Figure 13 Rounded External Cash Trap

Figures 9, 10, 11, 12 and 13 are examples of external cash traps that are mechanically triggered when the cash is presented. Some or all of the notes are held by the trap, thus overcoming the cash retract attempt. The perpetrator has an extended time period to return to the ATM and remove the trap and steal the cash.

2.3. External Electro-Mechanical Cash Traps

More sophisticated external cash traps are electro-mechanical devices that not only hide the cash from the consumer, but actually remove the cash from the ATM's presenter. Electro-mechanical devices effectively emulate the actions of a consumer by removing the cash and completing the transaction.

Figure 14 Electro-Mechanical External Cash Trap (rear)

Figure 15 Electro-Mechanical External Cash Trap (front)

Figures 14 and 15 are an example of an electro-mechanical cash trap. The device is powered by a battery and has a motor and transport mechanism to pull the cash out of the ATM presenter and place it in a storage area.

The perpetrator has an extended time period to return to the ATM and remove the trap and steal the cash.

2.4. Internal Cash Traps for Bunch Note Dispensers

While externally attached cash trapping devices are often effective, and, if well designed and camouflaged, difficult to observe, perpetrators also use cash trapping devices that are inserted into the ATM presenter transport behind the dispenser shutter or cash gate. This can be done from the front of the ATM and does not require access to areas restricted to CIT, service vendor or ATM deployer personnel.

Internal cash traps can be successful in trapping cash whether or not the ATM permits or is configured to retract cash.

Depending upon the actual design of the internal cash trap, all or some of the cash requested can be trapped. The particular design of the cash trap can also allow or prevent some of the cash actually being presented to the consumer.

Figure 16 Internal Cash Trap

Figure 17 Internal Cash Trap

Figure 18 Internal Cash Trap

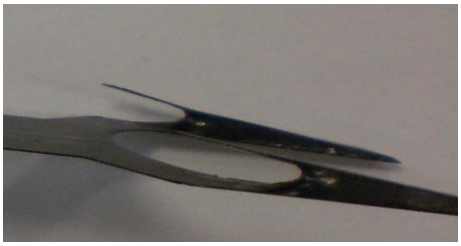

Figure 19 Internal Cash Trap

Figure 20 Internal Cash Trap

Figure 21 Internal Cash Trap

Figures 16 and 17 are an example of internal cash traps that include a blank plate to prevent consumers from observing that with the ATM shutter or cash gate open that cash is within the ATM presenter

transport. The twin hooked tails prevent the ATM from retracting all or some of the cash.

Figures 18, 19, 20 and 21 are examples of internal cash traps which are commonly referred to as 'Cash Claws' or 'Forks'. While the exact design can vary, the claw does not normally allow the cash to reach the consumer. The trailing hooks prevent the ATM from retracting all or some of the cash.

Chapter 3. Characteristics of Cash Trapping Devices

As shown in the previous chapter, there are many different designs of cash trapping devices. Each of the main types of trap has different characteristics. Differences include how they are installed, whether they are likely to be visually detected, and whether they prevent some or all of the requested cash from being presented or retracted.

3.1. Characteristics of Spray Dispenser Traps

3.1.1. Non-Interfering Traps

Spray dispenser cash traps that allow all of the cash to be delivered into the cash tray are normally designed to avoid causing any jam conditions. As the ATM system will believe that the full amount of cash was successfully delivered to the consumer, it is likely that the transaction will appear to have been completed correctly and the consumer's account debited by the full amount requested.

Spray dispenser cash traps are normally attached in a manner that allows rapid attachment and rapid removal. Physical inspection of the ATM cash tray area may identity the presence of the cash trap.

Multiple consumers may have their cash stolen before the perpetrator needs to remove the cash trap.

- No cash jam or error condition
- Consumer charged with amount dispensed
- Rapid attachment and removal of the device
- Possible to observe trap by careful inspection
- Multiple transactions before trap is removed

3.1.2. Interfering Traps

Spray dispenser cash traps that interfere with the delivery of the cash to the cash tray normally cause some cash to be trapped. Depending upon the number of notes requested and the position of sensors in the ATM, it is likely that a cash jam or similar error is generated.

If a cash jam or similar error is generated, the consumer's account may be debited with a portion of the amount requested and / or the transaction may be partially reversed.

While it is possible that multiple consumers may have their cash stolen before the perpetrator removes the trap, it is more common that single transactions are targeted.

- Cash jam or similar error likely
- Consumer charged with portion of amount requested
- Rapid attachment and removal of the device
- Possible to observe trap by careful inspection
- Single transaction more likely before trap is removed

3.2. Characteristics of External Cash Traps for Bunch Dispensers

3.2.1. Cash Not Retracting ATMs

External bunch note cash traps, attached to dispensers that do not retract the cash once presented, may not cause a cash jam or similar error condition. As the ATM system can interpret that the full amount of cash was successfully delivered to the consumer, it is likely that the transaction will appear to have been completed correctly and the consumer's account debited by the full amount requested. There can, however, be a record or log that the cash was not actually removed within a normal time period.

External cash traps are normally attached in a manner that allows rapid attachment and rapid removal. Physical inspection of the ATM cash presenter area may identity the presence of the cash trap.

As the trapped cash is at the exit area of the presenter, it is normal that only a single transaction is trapped before the perpetrator removes the device.

- No cash jam or error condition
- Record that cash not taken in normal time period
- Consumer charged for amount requested
- Rapid attachment and removal of device
- Possible to observe trap by careful inspection
- Single transaction before trap removed

3.2.2. Cash Retracting ATMs

External cash traps targeting ATMs that do retract cash if not removed by a consumer in a reasonable time period will normally cause a cash retract

jam or similar error condition. If some of the cash is successfully retracted, the consumer's account may or may not be debited by the amount requested.

- Cash retract jam or error condition
- Record that cash not taken in normal time period
- Consumer may or may not be charged for amount requested
- Rapid attachment and removal of device
- Possible to observe trap by careful inspection
- Normally single transaction before trap removed

3.3. Characteristics of External Electro-Mechanical Cash Traps

External electro-mechanical cash traps replicate the normal actions of a consumer and the ATM system believes the transaction has completed normally.

- No cash jam or error condition
- Transaction completes normally
- Consumer charged for amount requested
- Rapid attachment and removal of device
- Possible to observe trap by careful inspection
- Multiple transactions before trap removed

3.4. Characteristics of Internal Cash Traps for Bunch Dispensers

Internal cash traps are not observable from the exterior of the ATM.

Attaching an internal cash trap is more complex than attaching an external cash trap. To position the internal cash trap in the presenter transport, the perpetrator needs to have access to the inside of the ATM. In most cases, access is gained by performing a genuine transaction to allow the shutter or cash gate to open. Alternative methods include sabotaging the shutter or its locking mechanism to allow the shutter to be opened, or less commonly, gaining access to the ATM cabinet and the area of the presenter transport not within the security enclosure.

Removal of internal cash traps is also more complex and commonly involves damaging the shutter or its locking mechanism to allow the internal cash trap to be extracted along with the trapped cash.

Internal cash traps can trap all or some of the cash. They can allow some or none of the cash to reach the consumer. They can allow some or none of the notes to be retracted successfully.

Internal cash traps normally cause a cash jam or error condition in the presenter transport.

Internal cash traps that prevent all of the cash from reaching the consumer normally causes the ATM system to reverse the transaction and the consumer is effectively not charged for the transaction. Some traps and some ATM systems do not reverse the transaction and the consumer is charged for the transaction.

- Cash jam or error condition
- Consumer may or may not be charged for the transaction
- Complex attachment often involving prior normal transaction
- Complex removal normally involving damage to the shutter
- Trap not observable from the exterior of the ATM
- Normally single transaction before trap removed

Chapter 4. Technical Solutions for Cash Trapping

Given that there are a large number of different cash traps, constructed from various materials and installed both externally and internally, no single technical solution is likely to address every scenario.

There are also a large number of ATM models supplied by different ATM vendors which have very diverse physical and architectural design characteristics making one particular type of technical solution often more or less applicable to a particular ATM. Third-party solution providers also offer alternative technical solutions to address specific types of traps.

Some examples (in no specific order) of modifications, enhancements and specific anti-cash trapping approaches include:

- Intelligent sensor monitoring during and between transactions that can detect abnormal conditions at the dispenser and send error messages
- Forcing dispenser gate to lock closed when gate tampering is detected
- Enhanced fascia plate to deter devices being placed over the presenter
- Using anti-stick materials in dispenser exit area to prevent against use of glue or double sided tape.
- Low force belt cash present method to combat attacks with adhesives
- Separate retract and divert bins
- Dispensing a single “sacrificial” note or coupon to ensure no traps are attached and that the transport path is clear
- Enhanced dispenser shutters with externally protruding feature
- Strong shutters and locking mechanisms to resist being forced open
- Internal cash trap/cash claw blocker
- ATM independent internal and external cash trap sensors
- CCTV to detect attacks and aid investigation following consumer dispute
- ATM monitoring for cash jams and related error conditions

- Inclusion of module docking and gate tampering alarms
- Effective module docking / positive docking latches
- Additional status monitoring and logging for accurate forensics information

Chapter 5. Best Practice Recommendations

ATMIA members concerned about cash trapping fraud are advised to:

- Perform risk assessments and simulation attacks to determine if their ATMs are susceptible to external and internal cash trapping;
- Engage their ATM and third party hardware and software vendors for guidance on installing and correctly configuring any applicable hardware, firmware and software to address cash trapping;
- Monitor transactions and ATM device behaviour to detect cash trapping attacks;
- Regularly inspect ATMs for physical evidence that might be associated with cash trapping attacks;
- Investigate whether cash trapping is a possible reason for cash shortages at ATMs;
- Use surveillance cameras to record and review activity during ATM transactions, including the removal of cash by consumers at the end of the transaction;
- Review business process procedures to ensure that consumer disputes are appropriately responded to with due consideration given to the possibility of cash trapping;
- Implement rules and solutions without negatively impacting on consumers that genuinely experience a problem during a cash withdrawal transaction;
- Provide safety warning for consumers; and,
- Advise consumers not to remove cash traps. Often, the criminal is standing nearby the ATM.