User guide

Internal Lockbox
Coupon & Envelope Design

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Definitions

The purpose of this document is to aid in the overall design and use of remittance documents and envelopes. Not only will better designed documents improve operational efficiencies (thus saving you money), some design criteria enable newer technologies, allowing the Bank to offer features that were previously unavailable. While the focus of this document is on image-enabling features of document design, basic design considerations are also covered. When there is a business need for multiple coupons it is important to maintain design consistency.

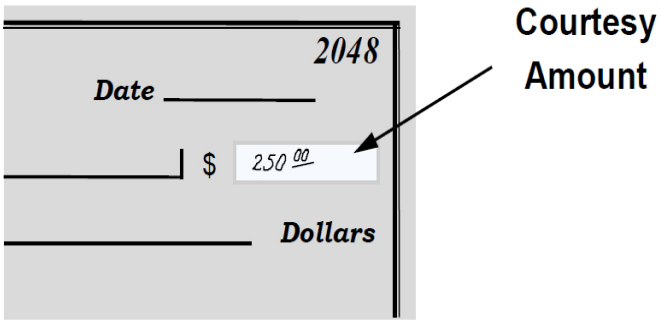
NOTE: Please consult with Lockbox Operations prior to making changes to your coupon layout. Coupon samples must be tested prior to mailing. Programming charges may apply.

Following are key imaging definitions that will be utilized throughout the document:

1. **OCR:** OCR stands for "Optical Character Recognition". This typically refers to systems that recognize printing generated by a machine. While systems recognize a variety of font types, some fonts yield better results (such as Courier, OCR B, OCR A and Helvetica).

2. **ICR:** The term ICR stands for "Intelligent Character Recognition". This typically refers to systems that recognize printing generated by a human.

3. **CAR:** While this technology could use either OCR or ICR, Courtesy Amount Read (CAR) is applied specifically to the automated recognition of the Courtesy (or Convenience) Amount Fields from images of checks and stubs. These systems are focused on translating numbers, not characters. The image below shows an example of a CAR amount.



4. **Mark Sense:** While OCR, ICR and CAR are trying to interpret something read from a document, Mark Sense simply detects if any mark (typically man made) exists in a pre-determined area of the document. The system can then display images of only those documents that contain such mark(s).

5. **Coupon Layout:** A coupon layout includes the scanline, mark sense boxes and the arrangement of all elements on the coupon.

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Document Design

The basic design elements that must be considered to maximize efficiencies and enable character recognition and mark sense detection are:

- Constraint / Data Entry Boxes
- Ink
- Mark Sense Detection
- Paper
- Physical Characteristics
- Scanline Characteristics
- Envelope Characteristics

Constraint/Data Entry Boxes

The most important factor in getting successful results from character recognition and mark sense systems is controlling what is written on the document, where its written and how its written. Constraint boxes are used to do this, down to the character if necessary. Figures 2 through 5 show various examples of constraint boxes and how they could be used.

Fig. 2 - Free Form field, Handwriting Restraint

Fig. 3 - Alpha / Numeric field, Character Restraint

Fig. 4 - Numeric field, Character Restraint

Fig. 5 - Date field, Character Restraint

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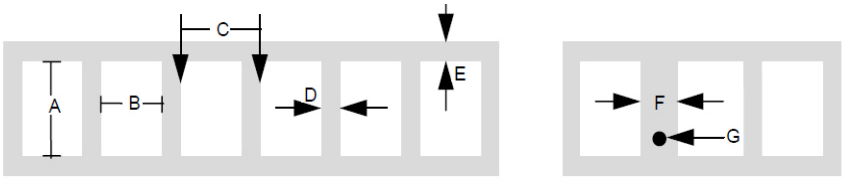
Document Design

The proper use of constraint boxes is important to successful results. Figure 6 shows typical dimensions that should be adhered to.



Legend	Constraint Feature	Dimension (Inches)
A	Inside Height	0.220
B	Inside Width	0.160
C	Box to Box Spacing	0.200
D	Vertical Guideline Width	>0.04
E	Horizontal Guideline Width	>0.04
F	Guideline Width Between Dollars & Cents	0.100
G	Decimal Point Diameter	0.030 - 0.050

Fig. 6

The final factor in designing successful constraint boxes is maintaining the proper clear space between all fields. For best results, keep 1/4" space between:

1. The top of a field and
   - the top edge of the document.
   - the bottom of another field.
   - any text on the document.
2. The bottom of a field and
   - the bottom edge of the document.
   - the top of another field.
   - any text on the document.
3. The left of a field and
   - the left edge of the document
   - the right side of another field
   - any text on the document
4. The right of a field and
   - the right edge of the document
   - the left side of another field
   - any text on the document

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Ink

After you have controlled where your customers can write, you need to make sure the constraint boxes will not be seen by the scanners. This is determined by selecting the proper inks and controlling how the ink is printed. Your choice of ink color and screening level will dramatically impact an imaging system's ability to find and interpret the data you want.

Dropout Inks / Screening

"Dropout Ink" refers to ink that is printed in such a way that scanners don't see it. The technique used by printers to achieve this is called "screening". Screening is a method of pushing ink through a screen onto paper that results in a pattern of dots surrounded by white space, and is measured in percentages. A 10% screen means that 10% of the areas being printed will contain ink.

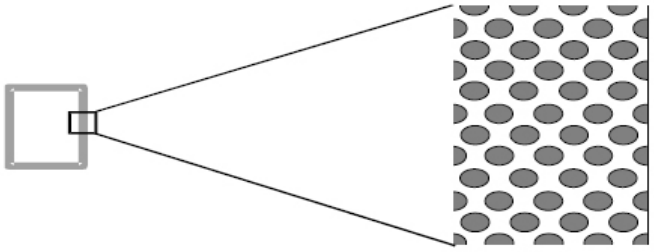

Fig. 7

The recommended screen for low-contrast box outlines is 5 %, using a 120 to 150 lines-per-inch screen.

Color

Most printers use a brand of ink (Flint InkTM , Pantone, etc) that is designed for dropout and is preferred for forms to be scanned. The key with these inks is color, screening and/or mixing. While black/gray can be printed using a 5% screening (or about a 30:1 white-to-color ratio), most pastel colors will yield far better resulting. Listed below are a few colors that drop-out with many types of scanners:

- Lavender
- Blue
- Green
- Yellow
- Pink

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Visibility to Humans

- **Color**: Brighter color inks such as orange or green that have the proper contrast level are more readily seen than gray ink of the same contrast level.
- **Broader Borders**: The border line between boxes should be > 0.040" (see figure 6).

Mark Sense Detection

A feature that detects human made marks in a pre-defined area. Mark sense is most accurate when dropout ink is used. (See page 7 above). The scanner picks up the mark in the pre-defined area and a report is created with the image that are identified by this process.

Paper

Considerations in selecting paper includes:

- **Document size**
- **Paper weight**
  - 24 lb. is preferred
  - Paper less than 20 lb. should not be used
- **Paper Grain**: If the paper is less than 24 lb., then the grain must be in the long direction.
- **Cost**

Try to use a common size and design for your forms. This should reduce the printing cost and should optimize scanner throughput, since forms of like size feed more smoothly through a scanner than forms of intermixed sizes.

Physical Characteristics

The physical characteristics of the remittance document should observe the following guidelines:

- **Dimensions**
  - The remittance document should be 1/4" less in width and height than the envelope.
  - Document Minimums
    - Length: 4.875"
    - Height: 2.75"
    - Length to height ratio: 1.5 : 1
  - Document Maximums
    - Length: 9.25"
    - Height: 4.75"
    - Length to height ratio: 3 : 1

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- **Edges**
  - Leading edge should be die-, knife- or laser-cut.
  - Bottom edge should be die-, knife- or laser-cut.
- **Perforations**
  - Perforations should be avoided if possible.
  - **If perforations are necessary, design the statement/remittance document such that the perforation is at the top or left edge of the remittance portion.**
  - Position the perforation on the remittance documents so that it will not have any fold lines after separation.
  - If perforations are required, request laser-cut or “clean” perforations.

Scanline Characteristics

- **Size:** Maximum scanline size is 80 characters.
- **Position**
  - At least 0.25” from all document and field edges.
  - Right justified on remittance stub.
- **Clear Band:** This is the white area that surrounds the scanline and contains no printing.
  - Should extend the length of the document.
  - Centerline between 0.35” and 3.875” from the bottom of the document.
  - Minimum of 0.5” high.
  - Avoid printing on the reverse side of the clear band.
- **Bottom of print area:** The bottom of the print area can be from 0.25” to 4.0” from the bottom of the document.
- **Font**
  - OCR-A or OCR-B.
- Scanline can contain all alpha, all numeric, or a combined alpha numeric character. **All alpha characters must be upper case.**
  - 10 characters per inch.
- **Check Digit(s):** The use of Check Digits on the entire scan line (as well as portions, like account numbers) are recommended. Following are best practices.

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Check Digit Best Practices

Check Digit Routine

The scanline includes a check digit for the scanline and is used to reduce keying errors. The check digit is the 19th digit from the left in the scanline. The routine used for this calculation is as follows:

1. Multiply each of the digits by the appropriate weight. The weights are applied to the scanline from **right to left**, 2,1,2,1,2,1,2,1,2,…
2. Sum the digits of step 1.
3. Divide the product by 10.
4. Subtract the remainder from 10; the result is the check digit. If the remainder is zero, the check digit is zero.

Check Digit Routine Example

1. Example Scanline: **00002325292500000420 (5 check digit)**
2. Multiply each of the digits by the appropriate weight.

0	0	0	0	2	3	2	5	2	9	2	5	0	0	0	0	0	4	2	0
1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
0	0	0	0	2	6	2	10	2	18	2	10	0	0	0	0	0	8	2	0

3. Sum the digits.
   0+0+0+0+2+6+2+1+0+2+1+8+2+1+0+0+0+0+0+0+8+2+0=35
4. Divide the number by 10.
   35/10 = 3 with a remainder of 5, 10 – 5 = 5

   Scanline Check Digit = 5

   NOTE: If there are alpha characters in the scanline, there are two methods that can be used to calculate the check digit.

   Method 1: When multiplying the scanline digits with weight, we substitute the alpha characters A – Z with zeros. Then the numbers are only considered during the calculation process. Please see example below.

   Method 2: In some instances, method 2 is also used for the calculation. Please see example below.

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Method 1	
A=0	N=0
B=0	O=0
C=0	P=0
D=0	Q=0
E=0	R=0
F=0	S=0
G=0	T=0
H=0	U=0
I=0	V=0
J=0	W=0
K=0	X=0
L=0	Y=0
M=0	Z=0

Method 2	
“ “=0	“M”=4
“A”=1	“N”=5
“B”=2	“O”=6
“C”=3	“P”=7
“D”=4	“R”=9
“E”=5	“S”=2
“F”=6	“T”=3
“G”=7	“U”=4
“H”=8	“V”=5
“J”=1	“W”=6
“K”=2	“X”=7
“L”=3	“Y”=8

Envelope Specifications

Envelope Size

- OPEX System 150
  - Length: 6.00” to 9.50” (shorter envelopes preferred for speed)
  - Height: 3.50” to 4.40”
- OPEX System 100
  - Length: 6.00” to 9.50” (shorter envelopes preferred for speed)
  - Height: 3.50” to 4.125”
- OPEX MPE 5.0
  - Length: 6.00” to 9.50” (shorter envelopes preferred for speed)
  - Height: 3.50” to 4.375” for standard machine and 4.5” to 5.75” for tall mail machine
- OPEX Model 51
  - Length: 5.00” to 11.50”
  - Height: 3.50” to 6.375”

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Paper Properties

1. Stiffness
   - High stiffness is always desirable. Basis weight may vary slightly from the values below if stiffness is maintained.
2. Paper Basis Weight
   - Uncoated White Wove: 20# minimum.
   - Coated White Wove: 70# minimum, matte finish preferred.
   - Recycled: 24# minimum (request testing for lighter weights).
3. Thickness
   - All envelopes to be run together as a single job must be of the same design and overall thickness. Envelope thickness variations exceeding .001" will degrade the quality of the extractor's thickness outsorting.
   - Although worst case paper thickness tolerances within the paper manufacturing industry allow greater variation than specified above, field experience has proven that real life variations can be maintained as specified by high quality vendors.
   - Single paper supply sourcing is highly recommended for each envelope size or style used.
4. Finish
   - Extremes of smoothness and coarseness should be avoided. Very smooth (highly calendared) envelopes may be slippery or retain ink poorly. Very coarse (toothy) envelopes are difficult to feed and stack.
5. Porosity
   - Low paper porosity is preferred. Failed extractions due to "bleed through" will be reduced as the porosity is decreased.
6. Color
   - Image-based functions rely on print contrast against the paper. For this reason, dark colored paper should be avoided if image functions (Postnet Bar Code read, Change of Address, Mark Sense, Bent Corner detection) are desired.

Printing On The Envelope

- Heavy printing under the glue line of the envelope flap will prevent the glue from adhering properly. If the flap or back seams are not fully sealed, an increase in paper jams and other serious extraction problems will occur.
- Heavy printing, particularly on high gloss coated papers, will cause ink to transfer to paper handling components and increase down time for maintenance of those items.
- Printing on the corners of the envelope will prevent optical detection of folded corners and should be avoided to optimize performance.

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Envelope Construction
Envelope designs that result in damage from Post Office handling (torn windows or flaps, crumpled, previously opened, etc.) will create problems for automated extraction equipment. The contact area of the envelope with the extraction mechanism must be structurally sound after cutting. The envelope sides must be connected securely to the contact area.

Trapping of Contents
Side seam envelope constructions may allow checks to become trapped under side seams, which may result in failed extractions. While these failed extractions may not cause the machine to jam, they will significantly increase manual processing of "reunites." The following are ways to minimize or eliminate the possibility of contents being trapped.

1. Shorten the length
   - If the envelope is short enough to prevent a 6" personal check from being inserted under the side seam, the problem is eliminated. This can be accomplished by either shortening the envelope or increasing the width of the side seam. (Side seam widths over 1" are not recommended; however, and the seam flap must be securely glued not more than 1/8" from its inside edge).
2. Use a Back Window
   - Checks cannot be trapped under the flaps of a side seam envelope if the window is placed on the back of the envelope. The return document, correctly inserted by the customer, shields the check from the side seams.
3. Use a Diagonal Seam Construction
   - Checks cannot be trapped under the flaps when the envelope is constructed using the diagonal seam design.
4. Secure the Side Seam
   - Specify that the side seams by securely glued within 1/8" from the inside edge of the seam. A double glue line rather than a wide glue line may be required to accurately secure the outside of the seam at the same time.

Glue
Exposed glue on the inside of the envelope is unacceptable. Special attention should be paid to the glue on the flap. Even when poorly closed, the glue should not be exposed on the inside of the envelope. Flaps and windows should be glued securely and as near to their edges as possible without exposing glue inside the envelope.

Fold Quality
Folds should be adjusted such that the corners are perfect or open. Over-folded corners (ears) will require that the cut depth be increased to ensure complete opening.

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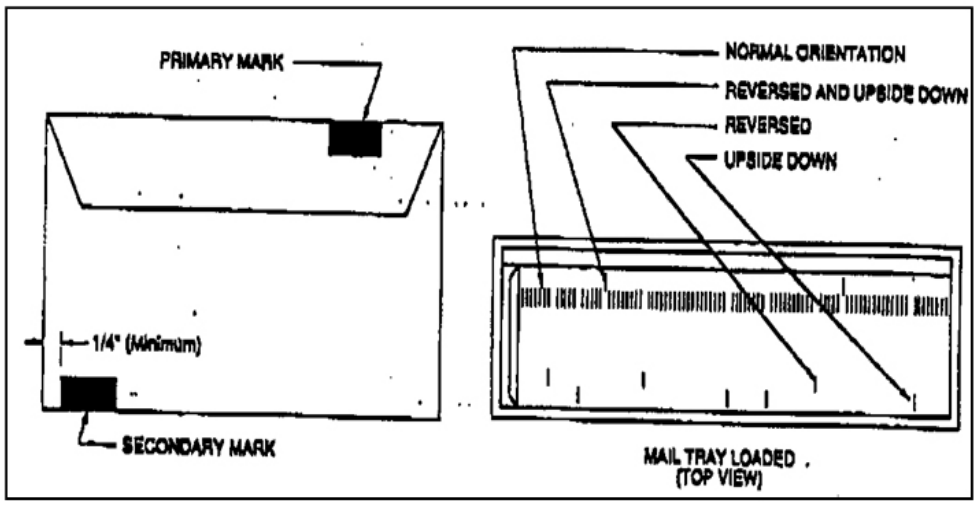
Throat
A tapered throat is preferred to enable full customer insertion of the documents. This minimizes the probability of the customer's documents being folded over with the glue flap.

Flap Length
- System 150
  - Long seal-flaps must fall at least 1/2" from the bottom edge of the envelope.
- System 100
  - Long seal-flaps must fall at least 2" from the bottom edge of the envelope.
- MPE 5.0
  - Long seal-flaps must fall at least 3/4" from the bottom edge of the envelope.

Bangtail (advertising flap)
Bangtails can be accommodated, but should be designed to encourage easy removal. Attached bangtails sometimes cause misfeeds and will always result in reunites or other exceptions which must be handled manually.

Static Electricity
Control of static during the manufacture and insertion of envelopes, particularly those with covered windows, is recommended. Laser printed documents should be discharged after printing.

Orientation Marks
Orientation marks on the edges of envelopes are highly recommended to assist in confirming orientation during mail preparation. Misoriented input will cause either output rejects or misoriented documents in the output. A very effective dual orientation mark system is shown below that highlights all misorientations while the mail is still in the tray or on the feed conveyor.



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Windows and Window Location
While virtually any windowed envelop can be made to run on automated equipment, optimum performance is achieved by proper window placement and construction. Improper placement of the envelope window can severely degrade the performance of high speed automated extraction equipment. Two rules apply:

- The opening mechanism (suction cup or friction) must not overlap uncovered windows.
- The area (and closely adjacent areas) where the opening mechanism operates must be structurally intact and free of damage. A common problem of this type occurs when an uncovered window is located too near to the edge of the envelope and is torn by Post Office sorting equipment.

Uncovered Windows
The key elements for good performance using an uncovered window are size and location. Window size should be minimized. Large uncovered windows create structural weaknesses and Postal damage due to “snagging” in the stackers. The window location must conform to the requirements for the extraction machine used to process the mail. (See diagrams on the next page.)

TIP: If the return address can be printed on the envelope and only the Company name shows through the window, a small uncovered window can be used resulting in a cost effective high performance design.

Covered Windows
These are preferred when the window must be large or when the window location causes the problems mentioned above. The primary concern when using covered windows is the tendency for the covering material to retain static electricity inside the envelope. If the window is in the extract area, this can cause contents to stick to the window and result in missed extractions (reunites). Reunites increase the customer’s manual exception processing work.

Window patch material may not be located within 1/8” of any edge of the envelope to prevent slivers from being created during the cutting process.

Covering Materials
Glassine holds much less static electricity than plastic patches. However, it is somewhat opaque (it looks like waxed paper) and may sometimes present problems reading a barcode through the window. Plastic patch material is very clear, but can hold a significant static electric charge.

Diagrams
Both covered and uncovered window envelopes can be processed at peak performance if the envelope windows are located according to the following specifications.

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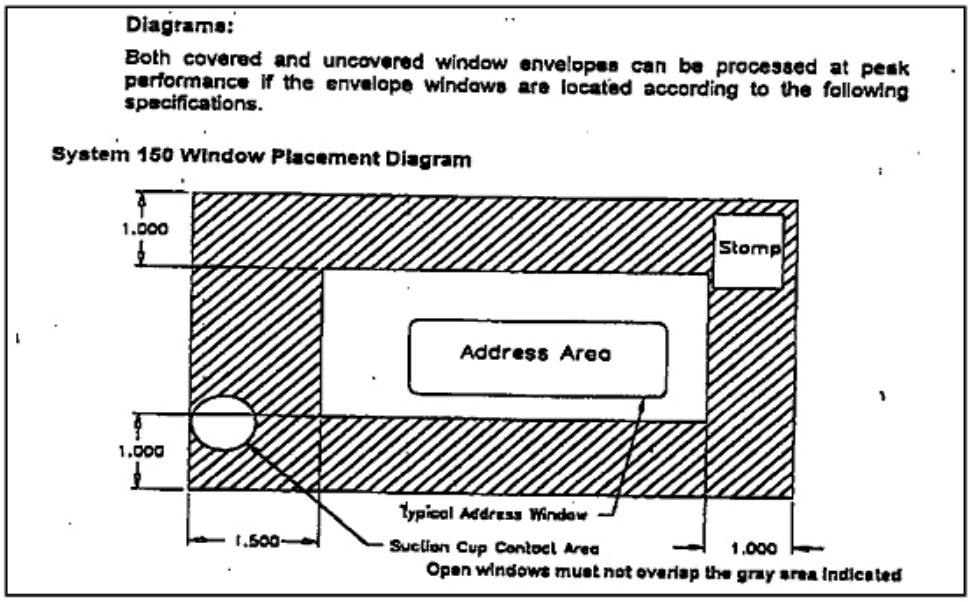
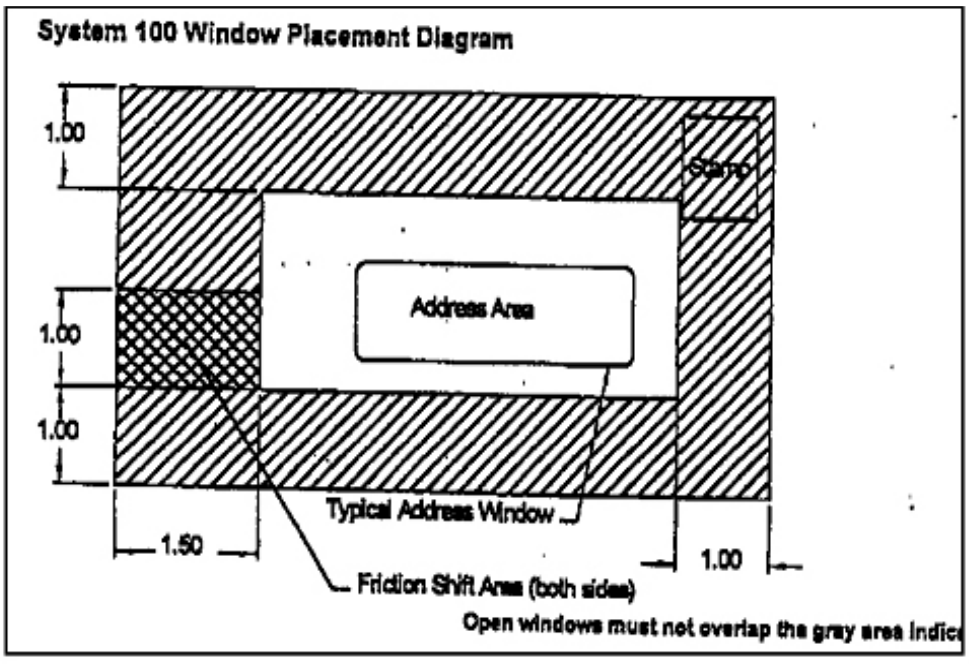
System 150 Window Placement Diagram



System 100 Window Placement Diagram



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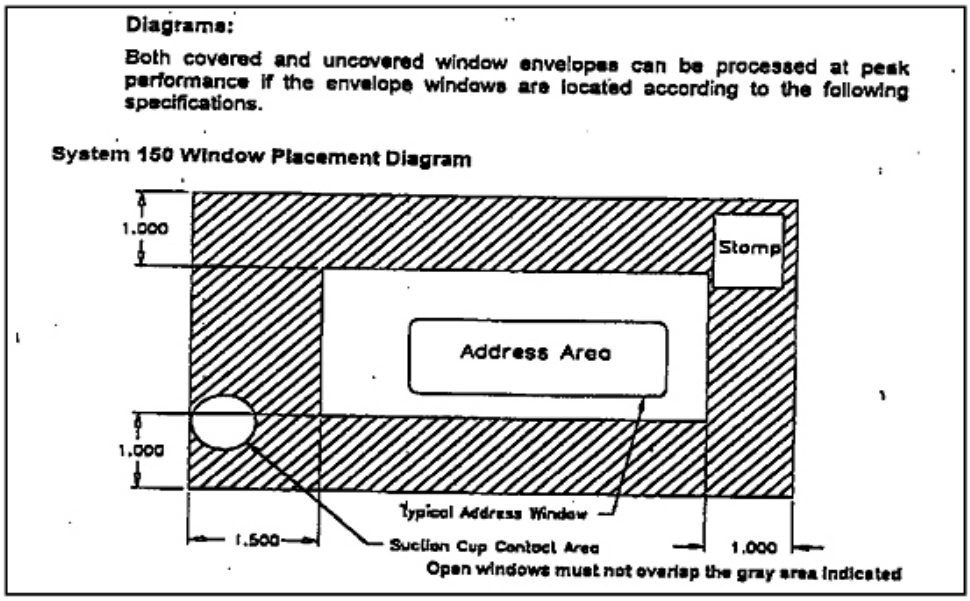
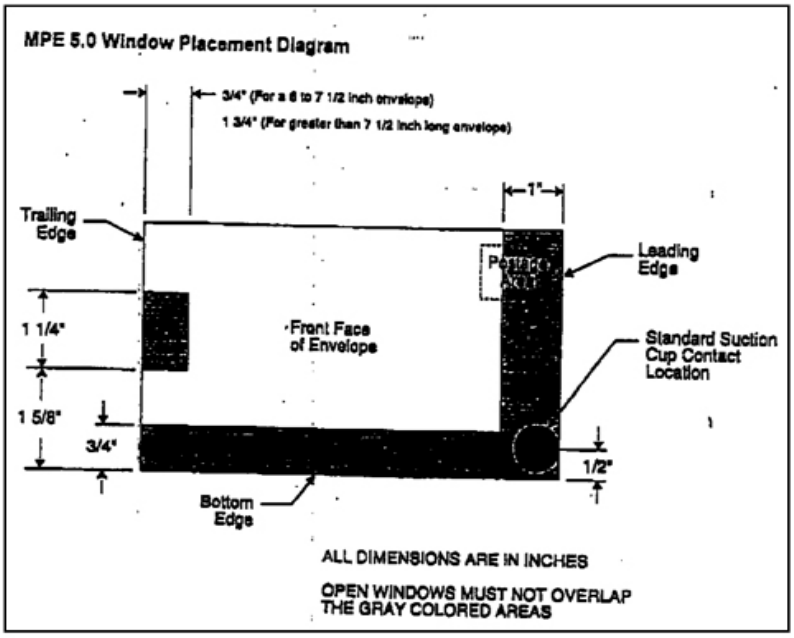
System 150 Window Placement Diagram



MPE 5.0 Window Placement Diagram



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Return Document Specifications

Size
The return document should be sized for a comfortable fit within the return envelope. Recommended clearance is 1/8 inch all around. A fit, which is too tight, can cause folding and damage. A fit which is too loose requires a larger window.

Paper Basis Weight
18 to 24 lb. preferred (high stiffness preferred).

Paper Thickness Variation
All documents to be run together as a single "job" must be of the same size and thickness. Document thickness variations exceeding .0004" will degrade the quality of thickness outsorting.

Miscellaneous
Holes in the document are not allowable. Perforated edges should be minimized. When they are needed, a fine perforation is required to prevent sloppy torn edges. If an edge is perforated, the top edge is preferred.

Orientation Feature On The Documents
A cut upper corner on the document can be helpful because mis-oriented items stand out in a finished stack of work.

Document Orientation: Mark Sense
The system 150 and the System 100 are capable of determining the orientation of documents. This optional feature acquires images of both sides of the document and determines document orientation based on the location of characteristic marks.

In order for a feature on a document to be used as an orientation mark, it must meet three requirements.

1. The mark must be recognizable to the scan system. A mark will be recognized by the scan system if there is a significant difference in contrast between the mark and the background area surrounding the mark.
2. The orientation mark must not be located near the center of the document. A mark near the center of the document will provide no useful orientation information. An off-center mark will appear to change position when the document orientation is changed. On the sample document shown below, the ABC logo would satisfy requirement three. The example illustrates how the mark will appear to change position if the document is viewed right side up and upside down.

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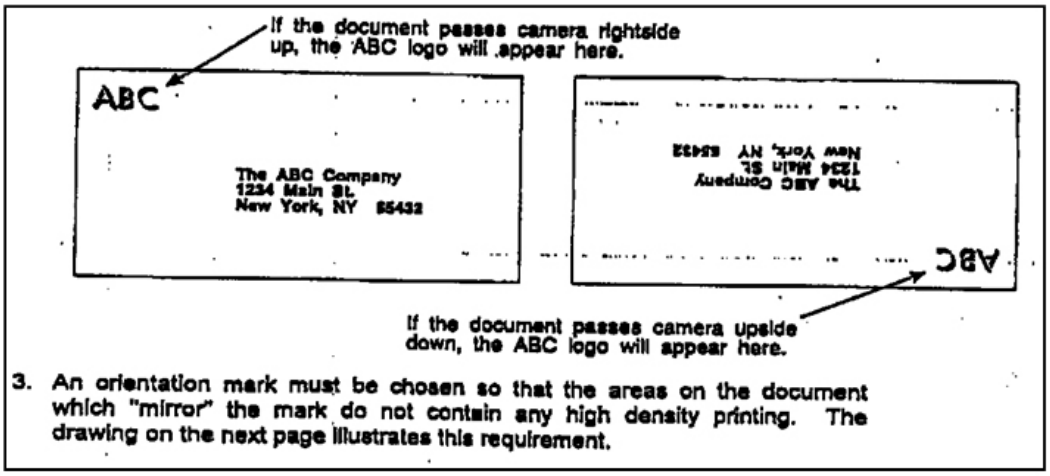
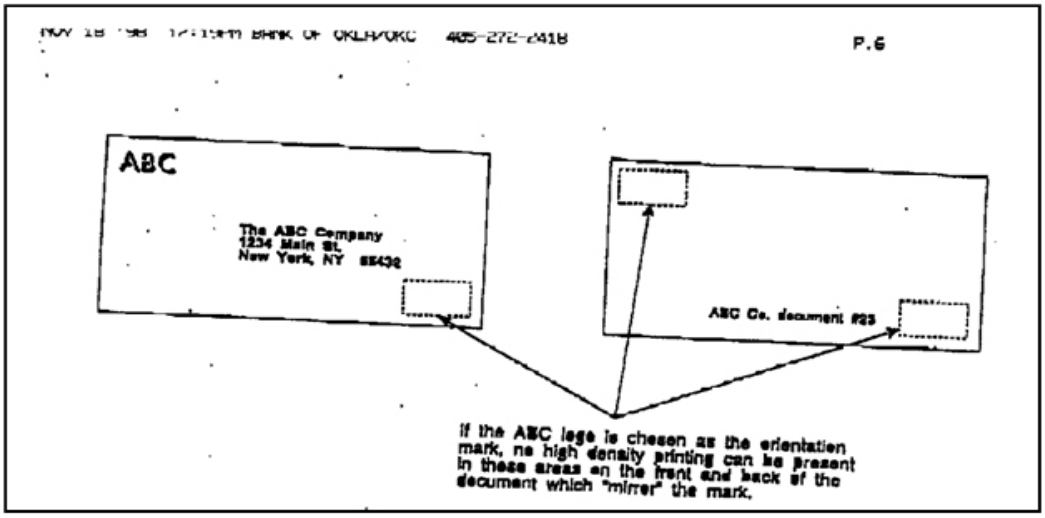


3. An orientation mark must be chosen so that the areas on the document which “mirror” the mark do not contain any high density printing. The following drawing illustrates this requirement.



Document Orientation by Barcodes: System 150

In addition to mark-based orientation outlined above, the System 150 can determine the orientation of a document based on the presence of a PostNet Barcode. This is particularly useful when the document has much data and little white space.

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MICR: Magnetic Printing on Documents
Magnetic detection is used to determine the orientation of checks. Magnetic printing on documents can disable this function in some instances.

Documents processed by the System 150, System 100
Check orientation is determined after extraction, and each item is scanned individually. Therefore, some MICR on the document can be tolerated, if either the length of the document or its magnetic profile do not match those of a valid check.

Documents processed by the MPE 5.0 or the MPS-30 Sorter
Check orientation is determined before extraction (through the envelope.) Therefore, no MICR on the document can be tolerated.

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