Departmental

Secure MICR Printer

User's Guide

This manual serves as a reference for Source Technologies Secure MICR Printers. The user manual that ships with your printer contains details on printer setup and operations and should be read first. This manual should be used as a reference for learning more about MICR technology, and developing MICR printing applications. This guide was produced to assist IS Technicians and Engineers in the use Source Technologies' programmed printers with their custom MICR applications. The guide also contains information on MICR related error messages that post to the operator panel.

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Electronic Emission Notices
with a Network Card Installed

Federal Communications Commission (FCC) Compliance Information Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The FCC Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which the user will be required to correct the interference at his or her own expense. The manufacturer is not responsible for any radio or television interference caused by using other than recommended cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this equipment.

Note: To assure compliance with FCC regulations on electromagnetic interference for a Class A computing device, use a properly shielded and grounded cable. Use of a substitute cable not properly grouped may result in a violation of FCC regulations.

Industry Canadian Compliance Statement

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

European Community (EC) Directives Conformity

This product is in conformity with the protection requirements of EC Council directives 89/336/EEC and 73/23/EEC on the approximation and harmonization of the laws of the Member States relating to electromagnetic equipment designed for use within certain voltage limits.

This product satisfies the Class A limits of EN 550022 and safety requirements of EN 60950.

Warning: When a network card is installed this is a Class A product. In a domestic environment, this product many cause radio interference, in which case, the user many be required to take adequate measures.

Without a Network Card Installed

Federal Communications Commission (FCC) Compliance Information Statement

This product has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that many cause undesired operation.

The FCC Class B limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encourage to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult your point of purchase or service representative for additional suggestions.

The manufacturer is not responsible for any radio or television interference caused by using other than recommended cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this equipment.

Note: To assure compliance with FCC regulations on electromagnetic interference for a Class B computing device, use a properly shielded and grounded cable. Use of a substitute cable not properly shielded and grounded may result in a violation of FCC regulations.

Industry Canadian Compliance Statement

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

European Community (EC) Directives Conformity

This product is in conformity with the protection requirements of EC Council directives 89/336/EEC and 73/23/EEC on the approximation and haronization of the laws of the Member States relating to electromagnetic equipment designed for use within certain voltage limits.

This product satisfies the Class B limits of EN 550022 and safety requirements of EN 60950.

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1   Printer Installation

For complete information on how to unpack and setup your printer, see your printer's user's guide. Please read the following if you are going to install the printer driver shipped with your printer.

1. Locate the CD that was shipped with your printer.

Note: If you do not have a CD-ROM drive on the host PC, locate another computer with a CD-ROM drive, start the CD-ROM utility, and then follow the instructions on the screen to create printer driver diskettes.

2. Follow the instructions in the CD booklet to start the printer setup utility appropriate for your operating system, i.e. Windows 95, NT, etc. The setup utility will install printer driver and utilities to manage Source Technologies printer(s) attached to your PC or Network.

3. The Source Technologies, in most cases, assumes the printer driver is set to the internal DEFAULT values. The following Default values should not be changed for best overall printer performance and data stream requirements of the ST Secure MICR printer.

- Print Resolution under the Graphic Tab should be set to the Default value of 600 DPI.
- Form Source under the Paper Tab should be set to Default value of By Source.
- Print Quality and PictureGrade under the Graphic Tab should be set to the Default values of Use Printer Default.

The ST Secure MICR Printer requires a PCL5 or PCL5e data stream. Current level printer drivers require Graphic Mode under the Graphic Tab be set to either Raster or GL/2. We recommend Raster. This is the only required non-Default value that needs to be set in the printer driver.

A majority of other driver options can be set for your particular requirements. The most obvious of these would be a Paper Tray selection if your application uses the Print Driver Setting.

2   MICR Overview

MICR stands for Magnetic Ink Character Recognition. All MICR documents have a MICR line with numbers and symbols printed in a MICR font with magnetically chargeable toner. Each character of the MICR font has a unique waveform when sensed magnetically. Financial institutions and the Federal Reserve use the MICR line to identify and sort checks. The high-speed automated processing of checks and other financial documents depends on the accuracy and the integrity of the data printed in the MICR line. Your new Source Technologies' Secure MICR Printer is specifically designed to produce high quality MICR documents.

The Check Processing System

As a MICR document travels through the check clearing system it is processed an average of about seven times by high speed reader/sorter machines. Some checks are read up to 30 times or more by these machines. Reader/sorter machines charge the toner in the MICR line and then read the line with a magnetically sensitive reader.

The MICR line contains numbers and symbols to indicate the check serial number, the routing number of the drawee institution and the makers' account number. The institution of first deposit encodes the check amount in the MICR line to be read by the reader/sorter equipment. Checks travel through reader/sorters at up to 20 miles-per-hour (2,400 documents per minute) with each MICR line read in three hundredths of a second.

MICR Printing Today

Congress established the Federal Reserve System (FRS) in 1913. Today most commercial banks in the United States belong to the FRS. Many other depository institutions provide banking and checking account services to the public. These other institutions, such as some credit unions, savings and loan associations and nonmember banks, are not formally part of the FRS. However, they have access to the payment services it provides and are subject to many of the FRS regulations.

In 1958, because of the explosive growth of check usage, the American Bankers Association selected the E-13B MICR font and the MICR system as the technology for high-speed check processing.   Today, check standards are determined by the American National Standards Institute (ANSI) Accredited Standards Committee (ASC) X9B of which Source Technologies is a voting member. The latest versions of the standards and technical guidelines are available from Global Engineering Documents.

> Global Engineering Documents
> Phone 800-854-7179 or 303-397-7956
> Fax 303-397-2740
> global@ihs.com
> http://global.ihs.com

The key standards that address check documents are as follows:

ANSI X9.7 Specifications for Bank Check Background and Convenience Amount Field
ANSI X9.13 Specifications for Placement and Location of MICR Printing
ANSI X9.18 Paper Specifications for Checks
ANSI X9.27 Print and Test Specifications for Magnetic Ink Character Recognition (MICR)

Standards can be purchased from the above address. They are also available for purchase on-line from NSSN (http://www.nssn.org), a national resource for global standards.

3   MICR Check Design

General Features of Check Design

To be a legal and negotiable document, the necessary elements required on a check are the date, amount, payee, drawee institution, and payer's signature.

Other elements included in a good check design are: the amount in words, account title, check serial number, fractional routing number and MICR line.

A good check design contains security features and is formatted to be easily read by both machines and the human eye. If the format is complicated, the depositor, bank employee or reader/sorter machine may make an error in reading the data.

Position and Dimension Gauge

A MICR position and dimension gauge (Source Technologies' part number 205-1000MGE or 220-M1027-34) is an important tool for use in designing checks. During check design, check your output against this gauge to determine if the data elements are correctly positioned on your document.

Design Elements in Detail

> **Paper**
> The ideal paper for check production is 24 lb. laser bond. Our MICR lab has tested paper stock from most major manufacturers and has compiled a list of products that produce superior results. Contact your sales representative for this information. For a fee, Source Technologies will test your paper for proper MICR adherence and check reader/sorter performance. There are also many security features available to aid in the overall security of your MICR documents. See Chapter 3 for more information on check stock specifications and security features.
>
> **Size**
> The size of check documents must be:
>
> Between 6.25 inches and 8.75 inches in length
> Between 2.75 inches and 3.66 inches in height
>
> We recommend standard 8.5" X 11" letter size stock or 8.5" X 14" legal size stock for proper feeding through your ST Secure MICR Printer. The number of checks per page is determined by your application. Custom size stock other than letter or legal can be done with proper planning and application programming within the paper size specifications for the base printer.

Duplexing

We do not recommend printing on both sides of the paper (duplexing) when printing checks. MICR toner on the back of a check may cause rejects. Order your check stock with any necessary information preprinted on the back. If duplex is necessary, we suggest a more aggressive test plan be developed to ensure print quality consistently conforms to the ANSI/ABA specifications.

MICR Clear Band

The MICR clear band is an area at the bottom of the check where the MICR line prints. No other magnetic printing should appear in this area on both the font and back of document. The clear band is an area 0.625 (5/8) inches high from the bottom of the check running the entire length of the check. Exact MICR line placement in this area is very important. See Figure 2.10 for more information on MICR line placement.

Data Elements

Date

The date is a required data element for negotiation. It represents the day on or after the transfer of the check amount may take place. It is usually placed in the upper right portion of the check so it does not interfere with the convenience amount field. The common format is Month, Day and Year, however, the military format of Day, Month and Year is also acceptable.

Amount

The amount of the check is a required element for negotiation. The amount usually appears at least twice on the check. The amount printed in numbers is called the convenience amount. The amount printed in words is sometimes referred to as the legal amount, since this is the amount that applies if there is a difference between the two amount fields. The amount may also be printed a third time on the check in a secure font, intended to make alteration of the amount field difficult. See Chapter 5 and Appendix C for information on Source Technologies' Secure Numeric Font.

Convenience Amount

The convenience amount location is specified in ANSI X9.7. The basic location is illustrated in Figure 2.1. Since this amount can be machine scanned, its location and design should be kept within the specifications. The amount beginning with the dollar sign should be left justified within the scan area with numbers spaced normally to the right. The dollars and cents should be separated by a decimal point with the cents printed in the same size font as the rest of the field. Embedded commas should not be used. The convenience amount background should have good reflectance so it does not interfere with optical scanning (see ANSI X9.7).

The convenience amount should be printed in a simple, fixed pitch font. We recommend our ICR Secure Numeric Font (see Appendix D). It was designed to be easily read by

image capture equipment and is also a fraud deterrent. A fixed pitch courier font, or if available OCR-B, are also acceptable fonts to print the convenience amount.

Note: The Source Technologies' Secure Numeric Font (see Appendix C) should not be used in the convenience amount since it is not a machine readable font.

Amount In Words

The amount in words (sometimes called the legal amount) is normally located either above or below and to the left of the convenience amount. The area for the amount in words should be entirely filled to make alteration difficult. The amount should start at the far left of the line with the words placed immediately adjacent to each other. The cents need not be written out. They may be expressed as a fraction (60/100), and should be placed immediately to the right of the dollar amount and followed by a line or other space filler to inhibit alteration.

Example: One hundred forty-four and 62/100---------------DOLLARS

Given the available area on the document, you may need to use a smaller font when printing larger value amounts.

Payee Area

The payee is a necessary element for a negotiable document. The payee area is generally to the left side of the document either above or below the amount in words. It is often preceded by the words "Pay to the Order Of." The payee data should not enter the MICR clear band which extends 5/8 of an inch above the bottom of the check.

Signature Area

A signature is a required element for a negotiable document. The signature or signatures authorize the bank to honor the check; therefore, it must match the bank's records. The signature area should be beneath the convenience amount area but the signatures should not enter the convenience amount area nor the MICR clear band. This is especially true if you print the signature with MICR toner.

We recommend using our MicroPrint font for the signature line as a fraud deterrent. Information on how to utilize this font is in section 5: MICR Features.

Drawee Institution Name

The name of the institution where the maker's account is located is referred to as the drawee institution. The bank's name, city, and state are required.

Account Title
The account title is normally printed in the upper left corner of the check. It includes the name of the account holder and other information such as addresses, telephone numbers, and logos. The data in the title should be legible and sufficiently complete so that if the MICR data account number is destroyed, the drawee institution can refer to the account title in order to trace the account number.

Memo Line
This line is located in the lower left quadrant of the check, and is not required. Data printed here does not contain any legal significance. Printing in this area with magnetic toner should not extend downward into the MICR clear band which is 5/8ths of an inch above the bottom of the check.

Check Serial Number
The check serial number is generally printed in the upper right quadrant of the check. Although the check number is not required for the check to be negotiable, the account holder and financial institution use these numbers to reconcile statements and stop payments. The check serial number should also appear a second time in the MICR line, and these numbers should match. The number of digits in the check serial number is controlled by the financial institution and the MICR line format. Consult your banking institution for their requirements.

Fractional Routing Number
The fractional routing number should be printed in a fractional format in the upper right quadrant of the check. This number is assigned to identify the Federal Reserve District and drawee institution. Consult with your bank for the proper routing number and format for each of your accounts.

MICR Line
Accurate high-speed processing of your checks by financial institutions is enabled by the accuracy and integrity of the data in the MICR line. Refer to figure 2.1 for the location of the following MICR line fields. The MICR line is read from right to left with position one being the right most position proceeding to position sixty-five on the left. The MICR line must be printed at exactly eight characters per inch.

Auxiliary On-Us Field   Positions 65 to 45
This field usually contains the check serial number for commercial size checks and possibly account control information. It is bounded by On-Us symbols. ( ). It is not included on personal, small size checks.

External Processing Code (EPC) Field   Position 44
This one digit field is position 44 of the MICR line. This field is usually left blank. The use of this field is reserved by the ABA and is controlled by the ASC X9B Standards Committee.

Routing Field   Positions 43 to 33

The routing field is bounded by Transit Symbols ( ) in positions 43 and 33. It contains fixed format information about the drawee institution. Consult with your bank for the specific data field to be placed here for each of your accounts.

On-Us Field   Positions 32 to 14

The On-us field contains the makers' account number. The structure and content of this field is left to the drawee bank. On personal checks this field also contains the check serial numbers. The On-Us field may not consist of more than 19 characters. An On-Us ( ) symbol must appear immediately to the right of the account number.

Blank Field   Position 13

Position 13 is always left blank.

Amount Field   Positions 1 to 12

The amount field is the right most field in the MICR line. It remains blank until it is printed by the institution of first deposit. When the check enters the banking system, the institution of first deposit encodes this field from data in the convenience amount field. It will be bounded by Amount Symbols ( ).

Figure 3.1: Sample Check

SAMPLE CHECK FOR MICR SPECIFICATION

* This check not scaled to size
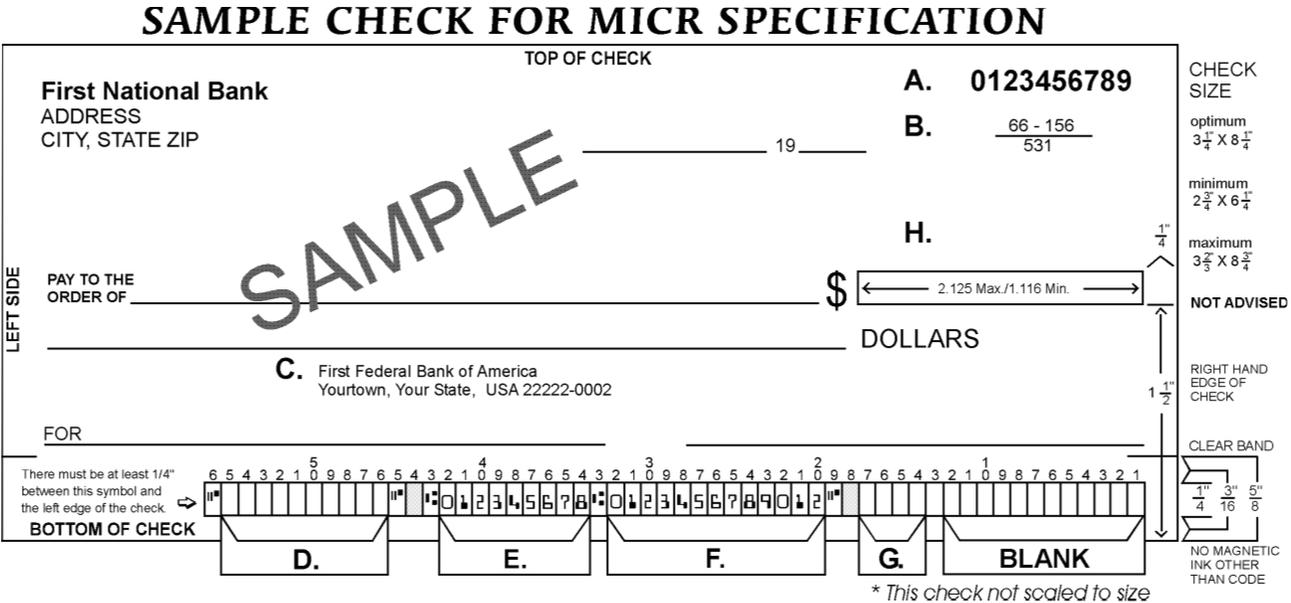
A. **Serial Number:** Must be in the upper right corner and match the serial number in the MICR line (see D for further explanation).

B. **Fractional Routing Transit Number:** Should be in the upper right corner and must match the routing transit number in the MICR line with the exception of the state prefix number (ex. 66 = NC, 67 = SC, 64 = GA, etc.) and the preceding zeros.

C. **Bank Name, State, City:** The bank logo is optional. Name of bank, city and state where the account will be assigned/opened is a required field.

D. **Aux On Us (46-55):** This is a required field if the customer desires services offered by the bank which require a serial number. The serial number format is controlled by the payor's bank. A & D should match.

E. **Routing Number (34-42):** Designates the Federal Reserve district and financial institution. Each city, state or region that the bank serves has a unique institution identifier. IMPORTANT: positions 35-42 is the Routing Number, position 34 is the check digit.

F. **Account Number:** This is a unique number assigned to the customer's account.

G. **Optional Serial Number:** Used for personal accounts (checks only). A 4 digit zero filled field that should match the serial number in the upper right corner.

H. **Convenience Amount Area** should be in the general location shown above in the diagram. The illustrated box in the diagram is optional and if used, should conform to ANS X9.7. A single stroke dollar sign is required.

4   Quality Issues

A high quality MICR document can be read by bank reader/sorter equipment many times with no readability issues and does not result in damage to bank equipment. This quality is the result of a well designed printer, an originally manufactured MICR toner cartridge and high quality check stock.

Printer Features

Your Secure MICR Printer is equipped with some features to ensure high quality MICR documents.

Paper Type
We recommend paper trays with check stock be set to "bond" paper type. The associated "weight" and "texture" settings should be set to "heavy" and "rough." See the base printers User's Guide. If more than one input tray has check stock and they are the same stock, set all to "bond" and they will be linked. If different stock is used in more than one input tray, use "custom" type, "rough" and "heavy."

MICR Toner Low Alarm
When MICR toner is low, the printer stops and the user is prompted to load a new MICR toner cartridge. We do not recommend shaking the cartridge to prolong its life. Once low toner is sensed, there may not be enough MICR toner left to produce quality MICR documents.

MICR Toner Sensing
When the printer enters MICR mode and attempts to print a MICR font, it checks to ensure a MICR toner cartridge is loaded in the printer. If a regular cartridge is present, an alarm will sound and the user must load a MICR cartridge before their print job will resume. A message "load MICR Toner" will appear on the Operator's Panel.

MICR Toner

Use only Source Technologies MICR toner when printing MICR documents. It is specifically engineered to print quality MICR documents with your printer. The printers' MICR toner sensor is designed to work with the Source Technologies MICR toner cartridge to prevent printing checks with regular toner present. You may choose to use this printer for general office printing, which is acceptable. If a MICR print job begins and the printer has a regular toner cartridge present, the printer will stop and prompt the operator to install a MICR toner cartridge.

Source Technologies does not recommend the use of refilled MICR toner cartridges. Although refilled cartridges are generally less expensive, they may result in expensive printer repairs and bank check reject fees due to inferior MICR toner formulation.

Source Technologies' MICR toner cartridges can be returned for recycling, not refilling. Refer to the instructions in the cartridge box for additional information.

MICR Check Stock

Check stock has a large impact on the resulting quality and security of your MICR document. Here are a few features that should be considered when selecting a check stock. Please see Chapter 4 for more information on check stock security features.

Quality
Quality MICR check printing with your ST Secure MICR Printer requires check stock that matches the printer's requirements. Source Technologies can supply paper specifically made for our printers. If you wish to order check stock from other suppliers, please show the following requirements to your sales representative. We will test other suppliers' paper for a nominal fee.

Size
The standard paper tray will adapt to A4, Letter, Executive and B5 sizes. Both the standard tray and all optional trays are auto size sensing. Universal trays are available for custom size documents.

An optional auxiliary feeder is available which will adapt to paper sizes from 3.0 to 8.5 inches in width and 5 to 14 inches in length. It is not auto size sensing. You must select the correct paper size from the front panel or from your print driver before you print from this feeder. It will hold approximately 100 sheets.

Layout
Layout your check design before any paper is purchased or layout your design to existing check stock. Keep in mind, perforations, orientation, special logos and any color elements. The printer can print just about anything as long as it is black.

Weight
We recommend 24 lb. - 29 lb. paper.

Stiffness
We recommend taber M.D. 2.5 and C.D. 1.1 minimum.

Smoothness
For best toner fusing, we recommend rougher surfaces within the base printers' specifications.

Paper Grain Direction
When using 24 lb. - 29 lb. bond paper we generally support either long or short paper grain. Overall performance in the banks reader/sorters is best when the resultant grain direction is left to right when viewing the check.

Perforations

All perforations in the stock should be Micro-Perfs (20 or more cuts per inch). Larger perforations can produce excessive paper chaff and result in damage to the toner cartridge. Perforations should be ironed by the paper supplier to reduce nesting and potential double feeding.

Moisture

The paper moisture content should be between 4.7 and 5.5%. Storage conditions have much to do with the final moisture content of most papers. Store your check stock in a cool, dry, environmentally stable and secure area. Protective wrappings should be removed just prior to use.

5 Security Issues

Printing negotiable documents from blank paper on desktop MICR laser printers makes security a top priority for any company embarking on a desktop check printing project.

Good security programs integrate hardware, software, your employees and your financial institution into a secure check production system. Recent changes relative to the responsibilities of banks and their customers have a bearing on the ultimate liability for fraudulent documents. Customers must have systems designed and documented to show "Ordinary Care and Good Faith Effort" is in place to avoid liability. In the past, financial institutions generally credited corporations when fraud was discovered. New regulations attempt to define who may have been negligent in the transaction and put the liability on that party or parties. Clearly, if a fraudulent occurrence can be traced to a corporation's lack of security procedures, or the design of their negotiable documents, the regulations will protect the banks, or at best case the loss will be shared.

Check Stock Security Features

We have found the following check stock security features to be of merit:

> **Artificial Watermarks** - White on white printing generally on the back reveals words or patterns when held at an angle. You should state on the front of the check that this feature is present. It cannot be copied.

> **Laid Lines** - Evenly spaced background lines that make cut and paste alteration difficult.

> **Void Pantograph** - Background printing of the word VOID or COPY which appears on photocopies. Some paper suppliers offer enhanced versions of pantographs which provide more protection from the latest in color copier technology.

> **Chemical Additives** - If an ink eradicator (bleach, acetone, etc.) is applied to the document, the eradicator creates a permanent stain.

> **Numbered Check Stock** - Sequential numbering printed in dye that penetrates to the reverse side of the check can be used to verify authenticity. This number may not relate to the check serial number. This also provides for inventory control of blank check stock.

NOTE: These quality issues serve as a general guide for check production. You should not consider these features as an all inclusive list. We recommend consulting with your local paper supplier for any additional comments or suggestions.

Security Note

Check fraud in the United States is a continuing problem. We have attempted to identify security features that can be incorporated into the base check stock. However, these may not prove 100% fraud preventative. Over time, technology will continue to develop new and improved measures to address check fraud.

The following internal and external security measures will help minimize your risk of check fraud.

1. Financial institutions should train tellers to look at the check, not the person presenting the check. The check, not the person, is the item that must be verified.

2. Firms accepting checks should be aware of damaged MICR lines. Intentionally damaging the MICR line can increase the time necessary to process an item, giving the forger enough time to leave town. Also be sensitive to discoloration, this could be an indication of alteration.

3. Incorporate security features into your base check stock and utilize printed security features that address both alteration and counterfeiting of original items. A short list of these features would be:
   - Warning Bands, or other methods that alert recipients to visual security features;
   - Artificial or genuine watermarks in the base paper;
   - Chemical additives in the base paper that react to chemical alteration attempts;
   - Void Pantographs that address attempts to copy original items;
   - Unique security fonts that deter attempts to alter payee or amount information.

4. When generating final negotiable items,
   - The document always includes the amount value in words;
   - The document should not include information that limits the value range, i.e. "Not valid over $500." This only guides the fraudulent attempt. Use your application software to detect out of range items;
   - All levels of hardware and software password protection should be utilized.

5. Safeguard check stock paper, and limit access only to necessary employees.

6. Understand and approve the security procedures of your check stock suppliers to safeguard stock in their custody.

7. Use "Positive Pay" check services from your financial institution that match check number and dollar amounts to known information. Financial institutions should encourage full participation of corporate clients.

8. Move methods of fraud detection to the item's point of entry into the clearing system. For example, low cost readers can detect low magnetic strength in the MICR line which is a good indication of attempts to copy an original.

9. Always verify the home address and place of employment of new account applicants.   Use public sources such as phone books to verify phone numbers. Ask new account applicants why they are opening an account with your institution. Be suspect of unusual answers or delays in responding.

10. Stay abreast of current check fraud methods and the latest in fraud detection. Offer seminars to educate corporate clients.

11. Review and document your internal negotiable document printing procedures. Investigate employee backgrounds before assigning security authority. Split responsibilities, for example, an accounts payable production/security officer should not also balance the account.

6   MICR Features

Source Technologies' Secure MICR Printers are designed to allow both general office document printing and secure MICR document printing. You may print a variety of conventional jobs with regular Lexmark toner using all of the printer features available such as MarkNet and MarkVision network attachment interfaces and network printer utilities. These printers come standard with HP PCL5, PCL6 and PostScript Level 2 emulations and others. Source Technologies has designed features to enhance these printers with MICR mode specific operation that allows you to securely print high quality negotiable documents.

MICR Mode

Your Secure MICR Printer has two operational states: normal and MICR mode. When the printer is in normal printing mode your MICR resources cannot be accessed. Once the printer enters into MICR mode your secure resources are available and the printer starts the process of confirming readiness to print a negotiable document. There are two conditions which must be met before MICR mode is activated:

> If the front panel combination lock feature is activated, the correct eight digit combination must be entered from the front panel.

> The correct password command must be received by the printer from the software application prior to printing any MICR documents.

MICR Fonts

The E-13B and CMC7 MICR fonts are resident in your printer. Examples of these fonts are in the Appendix of this manual. They can only be accessed after MICR mode is activated by your software. A MICR toner cartridge must be present to print the MICR fonts.

Secure Fonts

Two Source Technologies designed secure fonts: Secure Numeric Font and ICR Secure Numeric Font are resident in your printer.   Examples of these fonts are in the Appendix of this manual. Like the MICR fonts, these secure fonts can only be accessed after MICR mode is activated by your software.

The ICR Secure Numeric Font is designed for the convenience area of your check. It can be read by the imaging equipment used by many financial institutions. The Secure Numeric Font should not be used in this area since the reverse image aspect of this font prevents it from being read by this equipment. We recommend using both of these fonts on your checks as they are designed to deter check fraud.

MicroPrint

Your Secure MICR Printer also contains the MicroPrint font. MicroPrint is text less than .010" tall. It can easily be read with a magnifying glass but appears to be a solid line to an unaided

eye. This font provides protection against reproduction by most scanners and copiers because they cannot successfully print the tiny letters.

Most check printers use this font in the signature area of their preprinted checks. We recommend using this font to help deter check fraud. The text in this font can either be fixed, such as the name of your organization, or it can be variable, such as the check amount and payee name. The use of variable text provides an additional method of protection against check counterfeiters.

Use of the "MP" designate symbol to identify the line as MicroPrint is optional. The MicroPrint font only contains alphanumeric characters. Punctuation marks and spaces are ignored by this font and do not print.

Bi-Directional Feedback

Your Secure MICR Printer can provide MICR status messages to the check printing application. This feature is valuable in a networked environment with multiple printers or with users utilizing a printer located in another area. The application can get information on MICR settings such as toner cartridge type (MICR or regular), locked trays (which trays are locked to non-MICR applications), SIMM-resident fonts/macros and audit trail settings. The printer can send the application MICR error messages such as "load MICR toner."

When the printer receives the "@PJL INFO STVARIABLES" command it will report all MICR variables to the host. The MICR variables can also be seen by accessing the printer's front panel menu. Select Utilities>Print Menus. The second page of this menu shows the current MICR variable configuration.

If USTATUS DEVICE=On, the printer will report PJL error 40020 for any MICR error which causes the printer to go off-line. It will appear in this format:

```
@PJL USTATUS DEVICE
CODE=40020
DISPLAY="MICR Password Error  Press Go"
ONLINE=FALSE (formfeed----HEX 0C)
```

The code will always be 40020, only the display line will change to indicate the specific error.

Resource Storage

Check-related resources, such as form overlays and signatures, are stored in your printer with unique identification numbers. ID numbers must be less than 32767. Number 5001 is reserved for the Audit Trail overlay. Your Secure MICR Printer has three areas where you may store these resources: SIMM storage, flash memory and RAM.

SIMM Storage is an area of the Source Technologies code in your printer. Use of this area is controlled by Source Technologies. If you are interested in utilizing this storage option please contact your sales representative.

Flash Memory is an optional feature. It is user managed and resources can be designated as "secure" or "unsecure." Secure resources are loaded to flash with the STL command and have ID numbers greater than or equal to 10000. They can only be accessed by using the STP command when the printer is in MICR mode. Unsecure resources do not require a password and should be assigned an ID number less than 10000. Resources stored in flash memory are not deleted when the printer is powered off. Flash memory is required for all Audit Trail features.

Storing resources in RAM is also an option. Resources in RAM are deleted when the printer is powered off or reset. For this reason check-related resources may need to be loaded frequently. Resources stored in RAM cannot be password protected.

We recommend storing all check-related resources in secured flash memory.

MICR Menu

Your Secure MICR Printer contains a front panel menu specific to MICR applications. The complete menu is as follows:

    Security Lock
    MICR Type
            Normal
            OptraForms
    Audit Menu
            Record Sorting
            Overlay
            Sum Field 4
            Print Report
    Country Menu
            US
            Canada
            Other

Use the menu button on the front of your printer to toggle through the menu options. To select an option press the select (*) button. An item is selected when it has an asterisk (*) after it.

The Security Lock option allows the user to activate and set a front panel combination for additional security. This feature prevents anyone from printing checks without the proper 8-digit combination. See the MICR Mode Commands section of this chapter for more information.

MICR Type designates the printer as a "normal" Source Technologies Secure MICR Printer or as a Secure MICR OptraForms Printer. This menu option is set by Source Technologies and should not be changed.

The Audit Menu deals with the optional Audit Trail Report settings. See chapter 7 for more information.

Entering MICR Mode

To print MICR documents, your Secure MICR Printer uses special alphanumeric text commands called MICR Mode commands.

There are two different commands which activate MICR mode printing: &%STFPASSWORD$ and &%STHPASSWORD$. The &%STF is the default command and is recommended for most applications.

To use the &%STF command, it must be entered at the beginning of the job datastream. The &%STH command can be entered anywhere prior to accessing secured resources.

The &%STH command is not as powerful as the &%STF command because it does not set as many parameters for MICR printing. Both commands and descriptions are as follows:

> **&%STF Command**
> When entering MICR mode with the &%STF mode, the printer will:
>
> • Check to see if the proper Front Panel Combination has been entered (when enabled).
> • Allow access to secure check printing resources such as MICR fonts and secure fonts stored in printer ROM.
> • Allow access to protected signatures, overlays, logos and other important resources stored in password protected nonvolatile flash memory.
> • Display "MICR Mode Active" on the printer's front panel.
> • Disable the printer's front panel menu system.
> • Set printer resolution to 600 dpi for printing MICR fonts.
> • Disable Jam Recovery.
> • Set the copies parameter to 1.
> • Take the printer off-line if low toner is detected.
> • Turn command pass through ON.
>
> NOTE: The &%STF command must be entered at the beginning of the print job before any other print data is received.
>
> **&%STH Command**
> The &%STH command does not set-up the printer for check printing activity as completely as the &%STF command mode. This alternate MICR mode command forces the user to manually program some commands through their host application. It is used when programmers cannot place &%STFPASSWORD$ at the beginning of their job. Use the &%STH command if you experience page ejects while in &%STF mode.

When entering MICR mode with the &%STH command, the printer will:

- Check to see if the proper Front Panel Combination has been entered (when enabled).
- Allow access to secure check printing resources such as MICR fonts and secure fonts which are stored in printer ROM. It also allows access to protected signatures, overlays, logos and other important resources stored in password protected nonvolatile flash memory.
- Turn command pass through ON.

NOTE: The &%STH command can occur within a datastream after the page has started. The &%STH command, unlike the &%STF command, can be issued anywhere on the page.

MICR Mode Commands

Password Command   **&%STFPASSWORD$ or &%STHPASSWORD$**

&%STF or &%STH	Lead in sequence
PASSWORD	User defined password, 8 characters, case sensitive, unprintable characters allowed. Factory default is PASSWORD. See also New Password Command.
$	Command terminator

MICR Definition Command   **&%SMCPxxxx$**   (optional)

&%SMCP	Lead in sequence
xxxx	MICR count, the number of MICR lines to be printed during this print job. (4 bytes in hex)
$	Command terminator

Example: &%SMCP0010$

Prints 16 (Hex 10) MICR lines before disabling MICR mode. This command defines how many MICR lines may print in the current job. When the count decrements to zero, MICR mode is terminated.

Set New Password Command   &%STExxxxxxxx$

&%STE	Lead in sequence
xxxxxxxx	New password, must be 8 characters either printable or non printable. Dollar ($) sign is an invalid password character.
$	Command terminator.

In order to set a new password the current password must first be sent. Caution: Errors made in sending the new password command could lead to setting it to an unknown value. If the Password is unknown the printer must be returned to Source Technologies to be reset to PASSWORD.

Activate/Set Front Panel Combination Lock &%STSxxxxxxxx$ (optional)

&%STS	Lead in sequence
xxxxxxxx	Eight digit sequence, valid characters 0-9
$	Command terminator

Sets and activates the front panel MICR combination lock. If this feature is activated, MICR mode cannot be entered until the front panel combination is entered correctly. All MICR features will be inaccessible until this combination is entered. Sending an &%STS command and eight zeros deactivates the security lock.

Caution: If the front panel combination is set and then forgotten, the printer must be returned to Source Technologies for the combination to be deactivated.

Print MICR E-13B Font   &%SMDddd...ddd$

&%SMD	Lead in sequence
ddd...ddd	Data to be printed in E-13B MICR font
$	Command terminator

Prints the specified data in the E-13B MICR font which is used in the United States, Canada and Mexico. The correct spacing begins at the cursor position at the start of the command. After the terminator is sent, the printer is returned to its default font. After each Print E-13B command, the MICR count is decremented by one. Upon receiving this command the printer will check to ensure a MICR toner cartridge is installed. See Appendix A for MICR E-13B font character mapping.

Print MICR CMC7 Font   &%SM7ddd...ddd$

&%SM7	Lead in sequence
ddd...ddd	Data to be printed in CMC7 font
$	Command terminator

Prints the specified data in the CMC7 MICR font which is used in Europe and South America. The font and its correct spacing begins at the current cursor position at the start of the command. After the terminator is sent, the printer will return to its default font, and the MICR count will be decremented by one. Upon receiving this command the printer will check to ensure a MICR toner cartridge is installed. See Appendix B for CMC7 character mapping.

Print Secure Numeric Font   &%SMFddd..ddd~

&%SMF	Lead in sequence
ddd...ddd	Data to be printed in this font
~	Command terminator

The dollar sign ($) is not a command terminator for this command. For both security fonts the tilde ~ (hex 7E) is the command terminator since the dollar sign is a valid character.

Print ICR Secure Numeric Font &%SMIxxxxxx~

&%SMI	Lead in sequence
xxxxxxxx	Data variables to be printed in this font
~	Command terminator

Print MicroPrint Line   &%SMMxxxxxxxxx!$

&%SMM	Lead in sequence
xxxxxx	Data to be printed in this font
!	MP designator (optional)
$	Command terminator

If the exclamation point (!) is used, the "MP" designate will print just above and to the right of the last character. This is optional and is typically used to notify the check recipient of the presence of MicroPrinting. Only 0-9, A-Z (upper and lower case) print. Special characters and spaces disappear.

Load Flash Resource   &%STLxxxxxyyyyyyzdd....dd

&%STL	Lead in sequence
xxxxx	Resource number in decimal, must be 5 digits
yyyyyy	Byte count of resource file in Hex, must be 6 positions
z	Format of the resource file
	S = Single byte binary format
	D = Double byte text format
dd...dd	Flash resource file. e.g. forms overlay, signatures etc.

Resource number values may be between 00001 to 32767. Values of 10000 and above are password protected and will require the user to enter MICR mode with a valid password before they can be unlocked with the STP command. Values below 10000 will be unsecured. Resource number 5001 is reserved for the Audit Trail overlay, see chapter 7.

Format Flash Memory   **&%SFF$**

&%SFF   Lead in sequence

$ Command terminator

This command formats flash memory. A valid password command must precede this command.

Caution: All flash contents will be lost. This includes all electronic forms, signatures, logos, etc.

Secure Flash Resource Unlock Command   &%STPxxxxx$

&%STP   Unlock flash resource command

xxxxx   Flash resource number, must be 5 digits

$ Command terminator

Unlocks a secure flash resource.

Tray Lock Command   **&%STTL#$**

&%STTL   Lock tray command

The tray to be locked (choose from 1, 2 or 3 only)

$ Command terminator

This command prevents other applications from accessing a particular printer paper tray.

Tray Unlock Command   **&%STTU#$**

&%STTU#   Unlocks tray

The tray to be unlocked (choose from 1, 2 or 3 only)

$ Command terminator

Tray Swapping Commands &%STTSON$ / &%STTSOFF$

&%STTSON   Turns tray swapping on

&%STTSOFF   Turns tray swapping off

$ Command terminator

This command allows you to redefine the PCL values for Trays 2 and 3 to allow software and operational consistency with older printers in the system. Swapping ON causes any <esc>&l4H to be replaced with 5H and vice-versa.

ock of data. The process can run in several modes and involves 16 rounds or operations.

DES and AES Decryption

Data Encryption Standard (DES) and the recently approved Advanced Encryption Standard (AES) are both supported in the Source Technologies Secure MICR Printers. The minimum Code Level support for AES is 8.5j. Levels 8.5i. and lower only support DES.

DES originated at IBM in 1977 and was adopted by the U.S. Department of Defense. The controlling standards for DES are ANSI X3.92 and X3.106 and in the Federal FIPS 46-3 standard. An alternative to DES called Triple DES is not supported in our Secure MICR printers.

AES is documented in a new Federal Information Processing Standard (FIPS) standard FIPS 197, dated 11/26/2001. Three key sizes are documented in the standard, 128-bit, 192-bit, & 256-bit. We currently only support the most commonly used 128-bit key size.

The algorithm selected for AES is Rijndael. Developed in Belgium, an English pronunciation alternative is "Rain Doll". In addition to U.S. Government implementations, it is anticipated AES will be adopted by businesses, organizations, institutions, and individuals outside of government, and outside of the United States as was the case for DES.

We only support decryption for DES and AES. Encrypted printer data streams can be decrypted using the key stored some time prior to the message. Keys for both DES and AES are supported separately so that both AES and DES are supported simultaneously. The keys messages themselves can be encrypted with either DES or AES for either DES or AES. Only one DES and one AES key exists at any one point in time. Old keys are not saved. To change either a DES or an AES key requires the MICR Password Command.

The Secure MICR printer does not have any capability to encrypt a return or Bi-directional message.

Decryption Commands
Decryption requires printer processing overhead. In our testing encrypted printer data steams near or below 100K bytes per page do not seem to affect printer speed in term of pages per minute or first page out timings. Some testing done with print files from 500K to 1 Meg per page showed up to a 30% degradation in speed. It is therefore recommended the encryption be reserved for the confidential portions of the data when large file sizes are anticipated.

Set DES Decryption Key Command &%STSETDESKEY<16 Hex Characters>**$**

The command requires a MICR Password Command be sent prior to the Key Command. The Key Command could itself be encrypted and then decrypted in the printer. The command requires the key data be in a double-byte hex format. The 8 byte value must be converted to the 16 byte format. The only values that can be contained in the 16 command bytes are 0 through 9, A through F. Alpha key characters can be upper or lower case. Command characters must be upper case. An example of a valid key & command - %STSETDESKEY5f00FF7E3DA938eb$ The key value remains in the printer until another key command is received. Printer power cycles and printer reset commands do not affect the key value.

The dollar sign ($) is the command terminator and is required.

Set AES Decryption Key Command &%STSETAESKEY<32 Hex Characters>**$**

The command also requires a MICR Password Command be sent prior to the Key Command.
The key data is similar to DES, but is twice in length with 32 Hex character format representing the 16 byte or 128-bit key value.

Turn DES Decryption ON   **&%STDON$**

Turn AES Decryption ON   **&%STAON$**

All data following the $ command terminator will be decrypted using the current key value stored in the printer and the DES or AES algorithm. Decryption continues until a Decryption OFF command is received, a print Timeout occurs, a printer panel reset occurs, or printer power is cycled. Printer software language resets do not stop decryption.

Turn DES Decryption OFF   **&%STDOFF$**

Turn AES Decryption OFF   **&%STAOFF$**

The OFF command resides within the encrypted data, and must also be encrypted. The OFF occurs after an 8-byte block (DES) or 16-byte block (AES) is received and decrypted. The last block containing the OFF should either have the command right justified or padded out to the block boundary. Any padding bytes after the $ command terminator will be discarded.

MFP Copy Defeat Commands

A Secure MICR printer with the Multi Function Printer (MFP) feature can scan and copy documents. This allows the end users to copy MICR documents with MICR toner. The Copy Defeat command will block the copy function when a MICR toner cartridge is installed, but allow the copy function with standard toner.

MFP MICR Copy Defeat ON   **&%STMCDON$**

MFP MICR Copy Defeat OFF   **&%STMCDOFF$**

Both commands require the MICR Password Command. The ON command blocks the copy function with MICR toner. The OFF command allows the copy function with MICR toner. The factory default is OFF

Note – Postscript Language print jobs downloaded from a host will not print with MICR toner if the Postscript job contains a copy count command. Copy Defeat = ON will reset copy count to 0, and nothing prints. Either the Copy Defeat function needs to be set to OFF or the copy count command needs to be removed if the user requires Postscript MICR printing. We tested a few Postscript printer drivers and did not detect copy count commands, but the specific data streams should be tested.

7   IBM Host Programming Features and Examples

Hex Transfer

The Hex Transfer feature allows the user to send PCL escape sequence printer commands to the printer with simple text strings. You may send any valid command or string of commands with no limit on the length or complexity. Form macros, signatures, or simple commands may be passed through any platform to the printer since they are simple text. The printer will convert them back to ESC (escape) sequences when they arrive at the printer. Hex Transfer is automatically enabled while in MICR Mode. To enable it for all applications use the following commands:

Turning Hex Transfer On
To enable Hex Transfer, send the following command::

&&??&%

Once Hex Transfer is enabled, the character sequence &% will act as a trigger sequence. Any data following these trigger characters will not be printed and will be treated as Hex Transfer data until the Hex Transfer ending character $ is encountered.

Turning Hex Transfer Off
To turn Hex Transfer off, send the following command:

&&??!!

This command will clear the trigger character and allow the &% sequence to print. This clear command may be sent at any time to assure that Hex Transfer is disabled. When MICR Mode is entered, Hex Transfer will automatically be turned on, and when MICR Mode is exited, Hex Transfer will be turned off unless it has previously been activated outside of MICR Mode with the &&??&% string.

Hex Transfer Examples

&&??&%	This command enables Hex Transfer On
&%1B 26 6C 34 48 $ or &% 1B $& l 4H	Sends the PCL Esc sequence: <Esc>&l4H which is a paper source command identifying what tray the paper will be pulled from.
&% 1B 45$ or &% 1B $E	This command is a printer reset PCL command which consist of the Esc character and printable E character and may be sent by simply putting the Esc character in Hex.

Figure 7.1 MICR Mode Command Example

The following example shows the MICR Mode commands and Hex Transfer commands in use. This datastream would print the check on the following page (assuming the check macro and the signature are loaded as flash resources).

```
&%STFPASSWORD$ &%SMCP0001$ &%STP10001$ &%STP20000$
&%1B266C3178307331683261366346306F3165316C372E3330431B2661304C1B2873
3130481B266B31302E3030481B26663130303031793358$
```

```
1000
200     Vendor Systems
                                                                October 5, 2005


   99999      Oct 1 05          1000.00        20.00         980.00
  1234567     Oct 2 05           200.00         4.00         196.00
  136784      Oct 3 05           800.00        16.00         784.00
  555555      Oct 3 05            55.55         1.11          54.44



                   2055.55        41.11         2014.44



                                                                      1000
200             Vendor Systems
                                                                October 5, 2005


   99999      Oct 1 05          1000.00        20.00         980.00
  1234567     Oct 2 05           200.00         4.00         196.00
  136784      Oct 3 05           800.00        16.00         784.00
  555555      Oct 3 05            55.55         1.11          54.44



                   2055.55        41.11          2014.44


                                       &%1B$(s1p16v0s3b4148T 1000 &%1B$(3@

                                       October 5, 2005
 &%SMF$2014.44~
&%1B$(s0p12h1s0b4099T
*********** Two Thousand Fourteen and 44/100*******DOLLARS &%1B$(3@
                   $2014.44
        Vendor Systems
        927 Warehouse Road
        Kansas City, MO   59782           &%1B$(20000X!&%1B$(3@

&%1B$&f0S &%1B$*p296x3184Y &%SMD;00001000; :123456789:1234567890123:$
 &%1B$&f1S
```

Figure 7.2: Sample Check

ST SOURCE TECHNOLOGIES	**DUPLICATE FILE COPY**			**CHECK NO: 1000**

VENDOR NO: 200 **NAME: VENDOR SYSTEMS** **CHECK DATE: October 5, 2005**

REFERENCE NUMBER	INVOICE DATE	GROSS AMOUNT	DISCOUNT TAKEN	NET AMOUNT PAID
99999	Oct 1 05	1000.00	20.00	980.00
1234567	Oct 2 05	200.00	4.00	196.00
136784	Oct 3 05	800.00	16.00	784.00
555555	Oct 3 05	55.55	1.11	54.44
	TOTALS	2055.55	41.11	2014.44

ST SOURCE TECHNOLOGIES

CHECK NO: 1000

VENDOR NO: 200 **NAME: VENDOR SYSTEMS** **CHECK DATE: October 5, 2005**

REFERENCE NUMBER	INVOICE DATE	GROSS AMOUNT	DISCOUNT TAKEN	NET AMOUNT PAID
99999	Oct 1 05	1000.00	20.00	980.00
1234567	Oct 2 05	200.00	4.00	196.00
136784	Oct 3 05	800.00	16.00	784.00
555555	Oct 3 05	55.55	1.11	54.44
	TOTALS	2055.55	41.11	2014.44

ST SOURCE TECHNOLOGIES
2910 Whitehall Park Drive
Charlotte, NC 28273
(704) 969-7500

First National Bank
of Any State
Any City, NC 27514

CHECK No. 1000

66-156
531

DATE October 5, 2005

$2014.44

Pay

*********** Two Thousand Fourteen and 44/100 ************DOLLARS*

VOID

AMOUNT $2014.44

To the Order of

Vendor Systems
927 Warehouse Road
Kansas City, MO   59782

NON-NEGOTIABLE

⑈0000 1000⑈ ⑆123456789⑆123456789 0123⑆

The commands in Figure 7.1 in order of appearance:

&%STFPASSWORD$ Password Command.

&%SMCP0001$ MICR Definition Command with the count set to one.

&%STP10001$ Unlock Flash Resource number 10001.

&%STP20000$ Unlock Flash Resource number 20000.

&%1B26...3358$ PCL sequence in hex which sets the page format and
                        enables macro number 10001.

&%1B$(s1p16v0s3b4148T   PCL sequence which changes the font to Univers 16 point.
                        After the check serial number prints (1000), the printer is
                        returned to its default font with the following command.

&%1B$(3@   PCL command to return to default font.

&%SMF$2014.44~   Print Secure font command. **Note: The tilde ~ is the
                        command terminator.**

&%1B$(s0p12h1s0b4099T   PCL command to change the font to Courier 12 pitch Italic.
                        Print PCL Fonts from the Front Panel menu for a list of fonts
                        with their call commands.

&%1B$(3@   PCL command to return to the default font.

&%1B$(20000X!   PCL command to print font number 20000. In this example
                        font 20000 is a signature previously loaded into flash memory.
                        Here we call it and print it with an exclamation point (!).

&%1B$(3@   PCL command to return to the default font.

&%1B$&f0S   PCL command to Push (store) the current cursor position.

&%1B$*p296x3184Y   PCL command to move the cursor to 296X , 3184Y. At 300
                        units of measure, this is .97 inches across and 10.61 inches
                        down. We are precisely positioning the MICR line.

&%SMD....$ Print E-13B MICR Command. Prints the MICR line. **Note
                        the MICR font character mapping in Appendix A.**

&%1B$&f1S   PCL command to Pop (return) the cursor to the pushed
                        position.

Escape Character Translation

In many IBM host environments, the programmer cannot send an ESC character (ASCII hex 1B) to the printer from within the application. Your Secure MICR Printer allows you to define the ESC character as a printable character or a combination of two printable characters. You can select combinations of 1 or 2 characters which are translated to a Hex 1B when they are sent to the printer.

The command &%STYxxyy$ is used to select the character or character combination. The pair xx represents the first characters' ASCII hex value, yy represents the second characters hex value.

Example: The symbols @@ should be translated into the escape character:

&%STY4040$

After this is sent to the printer, anytime an @ @ is received in exact sequence, the pair is translated into the ESC character (Hex 1B). A single @ would print normally.

If yy is equal to 00, only the first character is used for the escape character.

Example: The symbol @ should translate into the escape character:

&%STY4000$

After this is sent to the printer, anytime an @ is received it is translated into the ESC character. This means that the printer will never print the @ character. The only invalid single characters are the **&** (HEX 26) and a null (00).

Example: **&%STY2300$ #&l8D**

The printer would translate the number sign (Hex 23) to the ESC character and it would act on the sequence Esc&l8D which will set line spacing to 8 lines per inch.

If you want to reset the ESC character translation from the previous settings then you can send the &%STY Command to deactivate the translation.

Example: **&%STY0000$**

8   Audit Trail Reports

The Audit Trail Report feature provides a report of the printer's MICR printing activity. The printer must have flash memory to utilize this option. Details of each flagged check record sent to the printer are provided since the last audit report was purged from flash memory.

Report Details

A record (check) must be bounded by a start of record command and an end of record command. Within each record, fields to be included in the Audit Trail Report must be flagged. The printer stores each record in flash memory. After the check is successfully printed, its record is designated as a successfully printed document in flash.

The report is built by printing each one of these check records as a line item. At the end of the report, an exception report is generated which highlights any records received by the printer but not successfully printed.

Each record (check) has a maximum of seven fields with a total of 146 bytes. **Two of the flagged fields, SQ1 and SQ7 are Audit Report fields only.** They are not printed on the MICR document. Flagging other fields for inclusion in the Audit Report does not effect how they print on a check.

Audit Trail Menu

The MICR menu contains a section for the Audit Trail options. Menu options are Record Sorting, Overlay, Sum Field 4 and Print Report.

Audit Record Sorting
Enables sorting of the report by the first 20 digits in the MICR line field.   In an unsorted report the records are in the order in which they were printed.

Overlay
To assist in reading an Audit Trail report you have the option of using a form overlay. This overlay can provide lines, boxes and shading for a more user friendly report format.

The Audit Trail Report overlay can be stored in printer flash or RAM. We recommend storing it in flash. It must have an ID of 5001. It is enabled by accessing the MICR menu via the printer's front panel. Select Audit Menu>Overlay. This overlay will now be merged with the record details every time the Audit Trail Report is printed.

Sum Field 4
The values in field four of the Audit Trail Report can be added together with the total provided at the end of the report. This feature is activated through the MICR menu. Select Audit Menu>Sum Field 4.

The values in field 4 must follow certain guidelines to be included in the column summation. Dollar signs and commas must be properly located, no more than two numbers after a decimal

point, and no alpha characters. For example:

Valid Formats	Invalid Formats
"$1,234,567.89"	"$1,23,"
"4321234.56"	"432.123"
"5,321"	"34 test"
"$.89"	"12$123"

If the value in field 4 is in an invalid format, that line will have a question mark to the right of the field and it will not be added to the total. Under these circumstances, the total will print with the notation "Fields flagged with '?' not included in total."

If the total exceeds $4,294,957,295.99 the printer will print an error message "Total exceeds maximum value" instead of the total.

Print Audit Report
Prints an Audit Trail Report.

The Audit Trail Report is also part of the command set so the Audit Report can be printed and purged via the host application. As a security control mechanism, purging is only possible after entering a valid password.

The printer can store approximately 6,000 records or checks for each megabyte of flash. If the Audit Report feature is activated, and the printer's flash memory becomes full, an error condition occurs. The printer will stop printing and prompt the operator to print and purge the Audit Report memory. See the following section for purge instructions.

Audit Trail Report Command Set

&%SAR$	Start Audit Record
&%SAR	Lead in sequence
$	Command terminator

Marks the start of an audit record and begins a PJL job.. This command must be inserted in the datastream after MICR Mode is entered and before the first flagged field appears. It should be sent at the beginning of each check record.

End Audit Record	**&%STORE$**
&%STORE	Lead in sequence
$	Command terminator

Ends the Audit Record and the PJL job (ignored if there was no Start Audit Record Command).

Audit Report Field One	**&%SQ1d..d$**
&%SQ1	Lead in sequence
d..d	Data to be stored
$	Command terminator

This command identifies the data to be printed in the first column of the report. It is a maximum of 14 characters in length. If less than 14 characters are sent, the printer fills the field with spaces when the audit report is printed. This field is recorded in the audit report only, it is not printed on the check.

Audit Report Field Two-MICR Line	**&%SMDd..d$**
&%SMD	Lead in sequence
d..d	Data to be printed
$	Command terminator

This command identifies the data to be printed in the second column of the report. It is a maximum of 40 characters in length.

Audit Report Field Three	**&%SQ3d..d$**
&%SQ3	Lead in sequence
d..d	Data to be printed
$	Command terminator

This command identifies the data to be printed in the third column of the report. It is a maximum of 40 characters.

Audit Report Field Four   **&%SQ4d..d~**

&%SQ4   Lead in sequence

d..d   Data to be printed

~   Command terminator

This command identifies the data to be printed in the fourth column of the report. It is a maximum of 16 characters in length. Since a total of this field can be provided at the end of the Audit Trail Report it is typically used for the convenience amount field. NOTE: This is the only command where the $ is not a command terminator. The tilde ~ (hex 7E) acts as the command terminator.

Audit Report Field Five   **&%SQ5d..d$**

&%SQ5   Lead in sequence

d..d   Data to be printed

$ Command terminator

This command identifies the data to be printed in the fifth column of the report. This field is a maximum of eight characters.

Audit Report Field Six   **&%SQ6d..d$**

&%SQ6   Lead in string

d..d   Data to be printed

$ Command terminator

This command identifies the data to be printed in the sixth column of the report. This field is a maximum of 19 characters.

Audit Report Field Seven   **&%SQ7d..d$**

&SQ&7   Lead in string

d..d   Data to be stored

$ Command terminator

This command identifies the data to be printed in the seventh column of the report. This field is a maximum of 12 characters. The data in this field is recorded for the Audit Report only.

Print and Purge Audit Report   &%SPURGExx$

&%SPURGE	Lead in string
x	option(s)
$	Command terminator

This command prints and purges the Audit Report. All recorded information is deleted. The optional field can be any combination of the following letters:

T	Sum Field 4
O	Overlay
S	Sort by MICR line

For example, the command &%SPURGES$ sorts the records by the MICR line while the command &%SPURGESO$ sorts the records by the MICR line and prints an overlay with the data.

Options can be forced on with these commands but they cannot be forced off. In other words, if the front panel overlay setting is on, it cannot be forced off by a datastream command. If the front panel overlay setting is off, however, a datastream command can activate this feature. This command can only be accessed with a valid password command.

Print Audit Report   &%SPRINTxx$

&%SPRINT	Lead in string
x	option(s)
$	Command terminator

The optional field can be any combination of the following letters:

T	Sum Field 4
O	Overlay
S	Sort by MICR line
U	Unsuccessful report only

Prints the Audit Report with the options listed above in the &%SPURGEx$ command with an additional U option, unsuccessful report only.

Figure 8.1 Audit Trail Commands Example

The following example shows the Audit Trail, MICR Mode and Hex Transfer commands in use.

```
&&??&% &%STFPASSWORD$ &%SMCP0001$ &%SAR$ &%STP10001$ &%STP20000$
&%1B266C31783073316832613634663036F3165316C372E3330431B2661304C
1B28733130481B266B31302E3030481B26663130303031793358$

                        1000

&%SQ1200$200        Vendor Systems
                                                                    Oct. 5, 2005

99999       Oct 1 05        1000.00        20.00        980.00
1234567     Oct 2 05         200.00         4.00        196.00
36784       Oct 3 05         800.00        16.00        784.00
555555      Oct 3 05         5 5.00         1.11         54.44

                        2055.55        41.11            2014.4
                    1000

200     Vendor Systems                                              Oct. 5, 2005

99999       Oct 1 05        1000.00        20.00        980.00
1234567     Oct 2 05         200.00         4.00        196.00
136784      Oct 3 05         800.00        16.00        784.00
555555      Oct 3 05          55.55         1.11         54.44

                        2055.55        41.11            2014.44


                    &%1B$(s1p16v0s3b4148T1000&%1B$(3@

                        &%SQ6October 5, 2005$

&%SMF$2014.44~
&%1B$(s0p12h10v1s0b4099T
***********Two Thousand Fourteen and 44/100*******DOLLARS &%1B$(3@
                &%SQ4$2014.44~

 &%SQ3 Vendor Systems$
        927 Warehouse Road
        Kansas City, MO    59782            &%1B$(20000X ! &%1B$(3@

&%1B$&f0S &%1B$*p296x3184Y &%SMD;00001000; :123456789:1234567890123:$
 &%1B$&f1S  &%SQ710:33:45 AM$            &%STORE$              &&??!!
```

Figure 8.2 Audit Trail Check Sample

Section 8: Audit Trail Reports

The datastream in Figure 7.1 will print the following check (assuming the check macro and signature are loaded as flash resources).

SOURCE TECHNOLOGIES

DUPLICATE FILE COPY   CHECK NO: 1000

VENDOR NO: 200   NAME: VENDOR SYSTEMS   CHECK DATE: October 5,   2005

REFERENCE NUMBER	INVOICE DATE	GROSS AMOUNT	DISCOUNT TAKEN	NET AMOUNT PAID
99999	Oct 1 05	1000.00	20.00	980.00
1234567	Oct 2 05	200.00	4.00	196.00
136784	Oct 3 05	800.00	16.00	784.00
555555	Oct 3 05	55.55	1.11	54.44
TOTALS		2055.55	41.11	2014.44

SOURCE TECHNOLOGIES

CHECK NO: **1000**

VENDOR NO: 200   NAME: VENDOR SYSTEMS   CHECK DATE: October 5,   2005

REFERENCE NUMBER	INVOICE DATE	GROSS AMOUNT	DISCOUNT TAKEN	NET AMOUNT PAID
99999	Oct 1 05	1000.00	20.00	980.00
1234567	Oct 2 05	200.00	4.00	196.00
136784	Oct 3 05	800.00	16.00	784.00
555555	Oct 3 05	55.55	1.11	54.44
TOTALS		2055.55	41.11	2014.44

SOURCE TECHNOLOGIES

2910 Whitehall Park Drive
Charlotte, NC 28273
(704) 969-7500

First National Bank
of Any State
Any City, NC 27514

CHECK No. 1000

66-156
531

DATE October 5, 2005

$2014.44

Pay

*********** Two Thousand Fourteen and 44/100 ***********DOLLARS

VOID

To the
Order of

Vendor Systems
927 Warehouse Road
Kansas City,   MO   59782

AMOUNT $2014.44

NON-NEGOTIABLE

⑈0000 1000⑈   ⑆1 2 3 4 5 6 7 8 9⑆1 2 3 4 5 6 7 8 9 0 1 2 3⑆

The commands in Figure 8.1 in order of appearance. (Audit Report fields shown in bold)

&&??&%   Hex transfer enable.

&%STFPASSWORD$ Password command.

&%SMCP0001$ MICR definition command with the count set to one.

&%SAR$ Activates Audit Report recording.

&%STP10001$ Unlock flash resource number 10001.

&%STP00200$ Unlock flash resource number 200.

&%1B26...3358$ PCL sequence in hex which sets the page format and enables macro number 10001.

&%SQ1200$200   Stores the vendor number 200 in the first position of the Audit Report. Note that this field will not be sent to the page to be printed. Here we send the field again so that it will print.

&%1B$(s1p16v0s3b4148T   PCL sequence which changes the font to Univers 16 point. After the check serial numbers prints (100), the printer is returned to its default font with the following command.

&%1B$(3@   PCL command to return to default font.

&%SQ6October 5, 2005$ Stores the date in the sixth position of the Audit Report.

&%SMF$2014.44~   Prints Secure Font command. **NOTE: Tilde (~) is command terminator.**

&%1B$(s0p12h10v1s0b4099T   PCL command to change the font to Courier 12 pitch Italic. See print PCL Fonts on the Front Panel under the test menu for a printout with their call commands.

&%1B$(3@   PCL command to return to the default font.

&%SQ4$2104.44~   Stores the amount in the fourth position of the Audit Report.

&%SQ3Vendor Systems $ Stores the payee, Vendor Systems, in the third position of the Audit Trail report.

&%1B$(200X!   PCL command to print font number 200. In this example font 200 is a signature previously loaded into flash memory. Here we call it and print it with an exclamation point (!).

&%1B(3@   PCL command to return to the default font.

&%1B$&f0S   PCL command to push (store) the current cursor position.

&%1B$*p296x3184Y   PCL command to move the cursor to 296X, 3184Y. At 300
                           dpi, this is .97 inches across and 10.61 inches down. We
                           are precisely positioning the MICR line.

&%SMD...$ Print E-13B MICR command. Prints the MICR line and
                           stores the MICR line information in the second position in
                           the Audit Report.

&%1B$&f1S   PCL command to pop (return) the cursor to the pushed
                           position.

&%SQ710:33:45 AM$ Here we send the time of print to the printer. The data is
                           recorded in the Audit Report but this field is not printed on the
                           page.

&%STORE$ Signals the end of a check and the end of Audit Report
                           recording.

&%??!!   Turns Hex Transfer off.

Figure 8.3 Audit Trail Report

Audit Report page1	Records 1 through 10 of 10	*indicates check did not print		**indicates gap in check numbers		
200	:00001000; :123456789: 12345678912345678:	Vendor Systems	$2,014.44		February 10, 2001	10:33:44 AM
200	:00001001; :562478923: 12345678912345678:	Classic Homes Construction	$28,576.72		February 12, 2001	09:45:40 AM
200	:00001002; :285946731: 12345678912345678:	Computer Source, Inc.	$55,600.00		February 14, 2001	01:00:26 AM
MSMITH	:00001003; :628499761: 12345678912345678:	Eastern Cleaning Supplies	$876.00		February 15, 2001	08:45:36 AM
MSMITH	:00001004; :559873164: 12345678912345678:	Dillon Consulting Company	$1,200.00		February 15, 2001	08:46:50 AM
MSMITH **	:00001006; :578642315: 12345678912345678:	Klaussen Enterprises	$449,466,800.00		February 15, 2001	08:47:32 AM
MSMITH	:00001007; :556791324: 12345678912345678:	Woods Paper Products	$89.95		February 15, 2001	08:49:45 AM
*PJONES	:00001008; :256988974: 12345678912345678:	Printers Quarterly	$899.99		February 19, 2001	09:35:40 AM
Administrator	:00001009; :123654987: 12345678912345678:	XYZ Insurance	$123,568.00		February 21, 2001	10:30:45 AM
T53DODER	:00001010; :155554897: 12345678912345678:	Carmine's Deli	$2,354.00		February 22, 2001	11:15:25 AM

SQ1=14 spaces **SMD**=40 spaces   **SQ3**=40 spaces   **SQ4**=16 spaces   **SQ5**=8 spaces   **SQ6**=19spaces   **Q7**=12 spaces

❶ ❷ ❸ ❹ ❺ ❻ ❼

NOTE: Each of the seven fields in the Audit Report holds a maximum number of characters. Those numbers are represented in BOLD above with their corresponding fields. Field 1 and Field 7 will not print on the check.

This Audit Report is just one example of a report format. Any of the seven fields can be manipulated to show any information the user feels is appropriate. For example, the check amount could be in field 3 rather than field 4; or field 5 could contain items such as taxes drawn on the check, check numbers, year-to-date accumulations, etc.

Each line is a record of a check that was printed. The top of every Audit Trail Report shows how many pages make up the report as well as the number of records that will print. The Audit Report can be printed in two ways: a sorted report or an unsorted report. A sorted report sorts all checks numerically by the first 20 characters in the MICR line field and prints asterisks (**) beside checks printed out of sequence. Sorting can be done via the front panel or by the commands &%SPRINTS$ or &%SPURGES$. An unsorted report lists checks in the order they were printed. An asterisk(*) at the beginning of a line states that the check number did not print.

In this example:

> **SQ1**= The authorized user who accessed the Audit Trail Report.
> **SMD**= Displays the client's check number, the bank institution's routing number, and account number.
> **SQ3**= The name of the payee (The name of the person or organization to whom the check was made payable).
> **SQ4**= The amount of the check.
> **SQ5**= Not used in this report.
> **SQ6**= The date the check was written.
> **SQ7**= The time that the check was printed.

All of the above fields will be printed on the check with the exception of field 1 and field 7.

9   Error Messages

Your Secure MICR Printer has a set of front panel error messages unique to MICR applications. These messages appear if there is a MICR related problem. The printer may also print an error message on the page near where the error occurred. In many cases you can receive more information about a displayed error by pressing Go to print the job which caused the error. Then inspect the printed page for a more detailed error message.

See list of MICR Error Messages on following page.

Error Message on Display	Printed Message	Description	Action
Can't Purge Pswd not enabled		This error indicates that MICR mode has not been enabled.	Press Go. Enter MICR mode, then re-attempt the purge.
Can't Sort Insufficient Memory		This error indicates the printer does not have sufficient memory to sort the Audit Report.	Press Go. The printer may need to be upgraded with more RAM memory to sort; otherwise an unsorted Audit Report may be printed.
Command Decode Error	Decode error &%Sx (where x is the incorrect character)	A syntax error was detected in a MICR command.	Check your software for a syntax error in the MICR command that was being used when the error occurred.
Convert to Esc Error	Invalid Convert to Escape Character	An error was detected in the User Programmable Escape Character Selection Command. The software tried to specify a NULL or an ampersand as the first Escape Character.	Check the Command (&%STY...) for errors.
Flash Full Purge and Format		This error message indicates that the printer's flash memory is full. The audit trail cannot accept more jobs until more space is available in flash.	Press Go then purge the audit trail. Then either defragment or format flash memory (Utilities Menu).
Load MICR Toner		Before printing a MICR font, the printer checks for MICR toner. If regular toner is present, the printer will stop all printing and display this message.	Replace standard toner cartridge with a MICR Toner. Go to proceed. If MICR toner is not available, you must power-off your printer and restart the print job at a later time when MICR toner is available.
Macro Definition Error	Invalid decode mode specified	The Load Flash Resource Command contained an invalid character specifying the format of the file. Must be either a D or S.	Check the Command (&%STL...) for syntax errors.
Macro Definition Error	Macro ID already in use on SIMM. Print menus to see a list of used ID's.	The resource number in the Load Flash Resource Command (&%STL...) was over the 32767 list.	Check the Load Flash Resource Command for syntax/numbering errors.
Macro Definition Error	Macro size exceeds available space	Flash resource file size specified in the Load Flash Resource Command is too large fro the available space remaining in the flash module.	Format flash memory to remove all existing resources or upgrade flash memory to a larger module.
Macro Definition Error	Non-hexadecimal value received.	The Load Flash Resource Command contained a non-hexadecimal value in the byte count parameter.	Check the Command (&%STL...) syntax for errors.
Macro Definition Error	Non integer value received.	The resource number in the Load Flash Resource Command (&%STL...) was not five integers.	Check the command for syntax/numbering errors.
Macro Transfer Error	Integer string incorrect length	The Flash Resource Number in the Secure Flash Resource Unlock Command was not five digits in length.	Check the Command (&%STP...) for syntax/numbering errors.
Macro Transfer Error	Non-integer value received.	The Secure Flash Resource Unlock Command contained a non-integer value.	Check the Command (&%STP...) for syntax/numbering errors.
MICR Definition Error		The number of digits in the MICR definition Command is not equal to four, or there is a non-hexadecimal character in the count.	Check your software for errors in the MICR definition Command.
MICR Password Error	Password Length Error.	Password length is not equal to eight characters.	Check the Password Command in your software, it must be eight characters long.
MICR Password Error	Password Match Error	Password sent does not match the current stored password.	Check the Password Command in your software.
MICR Password Error	Security Lock Not Enabled Error.	Front panel combination feature has been enabled but was not entered before a MICR job was started.	From the front panel select MICR Menu>Security Lock and enter the correct combination. Press Go to resume the print job.
Security Lock Error	Integer string incorrect length.	An error was detected in the Activate/Set Front Panel Combination Lock Command. The combination must be eight digits in length.	Check the Activate/Set Front Panel Combination Lock Command in your software.
Security Lock Error	Non-integer value received.	An error was detected in the Activate/Set Front Panel Combination Lock Command. A character was received in the command that was a non-integer.	Check the Activate/Set Front Panel Combination Lock Command syntax in your software.

Appendix A: E13B MICR Font Mapping

Command   **&%SMDddd..ddd$**

MICR Font Character	Description	Alpha/Numeric Values[1]	Hex Values
	Amount Symbol	A a /	41 61 2F
	Transit Symbol	T t B b :	54 74 42 62 3A
	On-Us Symbol	O o C c ;	4F 6F 43 63 3B
	Dash Symbol	V v D d - =	56 76 44 64 2D 3D
0	Zero	0	30
1	One	1	31
2	Two	2	32
3	Three	3	33
4	Four	4	34
5	Five	5	35
6	Six	6	36
7	Seven	7	37
8	Eight	8	38
9	Nine	9	39

Example: &%SMD ;00001234; T01234567T3210987654321;$ **will print:**

[1]Select only one alphanumeric character to call the font.

Appendix B: CMC7 MICR Font Mapping

Command   **&%SM7ddd..ddd$**

Description	Alpha/Numeric Characters	Hex Values	CMC7 Font Values[1]
Zero	0	30	
One	1	31	
Two	2	32	
Three	3	33	
Four	4	34	
Five	5	35	
Six	6	36	
Seven	7	37	
Eight	8	38	
Nine	9	39	
Colon	:	3A	
Semi-Colon	;	3B	
Less Than	<	3C	
Equal	=	3D	
Greater Than	>	3E	

[1]The CMC7 Font in the example above is magnified for purposes of clarity.

Appendix C: Secure Numeric Font Mapping

Command	&%SMFddd...dd~		
Description	**Alpha/Numeric Character**	**Hex Value**	**Secure Font Character**
Dollar Sign	$	23	
Left Bracket	(	28	
Right Bracket	)	29	
Asterisk	*	2A	
Comma	,	2C	
Dash	-	2D	
Period	.	2E	
Slash	/	2F	
Zero	0	30	
One	1	31	
Two	2	32	

Appendix C continued: Secure Numeric Font Mapping

Description	Alpha/Numeric Character	Hex Value	Secure Font Character
Three	3	33	
Four	4	34	
Five	5	35	
Six	6	36	
Seven	7	37	
Eight	8	38	
Nine	9	39	
Arrow	>	3E	

Example: &%SMF($>>>1,123.00)~   will print......

NOTE: The secure fonts in the example are magnified for purposes of clarity.

Appendix D: ICR Secure Numeric Font Mapping

Command   **&%SMIxxxxxx~**

Description	Alpha/Numeric Character	Hex Value	Character
Zero	0	30	
One	1	31	
Two	2	32	
Three	3	33	
Four	4	34	
Five	5	35	
Six	6	36	
Seven	7	37	
Eight	8	38	
Nine	9	39	
Asterisk	*	2A	
Comma	,	2C	
Period	.	2E	
Dollar Sign	$	23	

NOTE: The secure fonts in the example are magnified for purposes of clarity.

Appendix E: MICR Mode Command Summary

Description	Command	Structure Function
Password	&%STFPASSWORD$ &%STHPASSWORD$	Must be sent to enable MICR Mode
MICR Definition	&%SMCPxxxx$	MICR Line Count command
Set New Password	&%STExxxxxxxx$	Sets new password, must be preceeded by current password
Activate/Set Front Panel Combination	&%STSxxxxxxxxx$	Turns on and sets Front Panel Combination Lock, must be 8 integers
Print MICR E13B Font	&%SMDddd...ddd$	Prints E13-B MICR Font at the current print position, see Appendix A
Print MICR CMC7	&%SM7ddd...ddd$	Prints CMC-7 MICR font at the current print position, see Appendix B
Print Secure Numeric Font	&%SMFddd...ddd~	Prints the Secure Numeric Font at the current print position **Note:** The tilde is the command terminator, see Appendix C
Print ICR Secure Numeric Font	&%SMIxxxxxx~	Prints the ICR Secure Numeric Font at the current print position, see Appendix D
Print in MicroPrint	&%SMMxxxxxx$	Prints data in MicroPrint font.
Load Flash Resource	&%STLxxxxxyyyyyyzddd...dd$	Loads a Flash Resource file into password protected Flash Memory
Format Flash Memory	&%SFF$	Formats Flash Memory **Caution: All flash contents will be lost**
Flash Resource Unlock	&%STPxxxxx$	Makes Flash Resource Command available to be called, must be 5 integers
Tray Lock Command	&%STTL#$	Locks Tray 1, 2 or 3 for MICR printing
Unlock Tray Command	&%STTU#$	Locks Tray1, 2, or 3
Tray Swapping Commands	&%STTSON &%STTSOFF$	Turns tray swapping ON Turns tray swapping OFF
Quit MICR MODE Command	&%STQ$	Terminates MICR Mode

Appendix F: Audit Report Command Summary

Description	Command	Structure Function
Start Audit Record	&%SAR$	Activates Audit Trail and begins PJL job
Audit Report Field One	&%SQ1.d$	Records first field on the Audit Report - does not print
Print MICR E13B Font	&%SMD..d$	Print and records MICR line
Audit Report Field Three	&%SQ3d..$	Records third field on the Audit Report
Print the Check Amount	&%SQ4d..d~	Records fourth field of the Audit Report and prints the check amount
Audit Report Field Five	&%SQ5d..d$	Records fifth field of Audit Report
Audit Report Field Six	&%SQ6d..d$	Records sixth field of Audit Report
Audit Report Field Seven	&%SQ7d..d$	Records seventh field of Audit Report - does not print
Print Audit Report	&%SPRINT$	Prints Audit Report
End Audit Record	&%STORE$	Ends Audit Record and PJL Job
Print and Purge	&%SPURGE$	Prints and purges the Audit Report **Caution: All previous Audit Report information will be lost.**
Format Flash Memory	&%SFF$	Formats flash memory. **An error will occur if Audit Report has not been purged.**
End MICR Mode	&%STQ$	Ends MICR Mode

ADDENDUM
New Features

Custom Character Conversion Command

The Custom Character Conversion Command can be used to resolve some problems in printer data streams. An example might be to remove a special command character in an existing data stream that was used by your previous printer hardware. Without changing your data stream, these special characters can either be removed, converted to Nulls, or converted to other sets of data to accomplish what is required.

An example of this might convert a Skip Command used by an older generation printer to multiple Carriage Return / Line Feed commands. You could also store a PCL5 command in our SIMM and call it with one character in your data stream. Only one type of conversion is permitted at any particular point in time, but the function can be modified within a data stream multiple times.

The conversion information is stored in NVRAM and is retained through power off / power on cycles. This means you could send the command one time and all future print jobs would be converted. Special precautions are required if printer fonts and Macro's are downloaded to your printer. This might require you to disable the function during downloads and re-enable prior to your print data.

&%STCxx[yy...]$ xx is a double-byte character to convert - the following characters are not allowed: &, %, S, T, C, and $.

yy... is a double-byte string to convert to - can be 0 to 16 characters long

$ command terminator

Example:
&%STC1E0D0A$ sets the convert character to 1E - the printer will replace any 1E character in the data stream with 0D 0A (carriage return, line feed)

&%STC1E$ replace 1E with nothing - simply removes all 1E characters from the data

&%STC00$ turn character conversion off

Special Alert and Custom Beep Command

Using the Beep Command, the print data stream can alert printer operators that important pages are currently being printed. The STBEEP1 command sounds its special beeps but does not stop the printer. STBEEP2 stops the printing process and waits for the operator to Press Go.

The Custom BEEP can be used to create an alternative beep pattern to STBEEP1. This could be used to indicate a certain document, a custom signal to a different operator, or just an alternative of your choice to STBEEP1. The Custom Beep command will not stop the printing process.

NOTE: Beep Commands will not chain or link together. You cannot play Beethoven's 5th Symphony. During the execution of a beep pattern, all other beep commands are eaten. Two important documents could be sent to the printer one after the other, both with beep commands, but the pattern would only occur one time.

NOTE: The two digit frequency value is inverted. The higher the value, the lower the frequency.

&%STBEEP1$	plays 3 long beeps, 3 short beeps, 3 long beeps and 3 short beeps.
&%STBEEP2$	displays the message "Press Go to stop beeping" on the front panel and repeatedly plays 5 long beeps
&%STBEEPnnffdddd$	plays a custom beep - nn is a two digit number of beeps (0-63) ff is a two digit frequency (0-63) dddd is a four digit duration (0-1023)

Example:
&%STBEEP02250300$ plays 2 long (duration 300) beeps at a frequency of 25.

Start Audit Feedback Command

&%SAF$

The printer will report to the host that sent this command every time an audit job successfully prints.
Each report will be a 151 byte string:

byte 1	STX (0x02)
bytes 2-15	field 1 of the audit record (from SQ1)
16-55	field 2 (from SMD)
56-95	field 3 (from SQ3)
96-111	SQ4
112-119	SQ5
120-138	SQ6
139-150	SQ7
151	ETX (0x03)

The printer will continue to report until it is powered off and back on.

New Option on the &%SPRINT$ and &%SPURGE$ Commands:

In addition to the T, O, S, and U optional fields, we now have a C.

C will cause the report to be transmitted to the host instead of printed.

The report begins with SOH (0x01) and ends with EOT (04). Since the reports can be quite long, they will likely be broken into separate buffers which may be interspersed with non-audit buffers such as PJL JOB status. Each buffer will begin with an STX character (0x02) and end with ETX (0x03).

Each record will be terminated with a carriage return-line feed (0x0D 0A)

Example:
Send the &%SPRINTSTC$ command.
The printer will respond with a sorted report (S option) with field 4 totals (T option).