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THE VALUE OF MICR FOR THE REMOTE CHECK DEPOSITOR

Author:

Michael Pratt
Chief Marketing Officer
Panini

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Executive Summary

We are now in a world where depositing checks to an account is becoming an automated digital process. As we do this, we take on a new responsibility of ensuring that the information on the checks we deposit is presented to our financial institution in a way that allows for the automated processing of those checks and our deposit.

> Remote Deposit Capture (RDC) - *the automated capturing, imaging, balancing, and transmission of check deposits by financial institution business customers.*

As a remote depositor, it is important for you to understand what this means to your organization and how it may influence your choices. Several factors impact the quality of information that a remote depositor conveys to their financial institution. Among those choices, you will be faced with the selection of a hardware device for check image scanning.

The purpose of this paper is to provide you with critical information to help guide your decision making process. Many devices are available and there are substantial differences between the capabilities of these devices. One of the more significant, if not the most significant, is the ability of the hardware device to accurately read information encoded on the bottom of the check. This information is printed with a special ink and is commonly referred to as the 'MICR line'. The focus of this document is to help you understand the significance that the MICR line has on your remote check deposit.

The paper is organized in distinct sections so the reader may read the entire paper, or peruse only those sections of interest.

In Section I, we provide a brief overview of Check 21 and the major technology innovations Check 21 fostered, including Image Exchange, Branch Item Capture and Remote Deposit Capture. At the conclusion of this section you will have an understanding of why the adoption of distributed capture is important to you and your financial institution.

In Section II, we will provide a brief tutorial on MICR. We will then discuss the importance of MICR, how MICR reading devices work, and provide an explanation of why MICR is important to check processing.

In Section III, we will discuss why there is a relationship between remote check deposit and the ability to properly read MICR. We will cover the types of distributed check capture devices and discuss their MICR read capabilities. At the conclusion of this section, you should have an idea of the types of devices and the overall cost implications of OCR only devices on remote deposit capture.

In Section IV, we will introduce other related topics, such as fraud loss prevention, back office conversion of checks, and why MICR is required for these applications.

After reading this paper you should have an understanding of the value of MICR, its importance to remote deposit capture, and why you should use devices that are specifically designed with the built-in capability to read MICR.

Section I - CHECK 21 AND RELATED INNOVATIONS

A. Check 21

On October 28, 2004, the Check Clearing Act for the 21st Century, or Check 21, became federal law, designed to provide a faster and more efficient process for banks to clear and settle checks. Instead of physically moving paper checks from one bank to another, Check 21 allows banks to capture a digital image of the front and back of the check, along with the associated payment information, and transmit this information electronically.

The intent of Check 21 is to foster innovation in the payments system and to enhance its efficiency by reducing some of the legal impediments to check truncation. The law facilitates check truncation by creating a new negotiable instrument called a substitute check, which permits banks to truncate original checks, process check information electronically, and to deliver substitute checks to banks that want to continue receiving paper checks.

When a bank or its customer requires the paper check, the bank can use the electronic image to print a paper "substitute check." This process enables banks to reduce the cost of physically handling and transporting original paper checks, which can be very expensive.

B. Substitute Check

A substitute check is a paper copy of the front and back of the original check and is slightly larger than a standard personal check so that it can contain a picture of the original check. A substitute check must be printed in accordance with very specific standards[1] so that the substitute check can be used in the same way as the original check. Substitute checks are commonly referred to as Image Replacement Documents or IRDs.

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[1] ANSI X9.100-140:2004

Front view of a substitute check

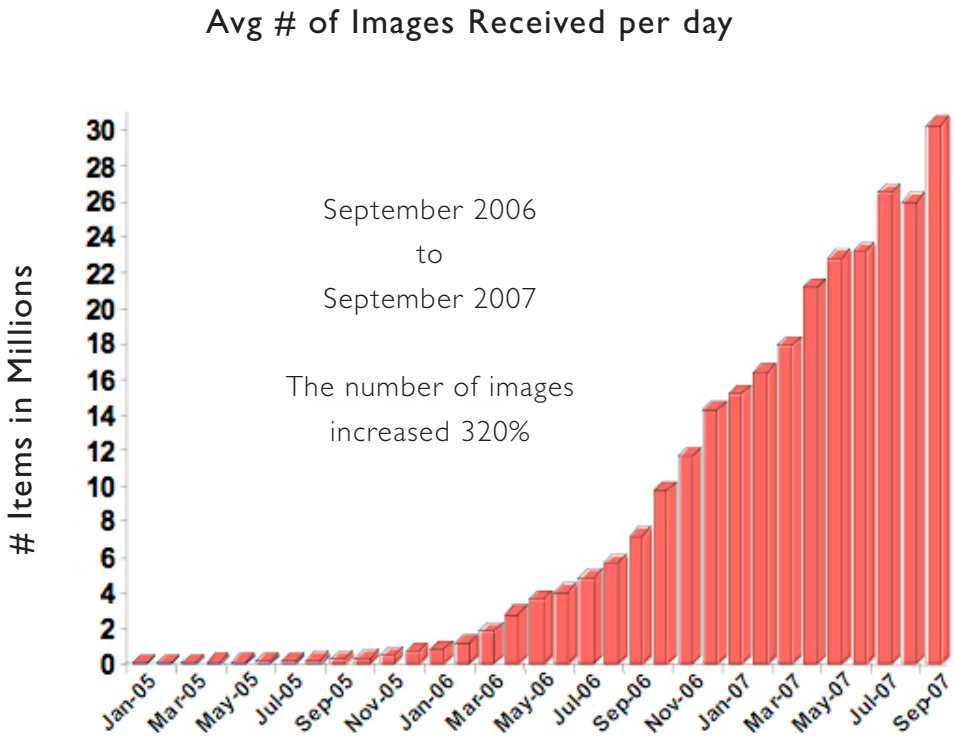
Back view of a substitute check

For clearing purposes, a substitute check has the same legal attributes as the original check if it accurately represents the information on the original check and includes the following statement: "This is a legal copy of your check. You can use it the same way you would use the original check." The substitute check must also have been processed (endorsed) by a bank.

C. Image Exchange

Since Check 21 legitimized the image of a check for deposit and clearing, it became obvious to the financial industry that as image technology matured, it would become far less expensive to electronically move an image of the check versus physically moving the actual check or IRD.

Changing the entire check processing infrastructure from an optimized paper process to an optimized check image process is an intensive effort. However, most of the larger financial institutions and processors have made the change and check image exchange volume is now growing rapidly.



Source: Federal Reserve, NCHA, SVPCO and local / regional exchanges

Why is this growth important? As volume grows, using image for the clearing and settlement of checks between banks is significantly lowering check processing cost. In addition to these industry savings, there are potential savings for you, the depositor.

It is far easier to electronically transmit a digital image of the check and much more cost effective than the cost of transporting the original paper check. The further away the check is from the bank, the higher the transportation cost. It is intuitively beneficial to capture a digital image of the check as soon as possible, and use that image to enable electronic deposit and clearing. As a result, customers and banks are moving aggressively to implement imaged based distributed capture check services.

D. Branch Item Capture (BIC)

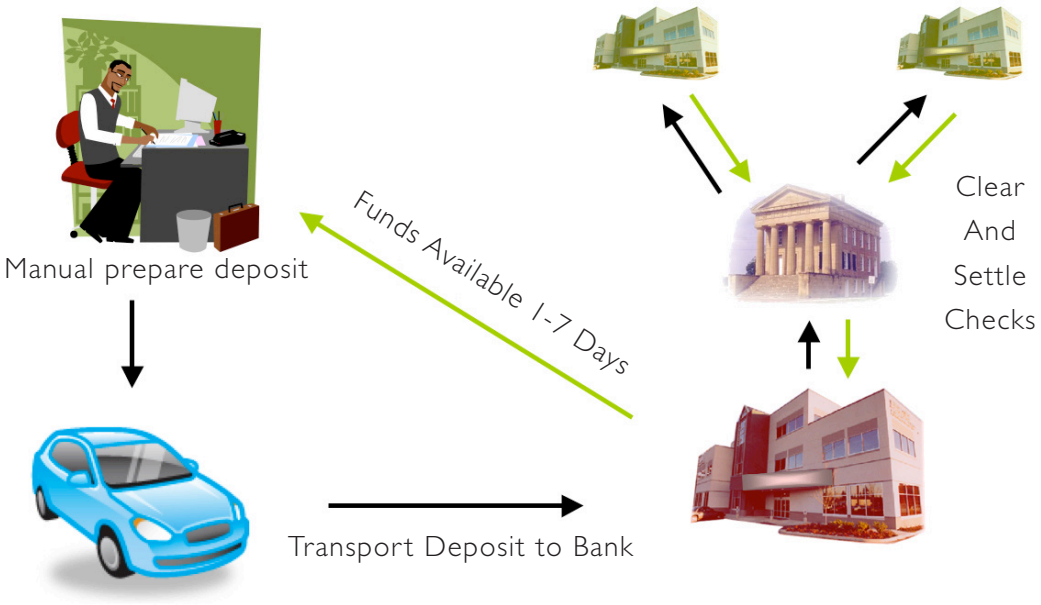
In addition to image exchange, the industry was initially focused on Branch Item Capture - the process of capturing and truncating check deposits at the bank branch. In the early stages of this new market, the volume of image exchange was low and this negatively impacted the growth of BIC. Today, however, most checks can be cleared and settled using image exchange and the cost savings of a successful image exchange infrastructure is now established. The business case for Branch Item Capture (BIC) is now very compelling, and many banks are moving aggressively forward with plans to implement BIC.

E. Remote Deposit Capture (RDC)

Check 21 also enabled a new application called Remote Deposit Capture (RDC) - the automated capturing, imaging, balancing, and transmission of check deposits by business customers of banks. In most cases, the business case for RDC was very positive and the subsequent adoption of RDC by business customers has exceeded initial expectations.

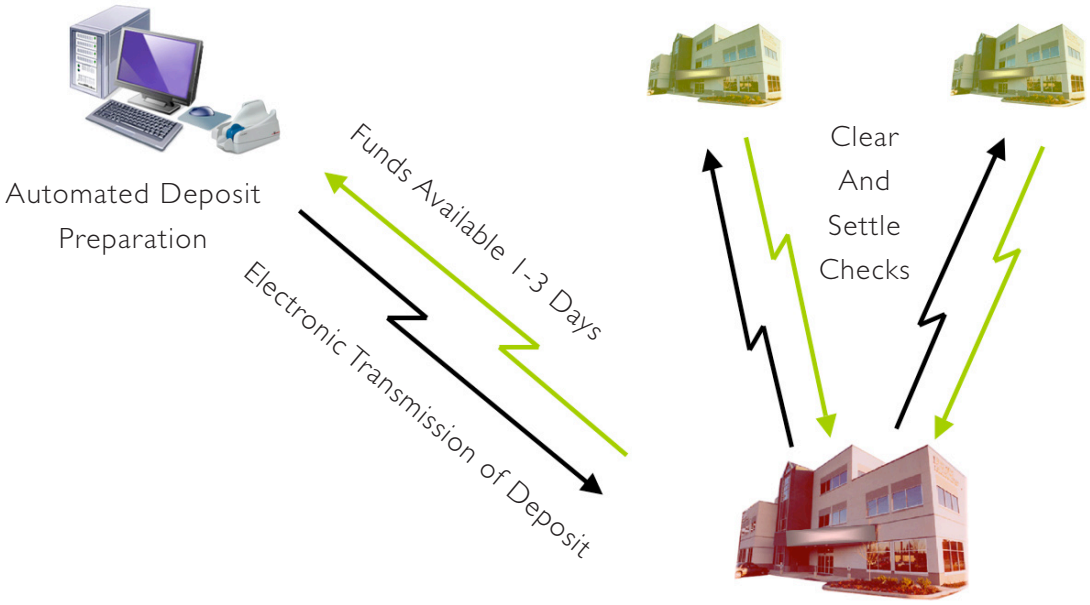
If you do not use RDC today, you have the costs of manually preparing and verifying your deposit at each of your locations, and the labor and transportation costs associated with the trip to the bank branch. In many cases the availability of the funds in your deposit are delayed as a result of this manual process, and deposits are constrained by the cutoff hours at the bank branch.

Current Manual Deposit Process



Customers who use RDC to make their deposits receive several benefits, including a reduction in deposit preparation times, elimination of transportation and labor costs, and will often receive the benefit of faster access to deposited funds, improving cash flow for the business. In addition, deposits can be made at times that are convenient to the business.

Customer Depositing with RDC



It is easy to see where RDC benefits both you and your bank.

Section II – MAGNETIC INK CHARACTER RECOGNITION (MICR)

A. Brief Tutorial On MICR

Since RDC includes the remote capture and imaging of checks and since MICR encoding is an important component of a check, a brief tutorial on MICR is appropriate. MICR represents a special character set created with a special magnetic ink. Using this character set and ink, information is placed in a specified area of the check so it can be read by a machine designed specifically to interpret this information.

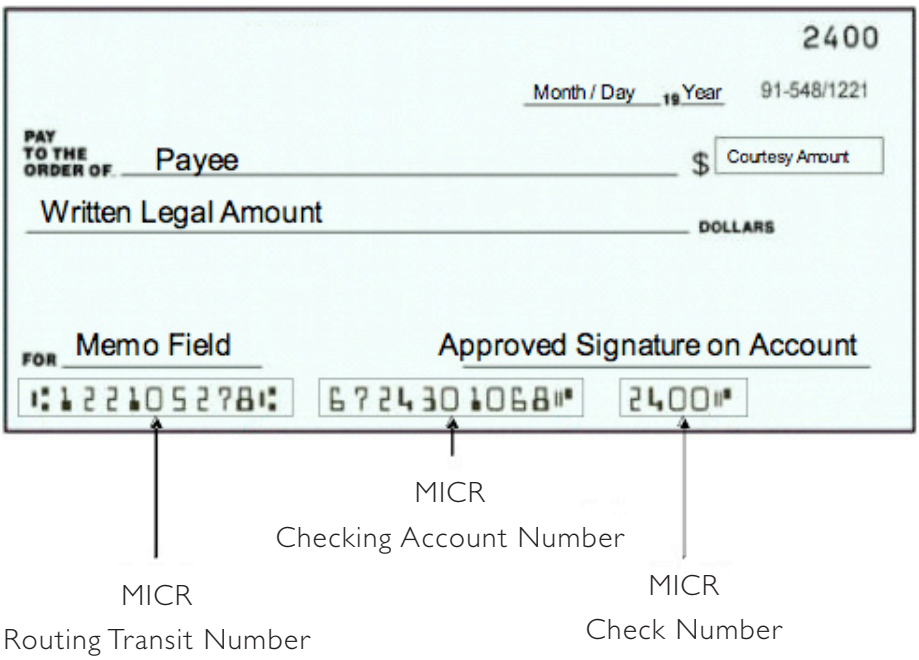
MICR technology was developed in the 1950s to address the growing volume of checks being used in the United States. The American Banking Association (ABA), in cooperation with Stanford University, developed a set of fourteen unique characters called the E-13B MICR Font. The combination of the magnetic inks and machine readable fonts was accepted as the standard method for encoding checks by the American Banking Institute. The American National Standards Institute (ANSI) certified the method in 1963, adopting E-13B as the U.S. standard for MICR printing.

MICR provides the critical foundation to automate check processing. It helps determine if the check is legitimate and provides data for upstream automated processes such as production of checking account statements. Being able to properly read MICR encoding from checks is a critical prerequisite to an efficient check deposit and clearing process.

B. How MICR Readers Work

E-13B MICR characters are printed in ink or toner containing metallic particles. When magnetized, the particles emit a signal that uniquely identifies each of the fourteen characters. The shape of the signal is developed from the character's horizontal/vertical attributes, and the amount/distribution of the material in the ink or toner from which the character is formed. MICR check readers measure the strength of the electrical signal emitted and reject the check if the shape and/or signals of the characters do not meet the specified standard.

Standard MICR Fields



C. Explanation of Why MICR Is Important

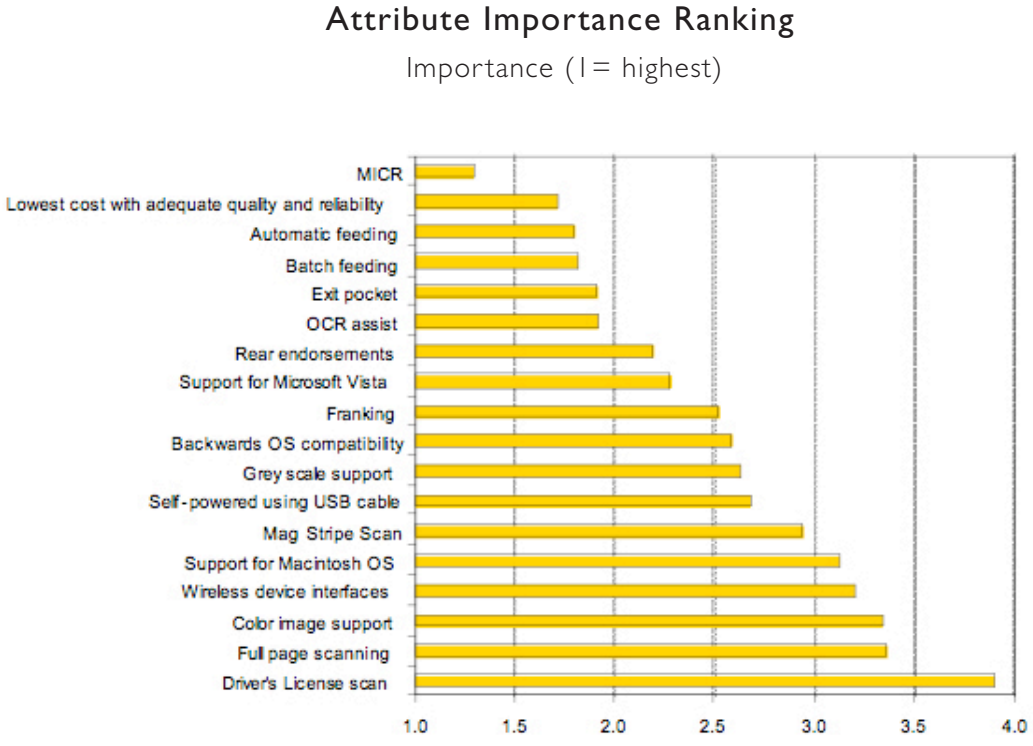
To help understand why MICR is important, it is useful to consider why consumers and businesses write checks. Consumers, small business, retailers of all size, corporations and government entities all write checks for multiple reasons. They pay bills, make payroll, and purchase goods & services. In addition, there are several unique reasons for businesses to write checks including use of checks as an additional way to access lines of credit, payment of claims, pricing rebates, bank issued cashier checks, and many more.

From the normal use to the unique, critical information is encoded on the check using MICR technology. For consumers the key field is the check number. Consumers use the check number to make sure that recorded information in the check book register equals the amount paid by the bank for that check, to verify who the check was paid to, and to order the checks for reconciliation to the check register.

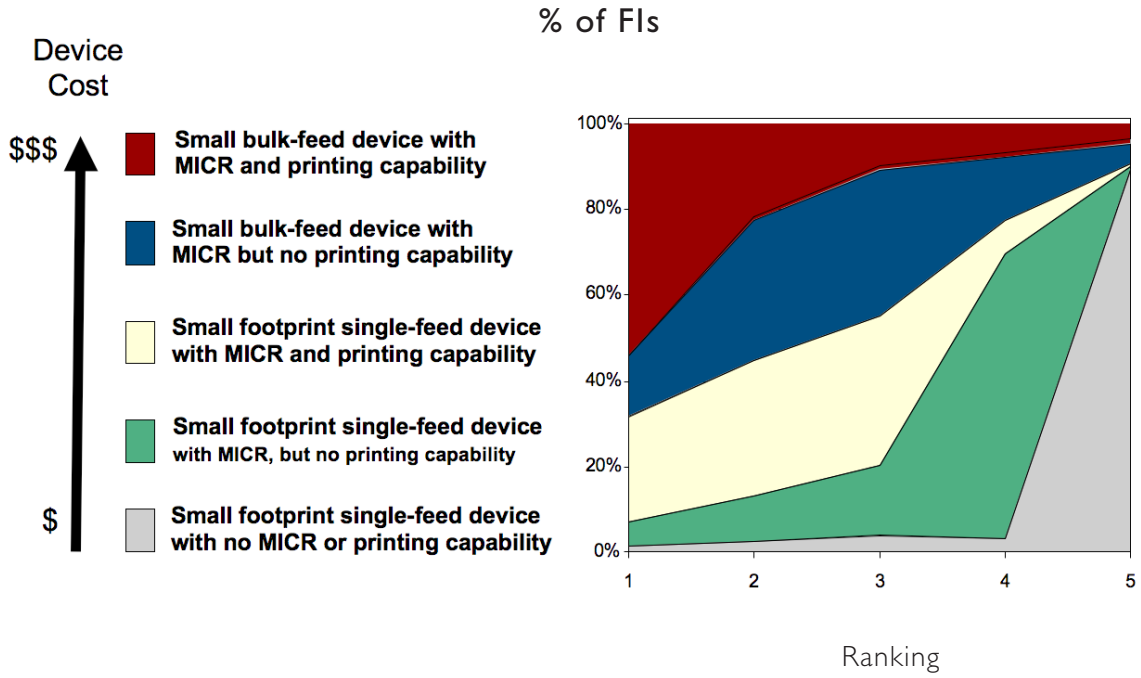
Businesses have multiple unique uses for MICR encoding on checks and the specifications for MICR provide for auxiliary fields to accommodate these needs. The reasons can be as simple as check number verification or as complex as providing the business with the payee account number, check issue number, general ledger cost center, etc. It is clear that businesses, consumers, and banks rely heavily on information encoded in the MICR line of checks.

D. Research Supporting the Importance of MICR

Panini recently conducted a survey to financial institutions across all tiers in the US with 147 banks participating in the study. Their responses confirmed the importance of MICR, which was ranked as the most important product attribute of remote deposit scanners.



In addition, the survey revealed that financial institutions would pay more to ensure that MICR was included on scanning devices.



To understand why banks place such a high importance on MICR, consider the following questions. What would happen if the information on the MICR line was wrong for the checks you deposit? Would it have an impact on your relationship with your consumer? The inability to properly read the MICR encoded information, or not having the ability to read it at all, will create significant disruption for you and your customers. It is so important that prior to RDC, banks invested heavily to create both automated and manual processes to ensure that the MICR line was correct on your deposits.

Section III – THE CRITICAL RELATIONSHIP OF MICR AND RDC

A. How Distributed Capture Impacts MICR

The banking industry has expressed concern that distributed capture may negatively impact the accuracy of the MICR encoded data. The concern over the accuracy of MICR is valid given that the check capture process is being moved from the stability and security of a centralized bank managed environment to remote capture at the customer's office.

The cost of a distributed capture device must be affordable to business users. To accomplish this, there may be some sacrifice in component quality when compared to the banks highly tuned centralized MICR reader/sorters. In addition, as RDC has matured, economics continue to apply downward pressure on the price of the distributed capture hardware scanning devices.

Banks have made large investments in creating processes and employing personnel who are specialists at verifying the accuracy of the MICR line. In contrast, a business RDC user does not have (nor should they) this level of MICR knowledge. Since RDC places check capture outside of the bank, the probability of error may increase dramatically. Considering all of the issues, if you select the wrong device, you may be forced to put controls and/or correction procedures in place or pay your bank to ensure the accuracy of MICR.

B. Distributed Capture Devices

There are two basic ways that distributed capture solutions read the MICR encoding on a check:

1. A capture device that does not provide the ability to read the specialized MICR ink. Only an image of the check is captured. Desktop scanners associated with common office equipment represent this type of device.

2. A capture device that does provide the ability to read the specialized MICR ink and character set.

Both types of devices may have a rated speed in documents per minute. The second type of device is normally designed specifically for check capture and will generally have a Document Per Minute (DPM) rating between 30 DPM to 120 DPM. The higher the rating, the faster the device can process checks.

No hardware / software combination can guarantee a 100% accurate read rate for MICR information. Some configurations and devices work better than others.

Not all distributed capture devices deliver the same proficiency at reading MICR from a check. When evaluating device performance in the critical area of MICR reading, the following factors should be considered:

- MICR accuracy read rate
- MICR misread rate
- Manufacturer industry experience with MICR reading
- Manufacturer technology employed to optimize MICR read rates
- Verification of MICR read with Optical Character Recognition software (reading MICR via a magnetic read and an optical read to improve accuracy).

Distributed Check Capture Devices

Capture Device - No MICR

Capture Device - With MICR

C. MICR Rejects

When a device is used that cannot read MICR, the only way to automate the reading of the MICR is to utilize an optical character recognition (OCR) software process. Computerized software examines each check image for the specialized MICR character font and returns the interpreted value from the OCR application. Reading information from the check using OCR software may make the device less expensive. However, based on initial market deployments, industry commentary, and Panini's own in-house testing, the read rate is substantially less accurate than devices that have MICR reading capability built in. As a result, a higher percentage of read errors will require incremental labor to perform manual corrections. If the error is not caught early in the process, the correction becomes expensive and can negatively impact customer service levels.

> MICR Reject – When a transaction is halted because one or more of the characters in the MICR string cannot be read. For example, a MICR reading device or an OCR only device could determine that the fifth position in the digit stream '12345' cannot be read. Both devices would return a value of '1234?' and the operator will need to manually key the fifth digit.

Both OCR and MICR devices will return a character-by-character acknowledgment of the read result. Both reading methods (OCR and devices with a MICR read capability) will make mistakes. However, a higher error rate is more likely when using OCR only compared to a device with a specialized MICR read capability.

When comparing the application read result versus the actual information on the check, the accuracy of an OCR read rate generally falls into the 80% - 98% accuracy range, depending on the quality of the OCR software and document image. This means that 2% to 20% of checks will be rejected. When a quality MICR read device is present, the accuracy range generally falls between 98% - 99.7%.

D. MICR Misreads

In addition, both reading methods (MICR and OCR) might indicate a value that is, in fact, incorrect. This is called a misread, and this error can be very expensive to correct. For example, if the number 12345 in the MICR line on the check is read as 12355, the read of the MICR information is assumed to be accurate. This could create situations where the check is processed based on inaccurate information, resulting in costly downstream processing errors and potential customer service situations.

MICR Misread – When one or more characters in the MICR string is read incorrectly.

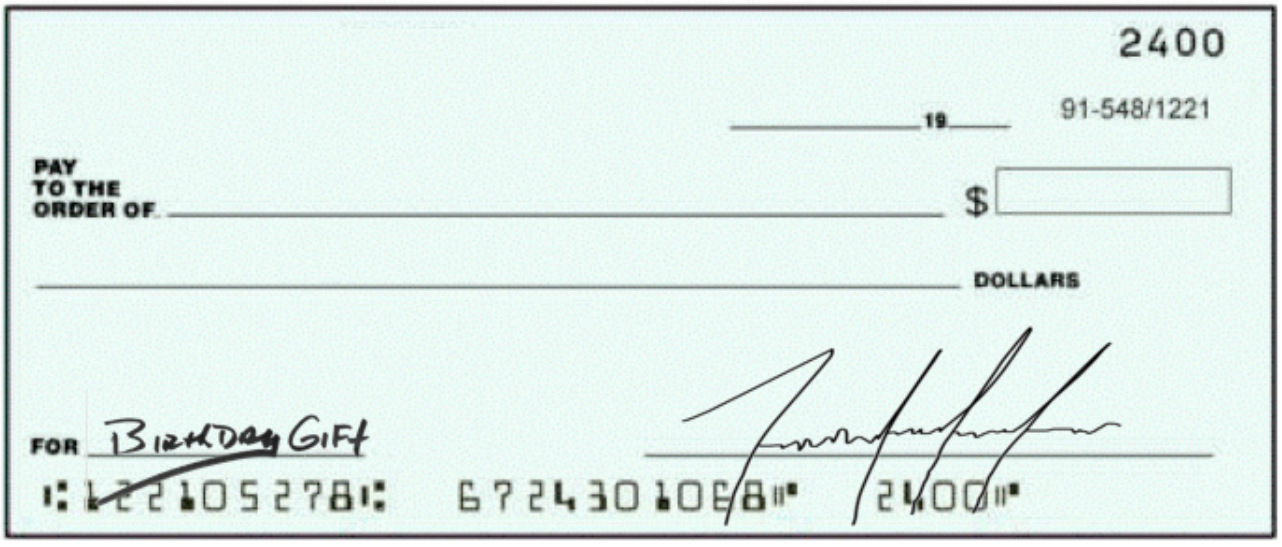
When using a device with MICR read capabilities the rate of this occurrence is very low. When using OCR, the rate has been shown to be higher. There are several reasons for this:

1. OCR cannot detect the specialized MICR ink.

2. OCR's ability is limited to what it can deduce from the image of the MICR, and is inherently dependent on the quality of the image, the quality of the OCR software, and the tuning of the OCR software.

3. Any marks on the check can interfere with OCR's ability. One classic example is the signature or memo field on the check. In both cases it is very easy for the customer to write in the MICR area.

Signature/Memo Over MICR Line



E. Implications of Not Capturing MICR

Since OCR has a higher MICR read error and misread rate, the problems created from an OCR read of MICR are exacerbated throughout the check processing system. In the case above, the checking account number returned is 12355, but the actual account number was 12345.

There are several problems that can be created by this misread. One possibility is that there is an account holder for account 12355. That individual's account balance would be reduced by the amount of the check they did not write.

A more likely scenario is that the paying bank probably does not have an account numbered 12355. If the paying bank does not catch the error, they would return the check indicating that there was no such account, when in fact the customer with the account number 12345 is a customer of the bank with available funds to pay the check. When the paying bank returns the check to the depositing bank, they will take the amount of the check out of your account balance. In many cases, as a depositor, the bank may charge your business a fee. Your business will attempt to collect the money from the writer of the check, generally charging your customer (the check writer) a fee. All of these negative consequences are incorrectly levied against a customer who is not at fault and who wrote a legitimate check.

There are checks and balances in place to minimize this type of mistake, but it is possible, and made more likely if the remote deposit process does not employ MICR reading technology.

In the scenario of a MICR misread, more likely with OCR capture versus magnetic capture, everyone loses time and cash flow while incurring additional cost. Your business will be upset with your bank. Your customer who wrote the check will be upset with your business. And your business and one or more banks will have to go through a manual process to identify and correct the problem, which is very costly. The ultimate cost will probably impact the overall pricing schedule from these banks.

F. Cost of MICR Rejects – OCR Versus MICR

The ability to obtain an OCR read rate from an image of the MICR with a low error rate may still seem like a viable alternative to some. Anyone considering this option should consider it carefully and be forewarned. Only MICR devices are designed to optimize the ability to read MICR from checks, and based on anecdotal data it would be reasonable to assume that a MICR read device would improve the read rate by at least 2% to 5% versus a method using only OCR.

Today, there are approximately 32 Billon checks processed a year. Using a moderate industry estimate of $0.10 a check, for each 1% that a MICR read device improves the error rate, the savings to the industry is $32 million a year. Using the improvement estimate of 2% to 5%, this represents a conservative potential annual industry savings of $64 to $160 million.

G. Cost of MICR Misreads – OCR Versus MICR

While the cost of a MICR reject is significant, it does not fully capture the overall benefits that can be obtained by using a quality MICR read device in an RDC environment. While properly reading MICR is critical, misreads or human keying errors create a more costly set of problems.

In order for your bank to process these checks, the check image must be capable of being processed via image exchange or substitute check. In both cases, the bank is required to represent what they believe to be the correct MICR information. Since the information is captured at your site, your bank received the MICR information from your business and your RDC application.

Your business and your bank cannot verify information that only the paying bank has access to, such as your customer's checking account number. Since your business cannot verify misreads of the MICR information, it falls on the paying bank to verify it. As a result, at the paying bank there are several processes in place to verify the accuracy of the MICR.

To examine the cost of a misread, we will use the example used earlier, and assume the '12345' is your customer's checking account number. Assuming there is no MICR reading capability and only OCR reading is employed, there is a higher probability that the characters are misread (read as 12355 for example, when the actual data is 12345). Your depositing bank will not know there is a problem and will represent that the actual MICR line includes the misread account number (12355).

When the paying bank processes the check, it will most likely say the account does not exist. That check now becomes an exception, since it did not properly post. For each bank the exception process can be different; but as a rule, a manual process is in place to ensure that the check was not drawn on an open account at the bank.

Normally, the paying bank will examine the account holder information on the check, determine that it was drawn on a valid account holder, determine why the check failed to post in the first place, manually correct the problem and then reprocess the check.

Today, the costs to the paying bank for these exceptions is far greater than the $0.10 cost estimated earlier for rejects, and may range as high as $1.00[2] or more. Using the baseline of 32 billion checks processed a year in the U.S., for each 1% misread, the cost could be as high as $320 million a year or more. If the paying bank begins to receive too many misreads, they will either pass the cost back to your bank or simply return the check.

There are several other problems and exception processes that can be impacted by invalid or misread MICR information. An invalid routing number, check number, customer account number, cost accounting code, region code, etc. may have a separate and unique set of issues and costs. Some of these exceptions may not be caught by the bank, but by you or your customer and would very likely represent a cost much more expensive than $0.10 to $1.00 per check. Furthermore, if these processes are not done or the check makes it through the manual review procedure without being caught, the expense can become even more significant, reaching several dollars per item to correct.

Whether it is your cost, your banks cost, or the paying banks cost, the cost will ultimately end up impacting your business.

[2] Global Concepts / BAI Benchmark Study - 2002

Section IV – OTHER RELATED TOPICS

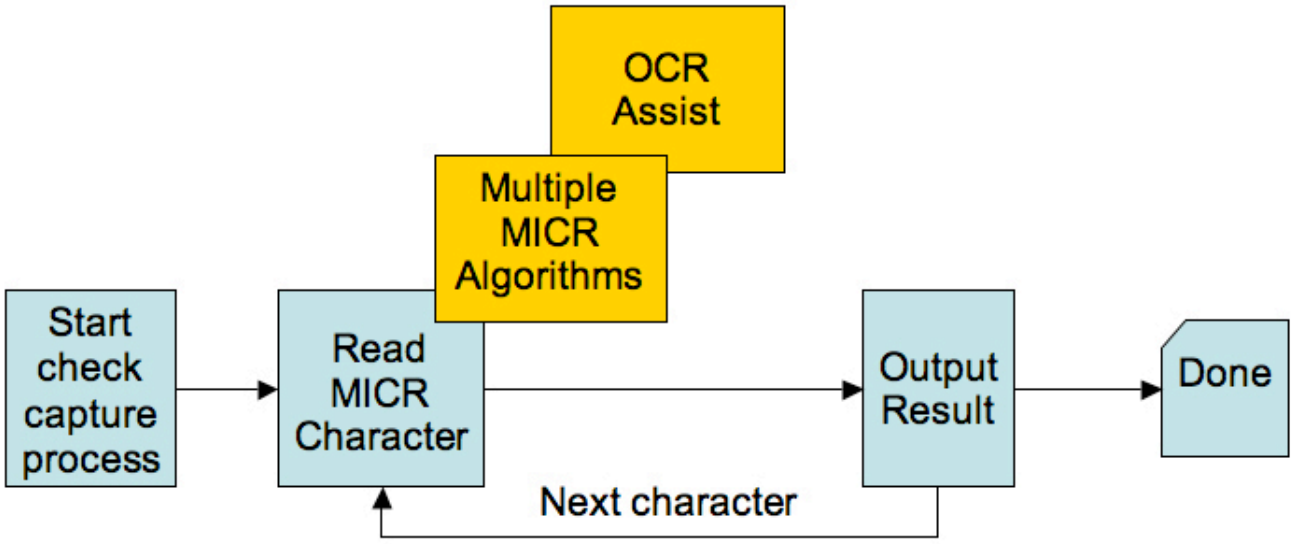
A. Fraud Costs

The financial losses associated with processing checks that all banks incurred before any associated recoveries was $1.0 billion in 2005.[3] MICR is printed with a specialized magnetic ink and recognizing MICR ink will help reduce fraud. Since OCR cannot detect the magnetic ink, if only OCR is used to read a check, it increases the chance that a fraudulent check is accepted and deposited. When comparing the additional cost of a device with built in MICR capabilities to a device that can only use OCR, the amount of savings from eliminating one fraudulent check could more than make up the difference.

[3] Report to the Congress on the Check Clearing for the 21st Century Act of 2003, April 2007.

B. Using Both OCR and MICR

The best scenario comes from the proper use of both technologies together. When you use a device with a magnetic read capability and then apply a properly tuned OCR engine, the end result is optimized, reducing MICR rejects and misreads. The result will be maximum utilization with the lowest associated cost.



C. Other Issues – Back office Conversion

NACHA, the Electronic Payments Association, governs electronic payment transactions that are submitted via their Automated Clearing House (ACH) network. In 2006, NACHA provided the opportunity for merchants to electronically convert check payments into electronic deposits in their back office. Checks could be truncated as an electronic ACH transaction for deposit, or converted to image for electronic deposit. In order to do this, there are guidelines and rules that require a check capture device with a MICR read capability to read the actual MICR from the check. With this requirement in place, many industry experts believe this may soon become a requirement for merchant capture using Check 21 image conversion. Should this happen, technology investments that do not support magnetic reading of MICR would become obsolete and would need to be replaced.

Summary

Because of the savings to banks and your business, banks are aggressively promoting RDC. In the near future, RDC may become the norm, not the exception. RDC will reduce your deposit preparation time, eliminate deposit transportation and labor costs, provide faster access to your deposits, and offer extended deposit cutoff times.

It is easy to see that using the wrong check scanning device could easily create new costs that could be greater than any potential savings. We recommend using a device with a true MICR read capability. These devices will reduce the overall cost of RDC, allowing you to gain the maximum benefit from this important application. We also recommend that you use a device with built in MICR read capability that is combined with the proper use of OCR. This will provide an optimal solution platform. If you are considering the conversion of checks into ACH, a process that is growing at an unprecedented rate,[4] the new check conversion procedures for BOC will require a device with MICR read capabilities.

While operational cost and hardware savings are critical issues that will impact your purchase decisions, Panini believes the most important issue is customer satisfaction. Make the right technology choice for RDC - You do **not** want to notify your customer that their check was not honored, when in fact the customer wrote a valid check.

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[4] Source - NACHA