

Advanced Function Presentation:
Set Media Origin
or
“Which Way is Up?”

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March, 2001

Introduction

The purpose of this document is to describe an AFP function called Set Media Origin or SMO. SMO provides control of the application page orientation as it is placed on the paper.

History

IBM 3800-3

The first AFP printer was the IBM 3800-3 delivered in 1983. It had a single, fixed media origin or “top, left-hand corner” as shown by the shaded rectangle in the figure below. Print data could be placed to print across, down, or up the page. Across and down are shown. Page definitions, (pagedefs), were used to place the line data on the page. IBM provided pagedefs for common line spacings for both portrait and landscape orientation. The two most common paper sizes used were 12” x 8.5” (shown on left) and 9.5” x 11” (shown on right). As shown below different pagedefs are required to print the same output on the two different sizes of paper. For example an “across” pagedef is used to print landscape output on 12 x 8.5 paper and a “down” pagedef is used for landscape output on 9.5 x 11 paper. Forms, like 12” x 8.5”, that have a width greater than their length are referred to as “wide continuous forms” and forms, like 9.5” x 11”, that have a length greater than their width are called “narrow continuous forms”.

```
MPRT DATA ..... DATE 12/14/81 TIME 13:42:44
PAGE 1 .....
1 / ..... /1823888
2 / ..... /1823888
3 / ..... /1823888
4 / ..... /1823888
5 / ..... /1823888
6 / ..... /1823888
7 / ..... /1823888
8 / ..... /1823888
9 / ..... /1823888
10 / ..... /1823888
11 / ..... /1823888
12 / ..... /1823888
13 / ..... /1823888
14 / ..... /1823888
15 / ..... /1823888
16 / ..... /1823888
17 / ..... /1823888
18 / ..... /1823888
19 / ..... /1823888
20 / ..... /1823888
21 / ..... /1823888
22 / ..... /1823888
23 / ..... /1823888
24 / ..... /1823888
25 / ..... /1823888
26 / ..... /1823888
27 / ..... /1823888
28 / ..... /1823888
29 / ..... /1823888
30 / ..... /1823888
31 / ..... /1823888
32 / ..... /1823888
33 / ..... /1823888
34 / ..... /1823888
35 / ..... /1823888
36 / ..... /1823888
```

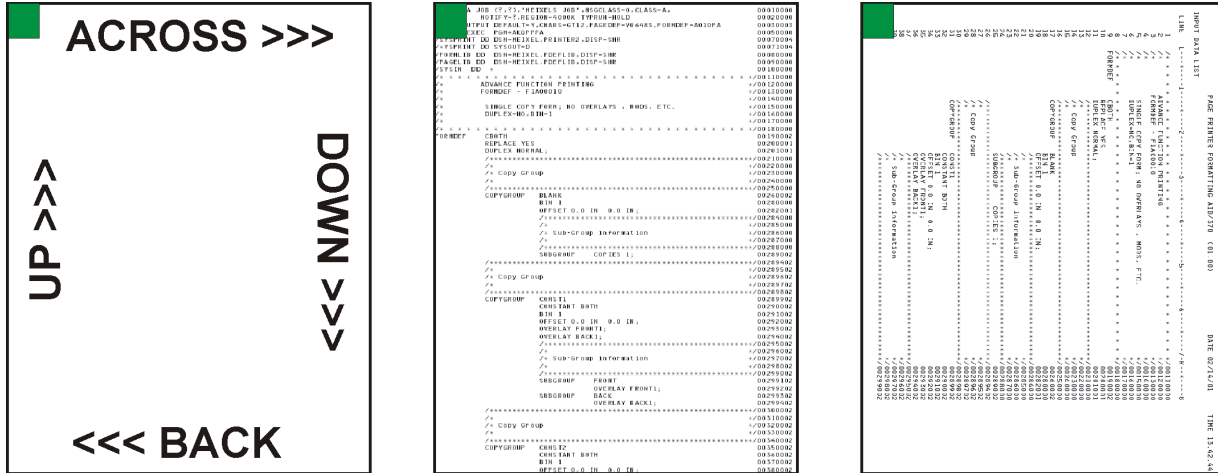
```
ACROSS >>>
PAGE 1 .....
1 / ..... /1823888
2 / ..... /1823888
3 / ..... /1823888
4 / ..... /1823888
5 / ..... /1823888
6 / ..... /1823888
7 / ..... /1823888
8 / ..... /1823888
9 / ..... /1823888
10 / ..... /1823888
11 / ..... /1823888
12 / ..... /1823888
13 / ..... /1823888
14 / ..... /1823888
15 / ..... /1823888
16 / ..... /1823888
17 / ..... /1823888
18 / ..... /1823888
19 / ..... /1823888
20 / ..... /1823888
21 / ..... /1823888
22 / ..... /1823888
23 / ..... /1823888
24 / ..... /1823888
25 / ..... /1823888
26 / ..... /1823888
27 / ..... /1823888
28 / ..... /1823888
29 / ..... /1823888
30 / ..... /1823888
31 / ..... /1823888
32 / ..... /1823888
33 / ..... /1823888
34 / ..... /1823888
35 / ..... /1823888
36 / ..... /1823888
```

```
DOWN >>>
PAGE 1 .....
1 / ..... /1823888
2 / ..... /1823888
3 / ..... /1823888
4 / ..... /1823888
5 / ..... /1823888
6 / ..... /1823888
7 / ..... /1823888
8 / ..... /1823888
9 / ..... /1823888
10 / ..... /1823888
11 / ..... /1823888
12 / ..... /1823888
13 / ..... /1823888
14 / ..... /1823888
15 / ..... /1823888
16 / ..... /1823888
17 / ..... /1823888
18 / ..... /1823888
19 / ..... /1823888
20 / ..... /1823888
21 / ..... /1823888
22 / ..... /1823888
23 / ..... /1823888
24 / ..... /1823888
25 / ..... /1823888
26 / ..... /1823888
27 / ..... /1823888
28 / ..... /1823888
29 / ..... /1823888
30 / ..... /1823888
31 / ..... /1823888
32 / ..... /1823888
33 / ..... /1823888
34 / ..... /1823888
35 / ..... /1823888
36 / ..... /1823888
```

```
DOWN >>>
PAGE 1 .....
1 / ..... /1823888
2 / ..... /1823888
3 / ..... /1823888
4 / ..... /1823888
5 / ..... /1823888
6 / ..... /1823888
7 / ..... /1823888
8 / ..... /1823888
9 / ..... /1823888
10 / ..... /1823888
11 / ..... /1823888
12 / ..... /1823888
13 / ..... /1823888
14 / ..... /1823888
15 / ..... /1823888
16 / ..... /1823888
17 / ..... /1823888
18 / ..... /1823888
19 / ..... /1823888
20 / ..... /1823888
21 / ..... /1823888
22 / ..... /1823888
23 / ..... /1823888
24 / ..... /1823888
25 / ..... /1823888
26 / ..... /1823888
27 / ..... /1823888
28 / ..... /1823888
29 / ..... /1823888
30 / ..... /1823888
31 / ..... /1823888
32 / ..... /1823888
33 / ..... /1823888
34 / ..... /1823888
35 / ..... /1823888
36 / ..... /1823888
```

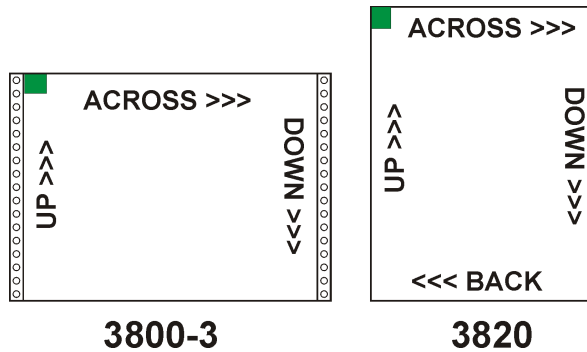
IBM 3820

In 1985 the IBM 3820 was introduced. It was the first IBM AFP cut-sheet printer. Like the 3800-3 it also had a single, fixed media origin as shown. The 3820 could print in the same directions as the 3800-3 plus one new direction, “back”. As shown below it had similar print direction characteristics as a 3800-3 using 9.5” x 11” paper.



The Problem

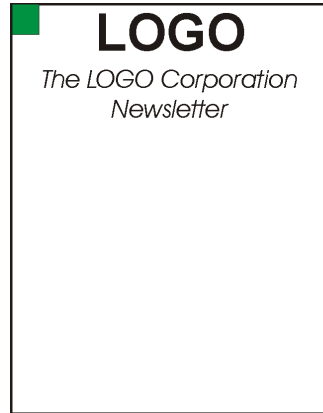
Many customers had both 3800-3's and 3820's. The 3800-3 was the fastest printer of its time at 215 impressions per minute. In order to achieve that speed it had to use the 12” x 8.5” paper. This paper had the additional benefit of reducing maintenance charges because the 3800's usage charge was based on the number of linear feet printed. The use of the shorter, 12” x 8.5” paper cost less per page than the longer, 9.5” x 11” paper. Unfortunately, when the 12” x 8.5” paper is used on the 3800-3 it causes an incompatibility with the 3820. As shown in the figure below the 3800-3 with 12” x 8.5” paper has a different media orientation than the 3820. The



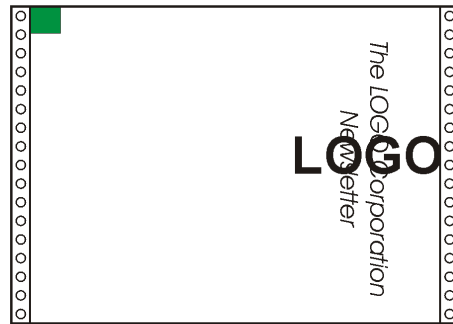
3800-3's media origin is at the left end of the long edge and the 3820's is at the left end of the short edge. Because of this different pagedefs would be needed to print the same output on both printers. For example, in order to print landscape output an “across” pagedef would be used on the 3800-3 and a “down” pagedef for the 3820. This would require different pagedefs to be specified for each printer.

Another Problem

AFP also provides the ability to print image data. The print direction coded in the pagedef controls how the text data is oriented on the page. Unfortunately it has no effect on data contained within an image. In the figure below an image containing the word, "LOGO" has been placed on the 3800-3 and 3820 pages. It is oriented as desired on the 3820 but appears to be rotated 90 degrees counterclockwise on the 3800-3. In reality the image has not been rotated, the paper has. In order to compensate for this a special, rotated version of the image had to be built for use on the 3800-3 and care taken to use the proper version on both printers.



3820



3800-3

The Solution

When IBM was developing its second, continuous forms AFP printer, the 3835, it was decided to develop a solution for the problem of different media origins between cut-sheet and continuous forms printers. The AFP architecture was enhanced to allow the media origin to be moved to any of the four corners of the paper. This function is called Set Media Origin and is controlled by a value in the form definition or formdef. This value is called the Medium Origin and is set using the Page Printer Formatting Aid, (PPFA), PRESENT and DIRECTION parameters on the FORMDEF and COPYGROUP commands.

PPFA PRESENT and DIRECTION

This document was written because the description and use of the PRESENT and DIRECTION parameters is extremely confusing. The best way to explain their use is by studying the SMO Reference Pages which follow. These pages show a sheet of paper and the placement of the Medium Origin for a particular PRESENT/DIRECTION combination. Notice that for a particular combination, (i.e. Medium Origin), you will have different results for cut-sheet paper, wide continuous forms paper, narrow continuous forms paper, and Cut Sheet Emulation. This was done to guarantee that the application pages would be oriented in the same manner on all printer and media types. Cut Sheet Emulation, (CSE), divides a continuous forms printer's paper web into two equal sheetlets.

The PRESENT parameter has two possible values of PORTRAIT and LANDSCAPE. The DIRECTION has values of ACROSS and DOWN. There is an additional optional parameter CUTSHEET. It specifies whether the SMO command will be sent to cut-sheet printers. (Note: Some older printers do not support the SMO function.) This is invoked by coding a value of YES. If NO is coded or allowed to default the media origin on cut-sheet printers will not be changed and will be at the default location which is equivalent to a formdef with PRESENT PORTRAIT and DIRECTION ACROSS. Coding the N_UP parameter, (1-up, 2-up, 3-up, 4-up), has the same effect as coding CUTSHEET. The CUTSHEET parameter was created to allow formdefs that did not have N-UP coded to cause SMO to be enabled on cut-sheet printers.

When Print Services Facility (PSF) or Infoprint Manager (IPM) converts an output file to Intelligent Printer Data Stream (IPDS) to send to the printer it includes an SMO value if SMO is supported by the printer. This value is calculated by examining the formdef's Medium Origin and then checking to see if the printer is cut-sheet, wide continuous, or narrow continuous. CSE on the printer will report back wide or narrow continuous as appropriate. PSF/IPM then specifies the proper SMO. The resulting SMO values are included in the figures for completeness.

The SMO Reference Pages

The following pages show how the four possible SMO combinations behave on the following four different printer types:

- Cut-sheet
- Continuous forms with wide paper
- Continuous forms with narrow paper
- Continuous forms with Cut Sheet Emulation enabled.

There are four summary pages that show the media origin and print directions for the above printer types. These are followed by detail pages.

The top of each detail page shows the:

- Printer type
- Values for Presentation and Direction coded on the formdef used
- Medium Origin value that this combination produces.

The page shows six images of a single paper sheet. The media origin or “top, left-hand corner” is shown with a shaded rectangle. The top three sheets show how data is oriented for:

- Simplex sheet or front of a duplex sheet
- Back of a normal duplex sheet
- Back of a tumble duplex sheet.

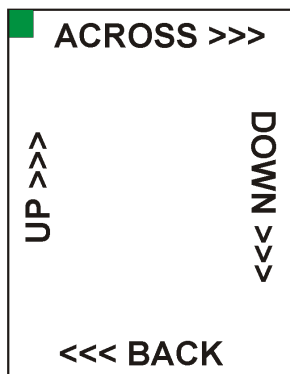
Simulated hole punches and rotation axis lines are provided to help visualize how the back of a duplex sheet relates to the front. An image made from a photograph is included on these sheets to help understand the orientation. The top, left-hand corner of the image is in the same corner as the media origin.

The leftmost sheet on the bottom row shows the four print directions and how they relate to the media origin. The middle sheet shows sample line data formatted using a page definition, (pagedef), coded with an “across” print direction. The rightmost sheet shows data formatted with a pagedef coded with a “down” print direction. The pagedef name, its direction, total lines, and lines-per-inch spacing are given below each page.

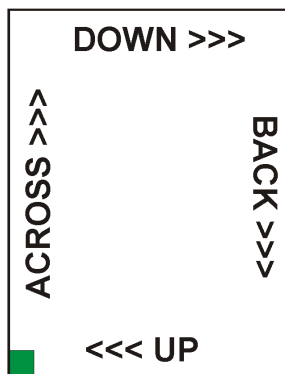
Cut-sheet Printer

Summary

Portrait Across

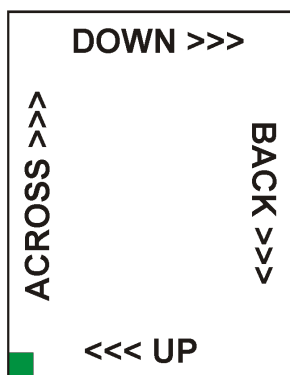


Landscape Across

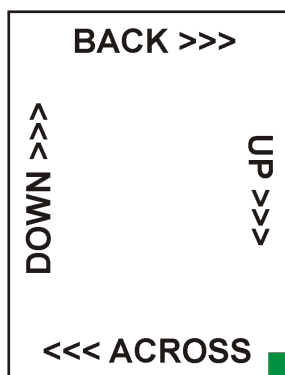


 = MEDIUM ORIGIN

Portrait Down



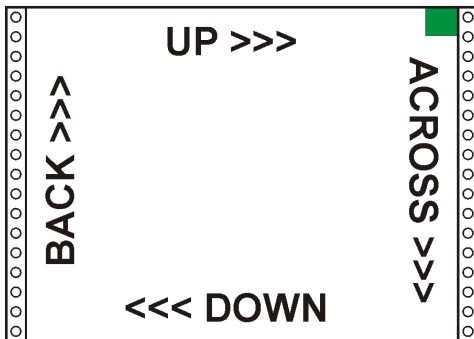
Landscape Down



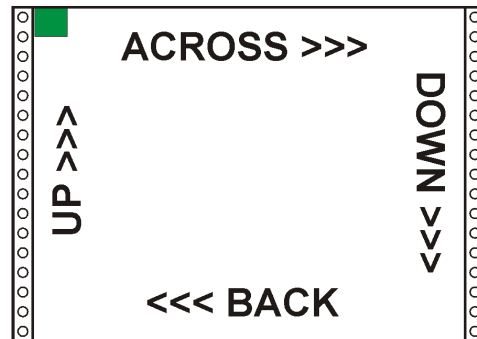
Wide Continuous Forms Paper

Summary

Portrait Across

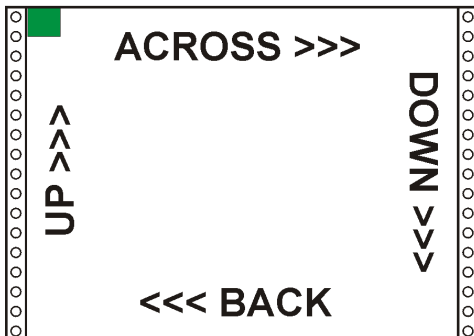


Landscape Across

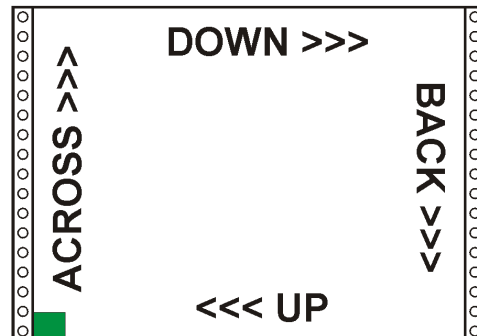


 = MEDIUM ORIGIN

Portrait Down



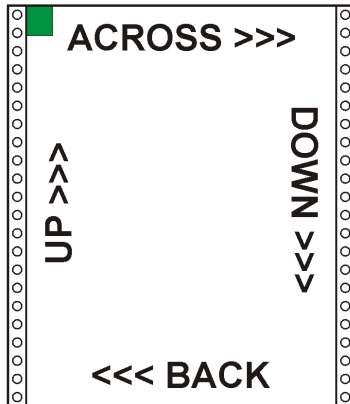
Landscape Down



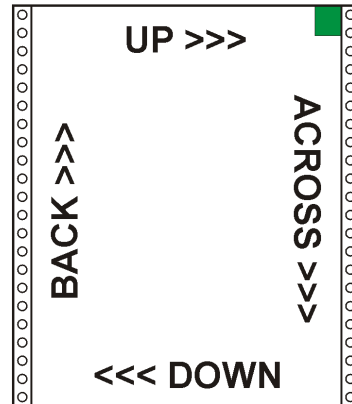
Narrow Continuous Forms Paper

Summary

Portrait Across

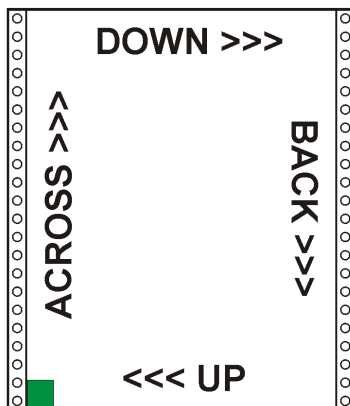


Landscape Across

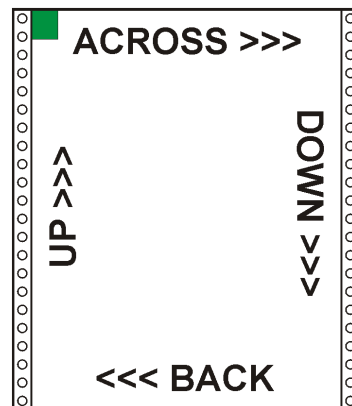


 = MEDIUM ORIGIN

Portrait Down



Landscape Down

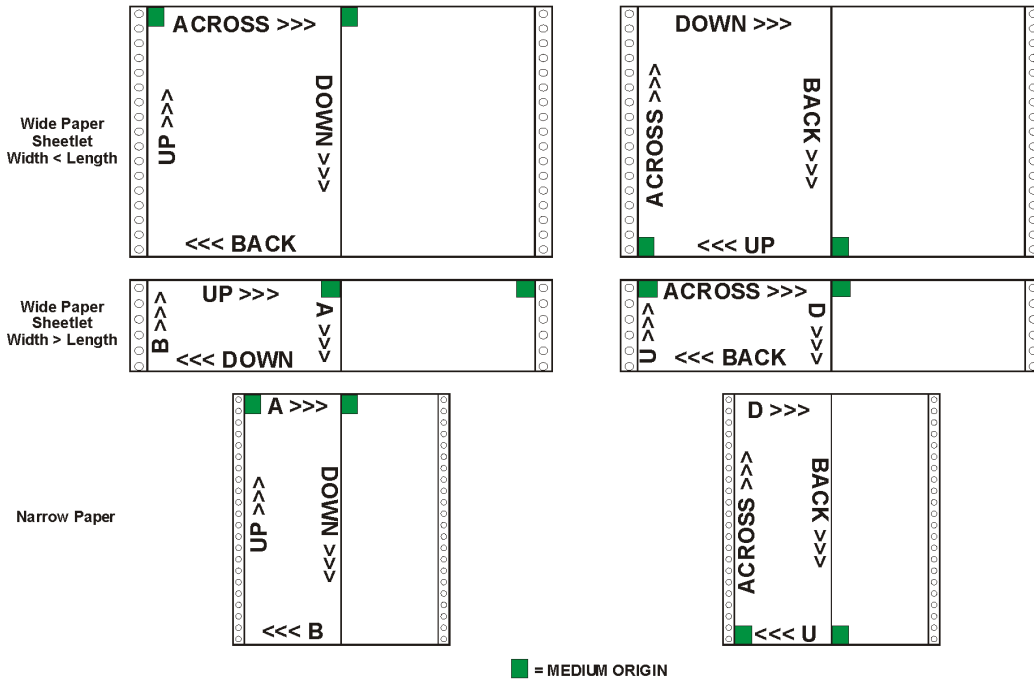


Cut Sheet Emulation

Continuous Forms Printer Wide and Narrow Paper

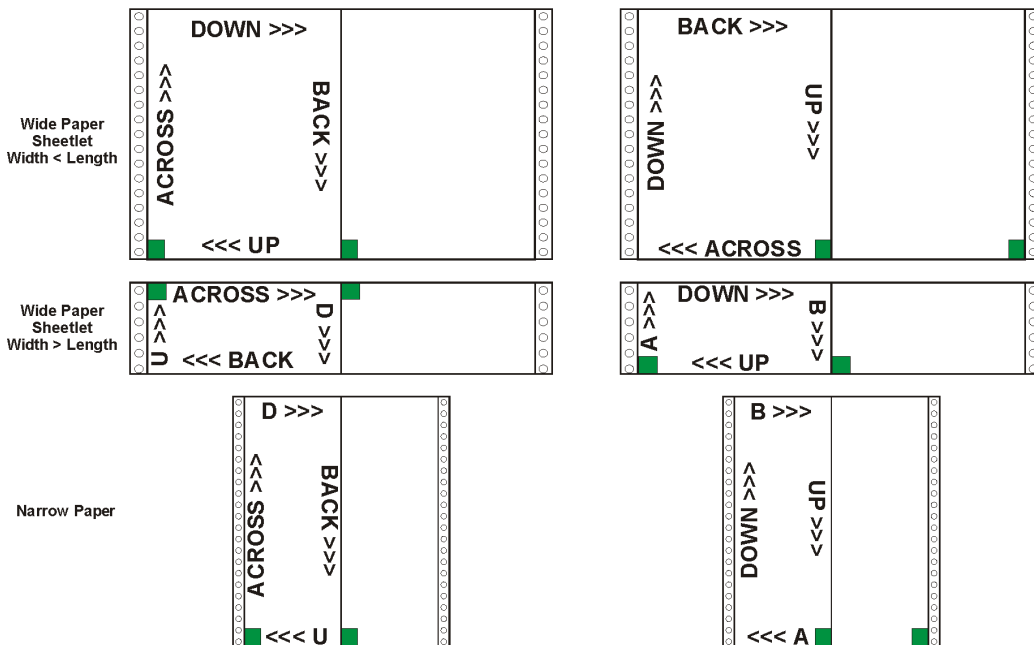
Portrait Across

Landscape Across



Portrait Down

Landscape Down

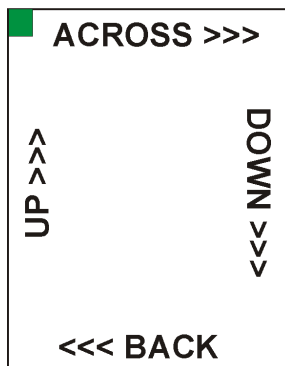
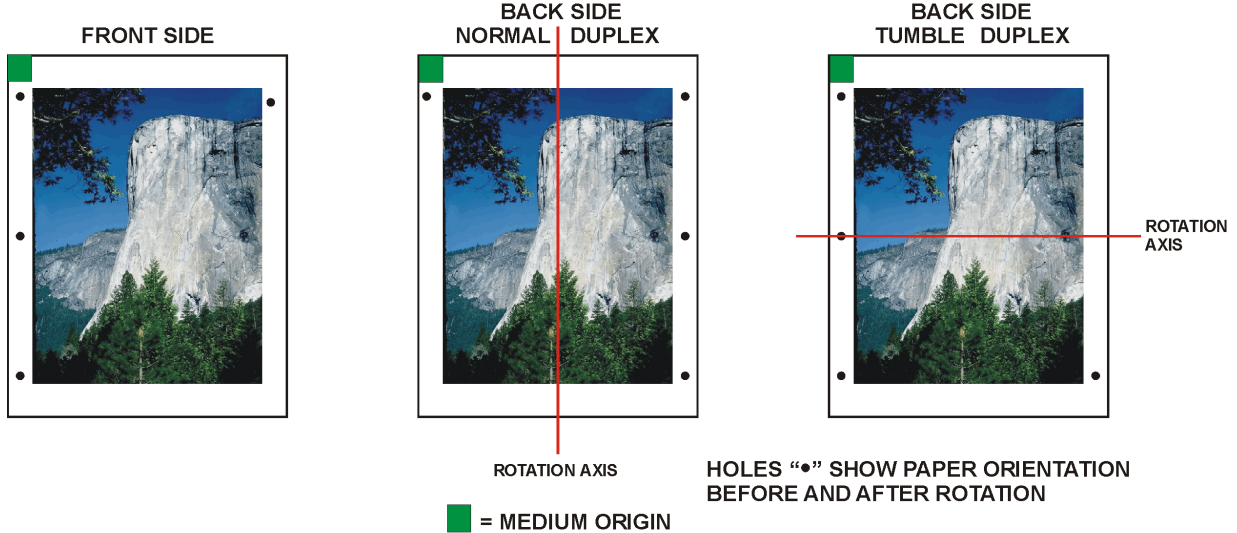


Cut-sheet Printer

Presentation: **Portrait** Direction: **Across**

Medium Origin: X'00'

Cut Sheet Printer, Portrait Across Formdef,
MO:DCA Medium Origin = X'00', IPDS SMO = X'00'



```

PAGEDEF: P1A06462
DIRECTION: ACROSS
64 LINES, 6 LPI
    
```

PAGEDEF: P1A06462
DIRECTION: ACROSS
64 LINES, 6 LPI

```

PAGEDEF: P1V04863
DIRECTION: DOWN
48 LINES, 6.1 LPI
    
```

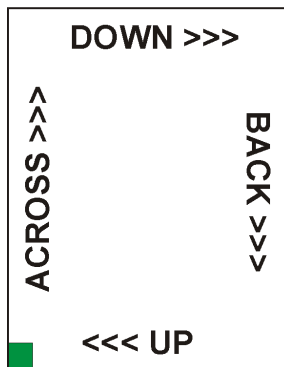
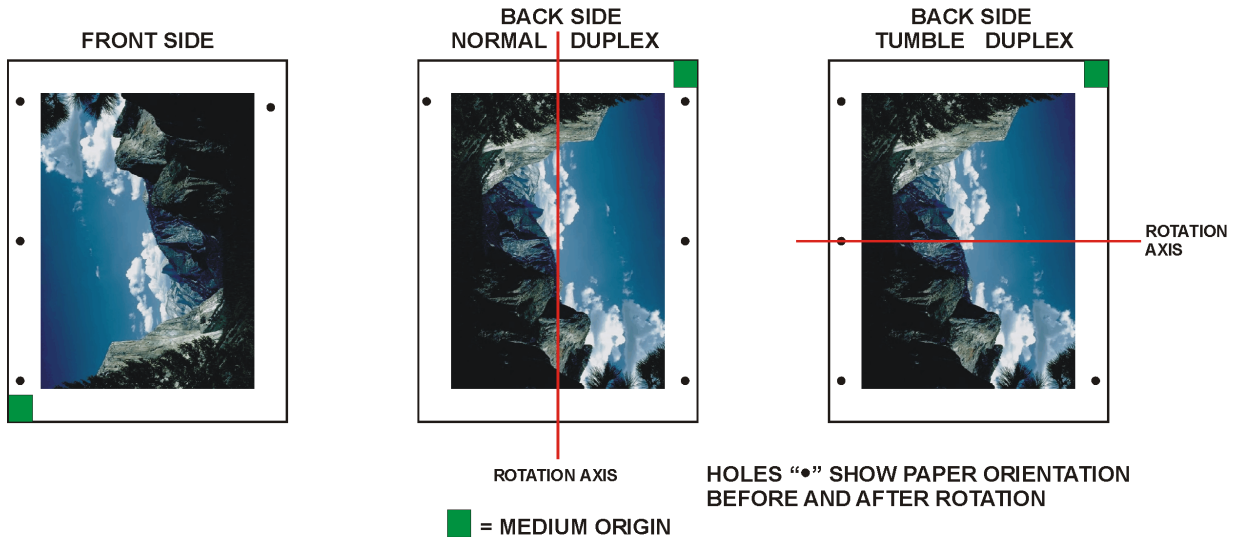
PAGEDEF: P1V04863
DIRECTION: DOWN
48 LINES, 6.1 LPI

Cut-sheet Printer

Presentation: **Landscape** Direction: **Across**

Medium Origin: X'01'

Cut Sheet Printer, Landscape Across Formdef,
MO:DCA Medium Origin = X'01', IPDS SMO = X'03'



```

PAGEDEF: P104560
DIRECTION: ACROSS
45 LINES, 6 LPI
    
```

PAGEDEF: P104560
DIRECTION: ACROSS
45 LINES, 6 LPI

```

PAGEDEF: P106061
DIRECTION: DOWN
60 LINES, 6 LPI
    
```

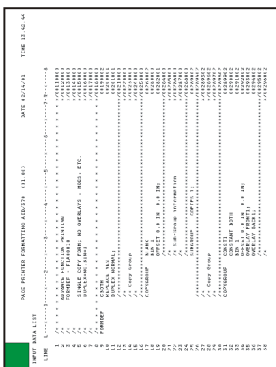
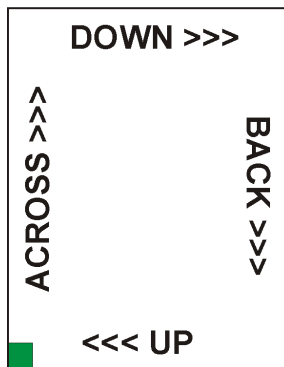
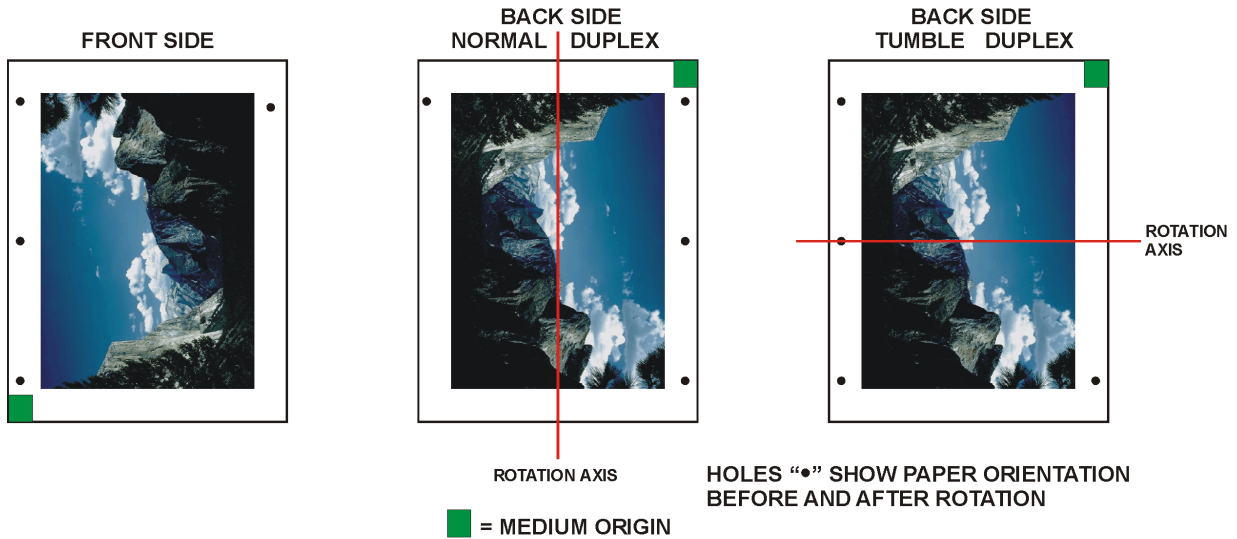
PAGEDEF: P106061
DIRECTION: DOWN
60 LINES, 6 LPI

Cut-sheet Printer

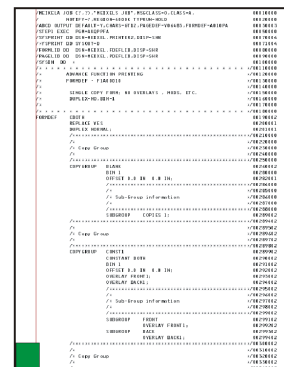
Presentation: **Portrait** Direction: **Down**

Medium Origin: X'04'

Cut Sheet Printer, Portrait Down Formdef,
MO:DCA Medium Origin = X'04', IPDS SMO = X'03'



PAGEDEF: P104560
DIRECTION: ACROSS
45 LINES, 6 LPI



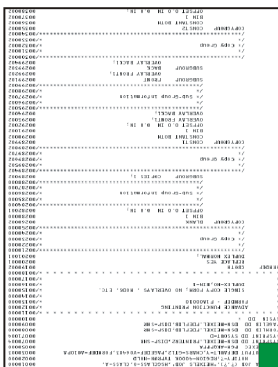
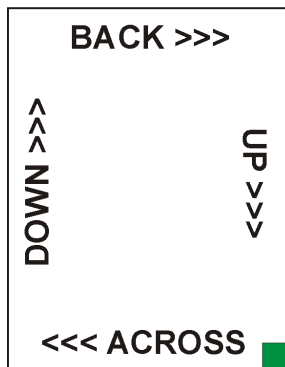
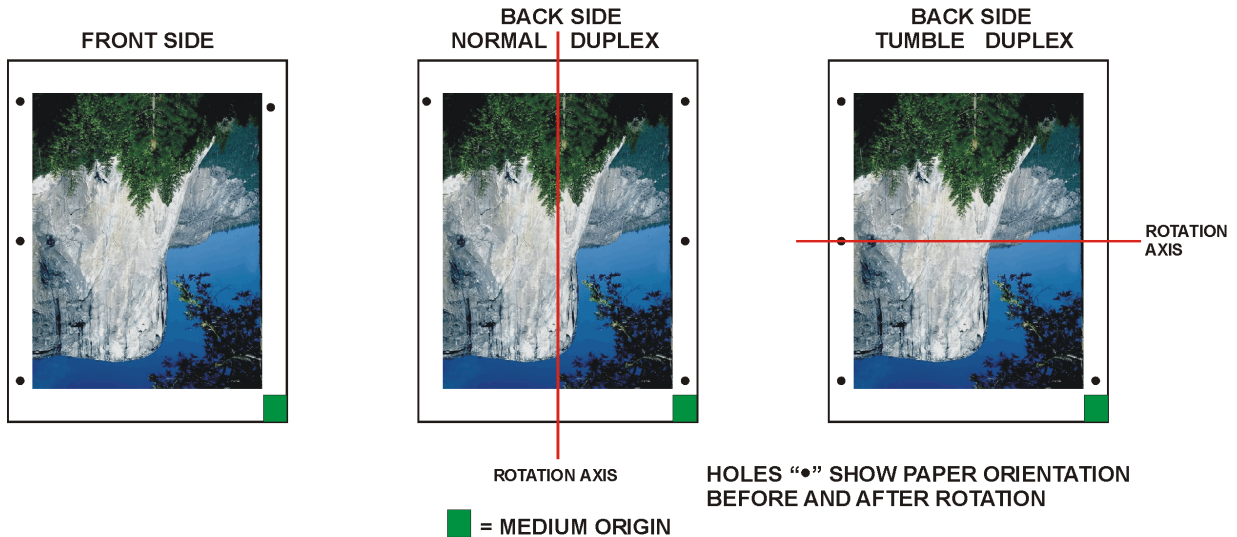
PAGEDEF: P106061
DIRECTION: DOWN
60 LINES, 6 LPI

Cut-sheet Printer

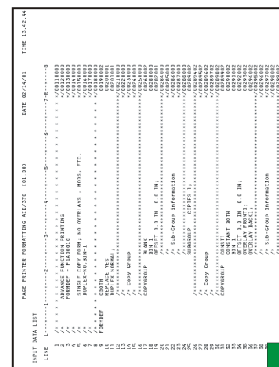
Presentation: **Landscape** Direction: **Down**

Medium Origin: X'05'

Cut Sheet Printer, Landscape Down Formdef,
MO:DCA Medium Origin = X'05', IPDS SMO = X'02'



PAGEDEF: P1A06462
DIRECTION: ACROSS
64 LINES, 6 LPI



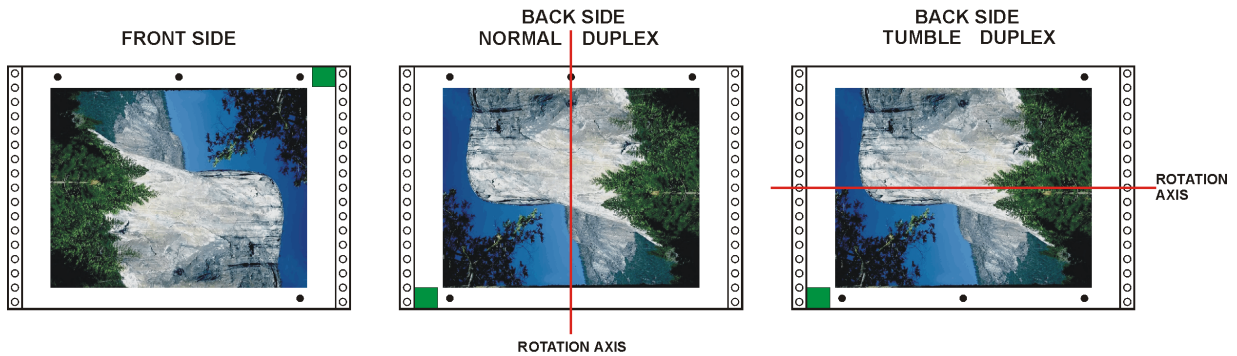
PAGEDEF: P1V04863
DIRECTION: DOWN
48 LINES, 6.1 LPI

Continuous Forms Printer Wide Paper

Presentation: **Portrait** Direction: **Across**

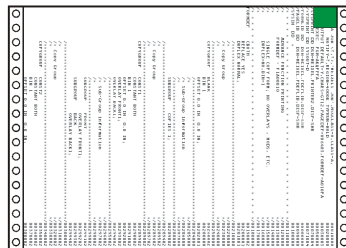
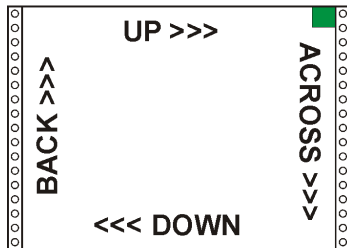
Medium Origin: X'00'

Continuous Forms Printer, Wide Paper,
Portrait Across Formdef,
MO:DCA Medium Origin = X'00', IPDS SMO = X'00'

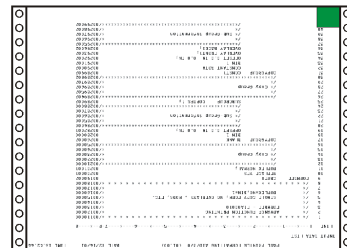


■ = MEDIUM ORIGIN

HOLES "•" SHOW PAPER ORIENTATION BEFORE AND AFTER ROTATION



PAGEDEF: P1A06462
DIRECTION: ACROSS
64 LINES, 6 LPI



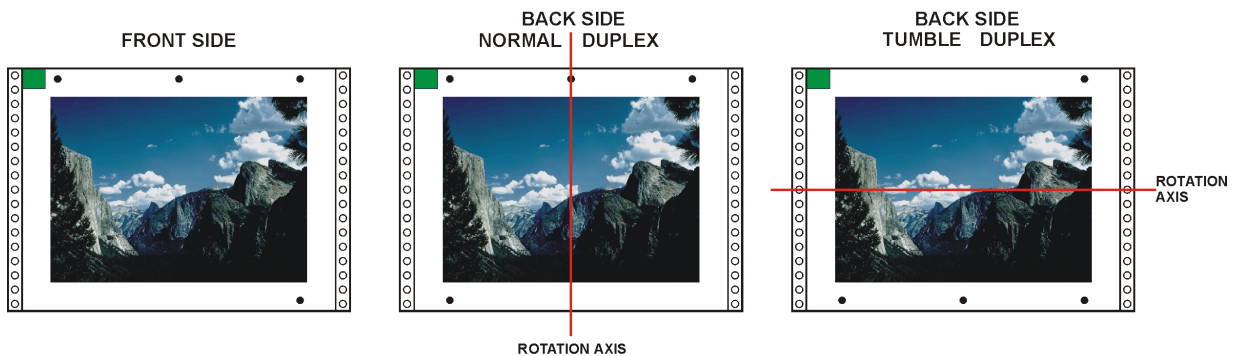
PAGEDEF: P1V04863
DIRECTION: DOWN
48 LINES, 6.1 LPI

Continuous Forms Printer Wide Paper

Presentation: **Landscape** Direction: **Across**

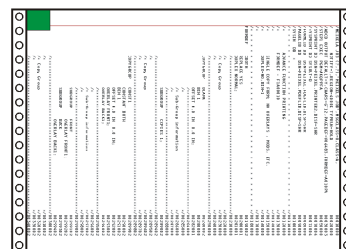
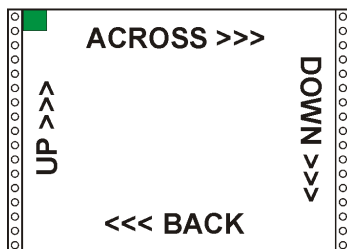
Medium Origin: X'01'

Continuous Forms Printer, Wide Paper,
Landscape Across Formdef,
MO:DCA Medium Origin = X'01', IPDS SMO = X'03'



■ = MEDIUM ORIGIN

HOLES "•" SHOW PAPER ORIENTATION
BEFORE AND AFTER ROTATION

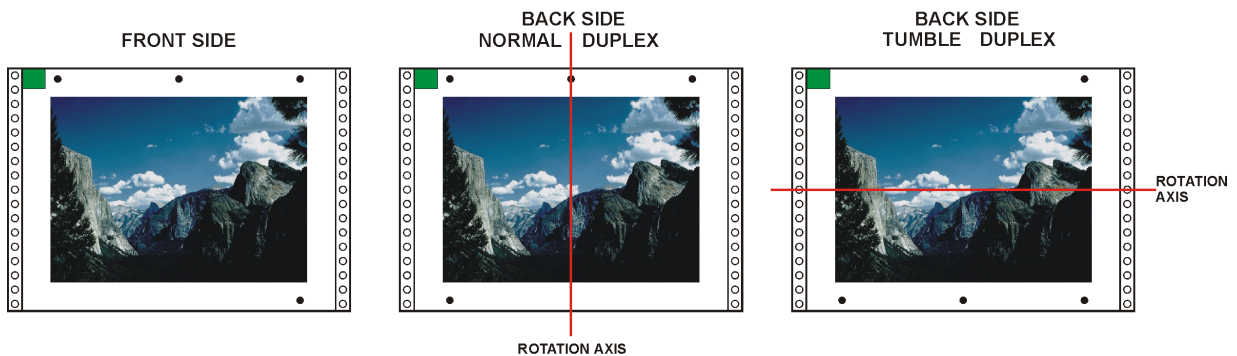


Continuous Forms Printer Wide Paper

Presentation: **Portrait** Direction: **Down**

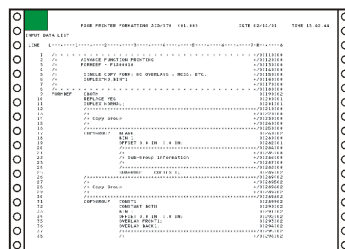
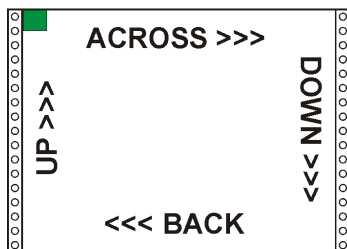
Medium Origin: X'04'

Continuous Forms Printer, Wide Paper,
Portrait Down Formdef,
MO:DCA Medium Origin = X'04', IPDS SMO = X'03'

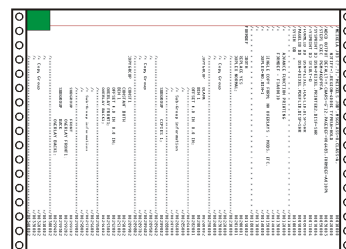


■ = MEDIUM ORIGIN

HOLES "•" SHOW PAPER ORIENTATION
BEFORE AND AFTER ROTATION



PAGEDEF: P104560
DIRECTION: ACROSS
45 LINES, 6 LPI



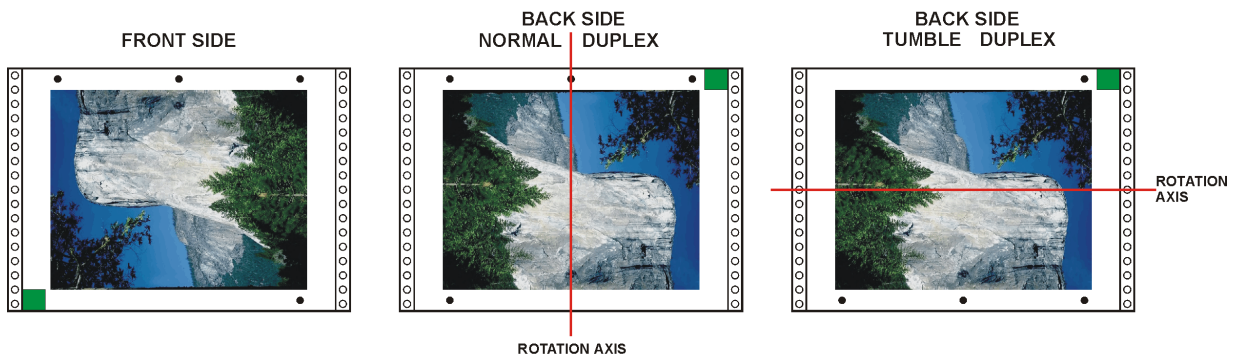
PAGEDEF: P106061
DIRECTION: DOWN
60 LINES, 6 LPI

Continuous Forms Printer Wide Paper

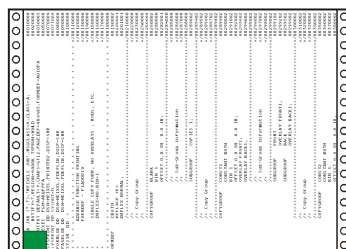
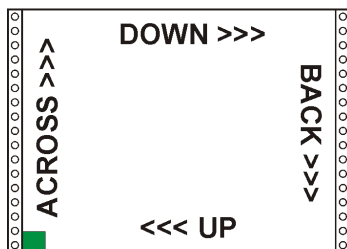
Presentation: **Landscape** Direction: **Down**

Medium Origin: X'05'

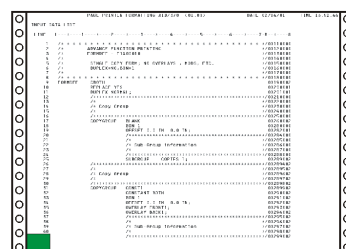
Continuous Forms Printer, Wide Paper,
Landscape Down Formdef,
MO:DCA Medium Origin = X'05', IPDS SMO = X'02'



■ = MEDIUM ORIGIN
HOLES "•" SHOW PAPER ORIENTATION BEFORE AND AFTER ROTATION



PAGEDEF: P1A06462
DIRECTION: ACROSS
64 LINES, 6 LPI



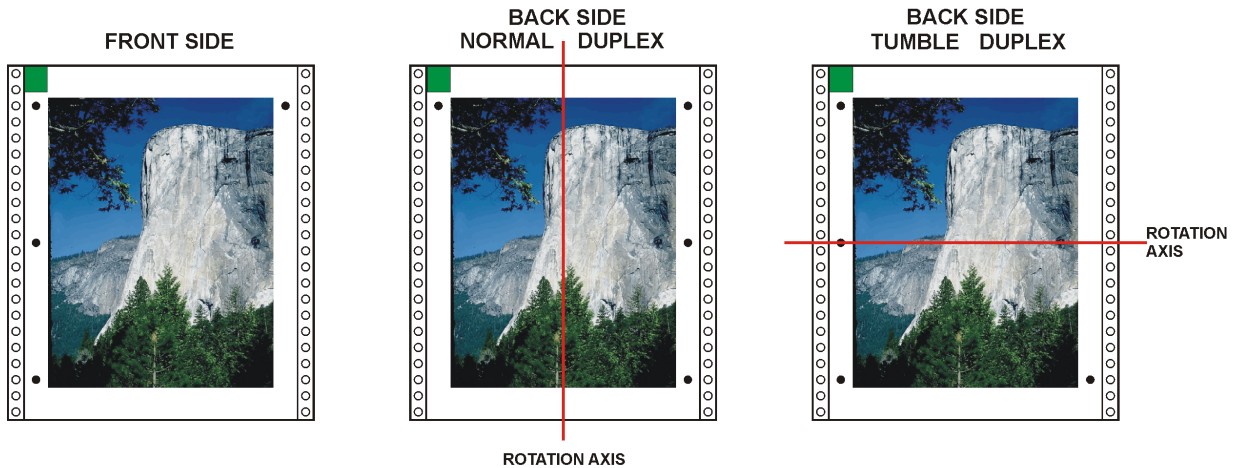
PAGEDEF: P1V04863
DIRECTION: DOWN
48 LINES, 6.1 LPI

Continuous Forms Printer Narrow Paper

Presentation: **Portrait** Direction: **Across**

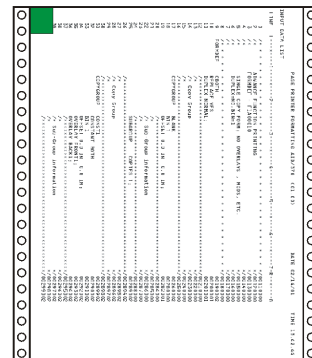
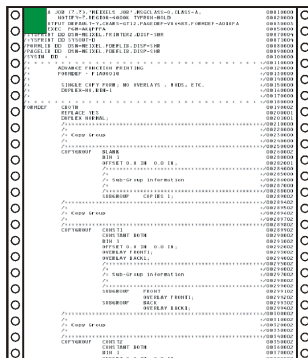
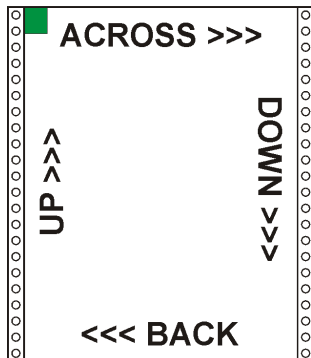
Medium Origin: X'00'

Continuous Forms Printer, Narrow Paper,
Portrait Across Formdef,
MO:DCA Medium Origin = X'00', IPDS SMO = X'00'



 = MEDIUM ORIGIN

HOLES "•" SHOW PAPER ORIENTATION BEFORE AND AFTER ROTATION



PAGEDEF: P1A06462
DIRECTION: ACROSS
64 LINES, 6 LPI

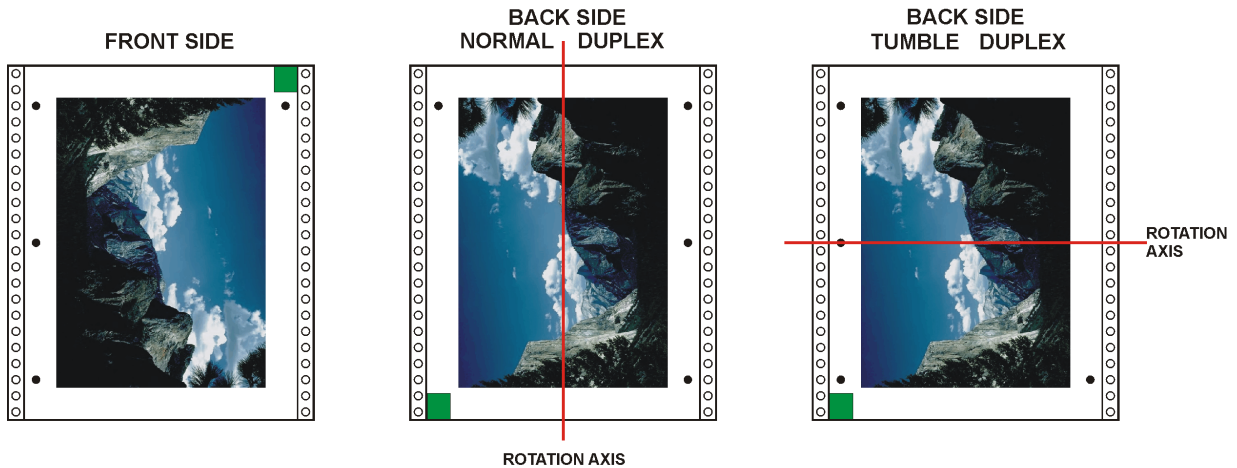
PAGEDEF: P1V04863
DIRECTION: DOWN
48 LINES, 6.1 LPI

Continuous Forms Printer Narrow Paper

Presentation: **Landscape** Direction: **Across**

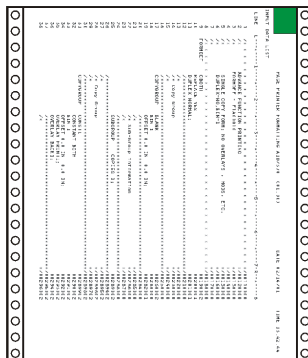
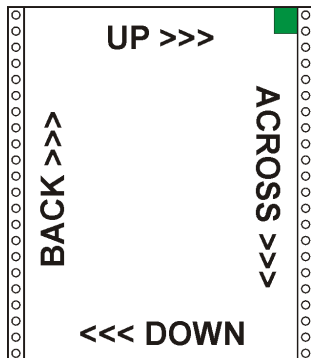
Medium Origin: X'01'

Continuous Forms Printer, Narrow Paper,
Landscape Across Formdef,
MO:DCA Medium Origin = X'01', IPDS SMO = X'01'

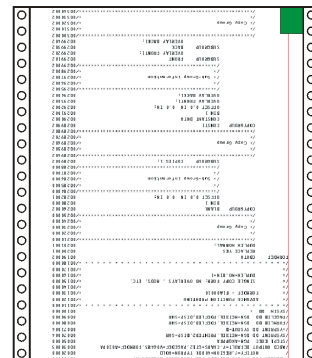


 = MEDIUM ORIGIN

HOLES "•" SHOW PAPER ORIENTATION BEFORE AND AFTER ROTATION



PAGEDEF: P104560
DIRECTION: ACROSS
45 LINES, 6 LPI



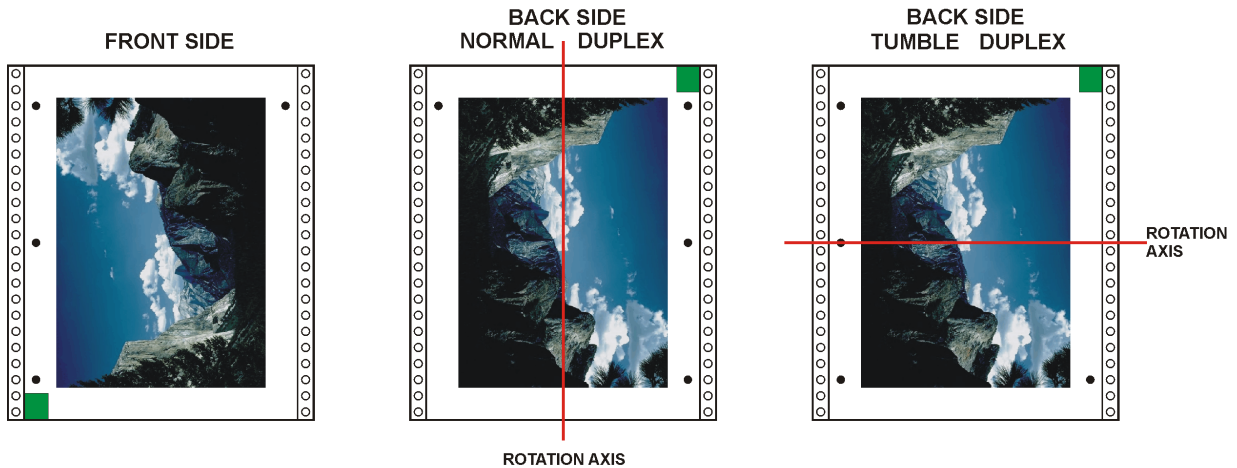
PAGEDEF: P106061
DIRECTION: DOWN
60 LINES, 6 LPI

Continuous Forms Printer Narrow Paper

Presentation: **Portrait** Direction: **Down**

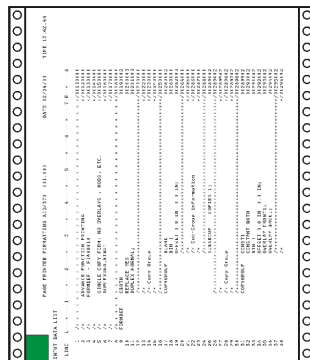
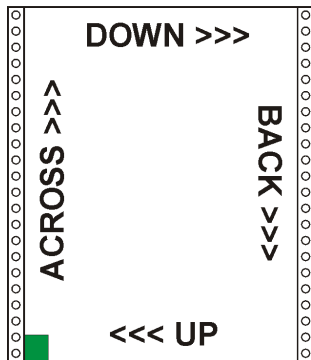
Medium Origin: X'04'

Continuous Forms Printer, Narrow Paper,
Portrait Down Formdef,
MO:DCA Medium Origin = X'04', IPDS SMO = X'03'

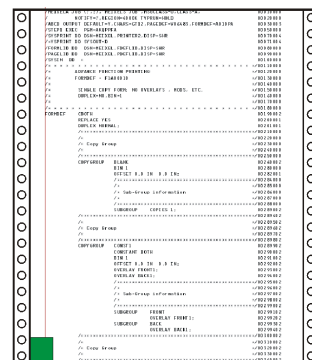


 = MEDIUM ORIGIN

HOLES “•” SHOW PAPER ORIENTATION BEFORE AND AFTER ROTATION



PAGEDEF: P104560
DIRECTION: ACROSS
45 LINES, 6 LPI



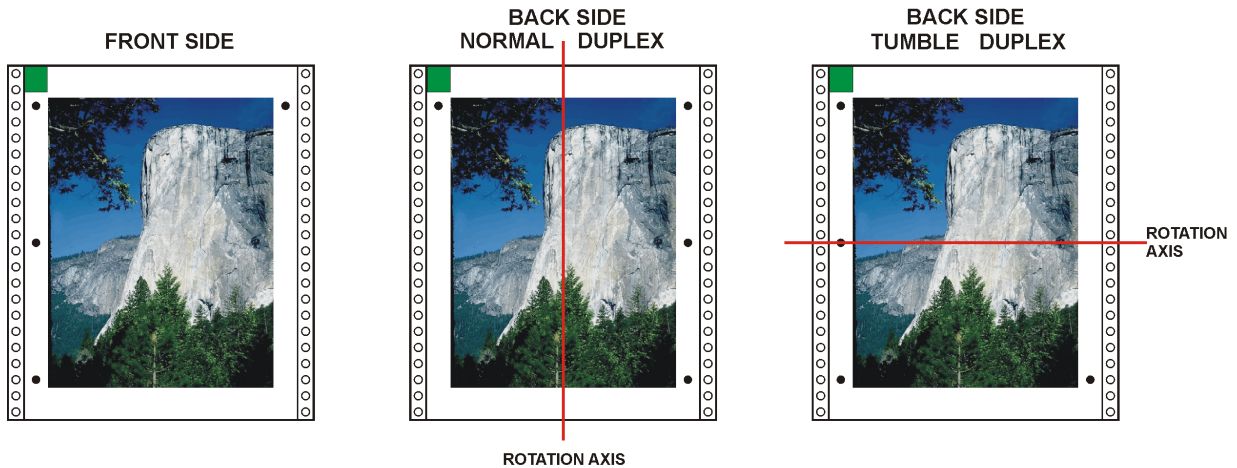
PAGEDEF: P106061
DIRECTION: DOWN
60 LINES, 6 LPI

Continuous Forms Printer Narrow Paper

Presentation: **Landscape** Direction: **Down**

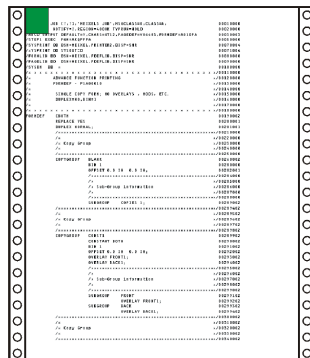
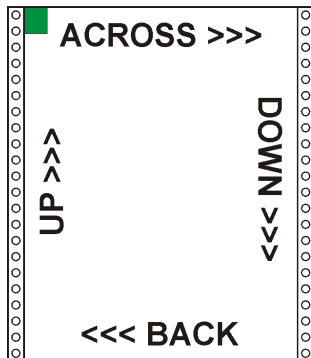
Medium Origin: X'05'

Continuous Forms Printer, Narrow Paper,
Landscape Down Formdef,
MO:DCA Medium Origin = X'05', IPDS SMO = X'00'

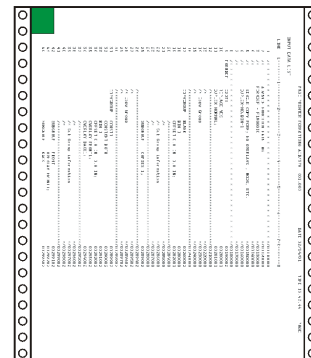


 = MEDIUM ORIGIN

HOLES "•" SHOW PAPER ORIENTATION BEFORE AND AFTER ROTATION



PAGEDEF: P106060
DIRECTION: ACROSS
60 LINES, 6 LPI



PAGEDEF: P105161
DIRECTION: DOWN
51 LINES, 6 LPI