XEROX

Xerox 4050/4090/4450/4650
Laser Printing Systems
Forms Creation Guide

April 1995
720P93990

Xerox Corporation
701 S. Aviation Boulevard
El Segundo, CA 90245

Printed in the United States of America

Publication number: 720P93990

Changes are periodically made to this document. Changes, technical inaccuracies, and typographic errors will be corrected in subsequent editions.

This document was created on the Xerox 6085 Professional Computer System using GlobalView software. The typeface is Optima.

Table of contents

Introduction vii

Document conventions vii

Related publications viii

1. Basic concepts 1-1

Page orientation 1-2

Fonts 1-2

Font memory 1-4

Paper 1-4

Image size considerations 1-4

System page 1-4

Physical page 1-5

Virtual page 1-5

Edgemarking 1-6

Non-imaged elements 1-7

Imaging error messages 1-7

Registration shift and skew 1-7

Output performance considerations 1-9

Form origin 1-10

Positioning form elements 1-11

Grids 1-12

x and y coordinates 1-12

Predefined formats 1-13

Data types 1-14

2. Forms Description Language 2-1

FDL command overview 2-1

Command format 2-1

Command summary 2-2

Form creation process 2-3

Setup commands 2-3

FORM/RESOLUTION 2-4

PAPER 2-5

LANDSCAPE/PORTRAIT 2-6

GRID 2-7
FONT 2-8
Description commands 2-9
LINE 2-10
BOX 2-11
TEXT 2-13
LOGO 2-17
GRAPHIC 2-18
SECTION 2-19
COMMENT 2-21
END 2-22
3. Compiling and printing forms 3-1
Form printing process 3-1
FSL data transfer 3-1
Compiling a form 3-2
Using the compilation options 3-4
Printing a compiled form 3-6
4. Troubleshooting 4-1
Suggested coding techniques 4-1
Converting preprinted forms 4-1
Designing new forms 4-1
Recommended coding sequence 4-2
Syntax ambiguities 4-2
Hints and tips 4-3
Image complexity factors 4-4
Line tables 4-4
Scan line density 4-6
Superimposed lines 4-8
Page generation errors 4-8
Local density and page setup errors 4-8
Using boxes 4-9
Text in boxes 4-10
Locating the closest box 4-10
Shading factors 4-12
Section factors 4-13
Rounding measurement factors 4-14
Converting other unit values to dots 4-14
Rounding variable data 4-15

FDL statistics 4-16

Grid unit scaling 4-16

Appendices

A. FDL command syntax summary A-1

B. System default summary B-1

C. Sample form creation C-1

D. FDL capacity limits D-1

E. Standard print formats E-1

F. Support tools and measurements F-1

G. Command examples G-1

Glossary

GLOSSARY-1

Index

INDEX-1

Introduction

The *Xerox 4050/4090/4450/4650 LPS Forms Creation Guide* describes the use of Forms Description Language (FDL) commands you use to create forms for merging with variable data to print on a laser printing system (LPS). Descriptions include the following:

- FDL commands necessary to create any desired form with the correct page orientation, fonts, line widths, and positioning of captions and logos
- Fundamental printing terms, techniques, and troubleshooting
- Support tools used to simplify the creation of forms
- Command and default summaries, examples, limitations, and capacities.

Document conventions

This guide uses the following conventions:

UPPERCASE BOLD BLUE Uppercase bold blue text indicates required characters or command keywords.

UPPERCASE BLUE ITALICS Uppercase blue italics indicate optional parameter keywords, characters, or values.

Lowercase black italics Lowercase black italics indicate variable parameter options, (word, character, phrase, or value).

... Ellipses indicate that you can repeat a parameter option, or list a series of parameter options.

<> Angle brackets indicate keys on the system controller keyboard.

The carat character represents a required space.

`TERMINAL FONT` Terminal or monospace fonts are used to represent LPS screen responses.

UPPERCASE Uppercase letters indicate command names and parameter keywords.

CAUTION: Cautions appear immediately before any action or omission that may result in damage to your equipment, software, or data.

WARNING: Warnings are associated with the safety of people.

Related publications

You can find additional information related to the 4050/4090/4450/4650 LPS in the following publications.

Publication	Number
Xerox 4050/4090/4450/4650 LPS Master Index	720P94030
Xerox 4050/4090/4450/4650 LPS Bypass Transport Instructions, V3.5/3.8	720P22320
Xerox 4050/4090/4450/4650 LPS Bypass Transport Operator Training Guide Flipcharts Supplement	720P22340
Xerox 4050/4090/4450/4650 LPS Bypass Transport Operator Training Guide Supplement	720P22330
Xerox 4050/4090/4450/4650 LPS Command Reference	720P94020
Xerox 4050/4090/4450/4650 LPS Forms Creation Quick Reference Card	720P93100
Xerox 4050/4090/4450/4650 LPS Installation Planning	720P92990
Xerox 4050/4090/4450/4650 LPS Message Guide	720P93980
Xerox 4050/4090/4450/4650 LPS Operator Guide	720P94000
Xerox 4050/4090/4450/4650 LPS Operator Instructor Training Flipcharts	720P22080
Xerox 4050/4090/4450/4650 LPS Operator Instructor Training Guide	720P22070
Xerox 4050/4090/4450/4650 LPS Operator Quick Reference	720P93050
Xerox 4050/4090/4450/4650 LPS Print Description Language (PDL) Quick Ref. Card	720P93090
Xerox 4050/4090/4450/4650 LPS Print Description Language (PDL) Reference	720P94090
Xerox 4050/4090/4450/4650 LPS Product Reference	720P94060
Xerox 4050/4090/4450/4650 LPS System Administration Guide	720P94010
Xerox 4050/4090/4450/4650 LPS System Administration Quick Reference Card	720P93090
Xerox Standard Font Library Font User Guide	600P86174
Xerox Tape Formats Manual	600P86175
Helpful Facts About Paper	610P50497
Xerox Dynamic Document Interface Command Summary	720P13680
Xerox Dynamic Document Interface Operator Guide	720P13670

1. Basic concepts

The laser printing system (LPS) provides the capability to create electronic forms tailored to meet your individual requirements. You create electronic forms using the Forms Description Language (FDL). This simple-to-learn, easy-to-use language enables you to design and alter forms in minutes.

FDL-defined forms are input to the printer as data, using the LPS keyboard and display, or a host computer terminal. To define a form, FDL uses lines, logos, images, signatures, shading, and different font styles and sizes to make full use of laser printing system features and capabilities.

Advantages of FDL

- Lines can be drawn at specified intervals without being redefined each time.
- You state the origin and the dimensions of a box to have it drawn at any specified location on the page.
- An entire section of a form, once defined, can be repeated anywhere on the same form.
- In defining a location on a page, you are not restricted to lines and character positions. You can specify coordinates in inches, centimeters, or dots with a resolution of 1/300 inch in either direction.

  Note: An xdot is a 1/600 inch unit of measure that is provided with version 3 software. A form specifying xdots may be created, edited, and compiled on any V3-based LPS. However, results are unpredictable if you attempt to print a 600 spots per inch (spi) form on a 300-spi LPS.
- Once you create a form, it can be stored on the system and printed as many times and as often as you need.
- You can use three types of lines (solid, broken, and dotted) in four thicknesses: invisible [0], hairline, medium [1], or bold [2]. You can also mix fonts and arrange text in many ways.

Certain basic concepts are required to understand the forms creation process on laser printing systems. These include the size, shape, and location of the overall image on the page of a document, the orientation of the text or graphics on the page, the size and style of the characters to be used, and the type of data to be entered.

This chapter discusses fonts and font memory, registration and skew, and output information for the jobs you create on your LPS.

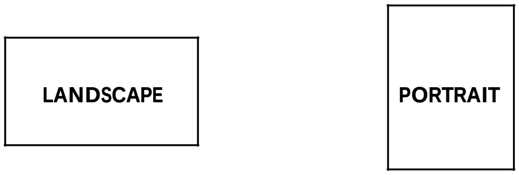
Page orientation

There are two types of page, or text, orientation:

- Portrait
- Landscape.

In portrait orientation, the vertical side of the page is longer than the horizontal side. In landscape orientation, the horizontal side of the page is longer than the vertical side. Portrait and landscape orientations are illustrated in figure 1-1.

Figure 1-1. **Page orientation**



Landscape is the usual orientation for computer reports. Portrait is the usual orientation for letters, manuals, and other text printing. On a laser printing system, you can change page orientation from page to page without interrupting the printing operation. This capability, coupled with variable character size, permits maximum flexibility for the effective presentation of information.

Fonts

A font is a character set which has a unique type style, type size, and orientation.

Fixed and proportional fonts

Both fixed and proportionally spaced fonts are available for use on the 4050/4090/4450/4650 LPS. Each font character occupies an area called a character cell. All character cells in a fixed font are the same width. Character cells in a proportional font vary in width.

Figure 1-2. **Character spacing**

Because the length of a line printed with a proportional font is unpredictable, the system uses fixed fonts for variable data on a report to avoid overprinting of forms by variable data. The system uses proportional fonts for forms data such as titles, headings, and so forth. A business letter is an example of the use of proportional fonts for variable data. Figure 1-3 shows an example of the difference in line length.

Figure 1-3. **Character spacing/line length examples**

Font typefaces

Fonts are available in various typefaces (such as OCR and Titan), sizes, styles (such as serif and sans serif), and weights (such as medium and bold). The *Xerox LPS Standard Font Library Font User Guide* lists the standard fixed and proportional fonts.

Font orientation

In addition to typeface, style, and size, a font can be defined by its orientation:

- Landscape
- Portrait
- Inverse landscape
- Inverse portrait.

Font orientation is relative to the physical page.

Figure 1-4. **Font orientation**

Refer to the *Xerox Laser Printing Systems Standard Font Library Font User Guide* for specific font information and the *Xerox 4050/4090/4450/4650 LPS System Administration Guide* for information on using Font Editor keyword commands to create source font files from existing licensed and nonlicensed font files.

Font memory

Increasing font memory improves processing time for applications that require large fonts or a large number of different fonts on a single page. In the pass through mode, the LPS prints up to 128 fonts on a single page. In normal mode, the amount of fonts per page that the LPS prints depends on the font definitions for the emulated line printer. When processing the page data, the controller stores font information in a special memory cache called font memory. The amount of memory required to store font data depends on the size of the fonts and the number of different fonts on a single page.

If your applications call for either large fonts, or a variety of fonts on a single page, the increased font memory option can greatly improve the processing time required to print these documents.

Custom fonts, logos, and signature font data also consume font memory during processing.

Paper

Paper sizes

Laser printing systems print on the following paper sizes:

- 8.5 by 11 inch (216 by 279 mm)
- A4 (8.27 by 11.69 inch, 210 by 297 mm)
- 8.5 by 14 inch (216 by 356 mm).

Paper types

A large variety of paper types can also be used on the LPS:

- Label stock
- Transparencies
- Predrilled
- Perforated
- Colored.

Paper weights and printing speed vary with each printer.

Image size considerations

Your LPS can print on a variety of paper sizes. You can manipulate the size of the image with some limitations. Understanding the terms system page, physical page and virtual page helps to define these limitations.

System page

This refers to the maximum image area, which is 8.6 by 14.00 inches. Elements which do not print may originate off the leading edge of the system page.

Refer to the “Non-imaged elements” subsection later in this chapter for more information.

Physical page

This refers to the size of the paper itself. You can use any page dimension as long as the paper physically fits in the feeder trays and you can preselect the following paper sizes at system generation (sysgen), as shown in table 1-1.

Table 1-1. **Physical page sizes**

Inches	Millimeters
8.0 x 10.0	203 x 254
8.0 x 10.5	203 x 267
8.0 x 13.0	203 x 330
8.27 x 10.63	210 x 270
8.27 x 11.69/A4	210 x 297
8.27 x 13.0	210 x 330
8.37 x 10.78	213 x 274
8.46 x 10.83	215 x 275
8.46 x 12.4	215 x 315
8.46 x 14.02	215 x 356
8.5 x 10.75	216 x 273
8.5 x 11.0/USLETTER	216 x 279
8.5 x 13.0	216 x 330
8.5 x 14.0/USLEGAL	216 x 356

Use the PAPERSIZE command in the Print Description Language (PDL) and the PAPER command in the Forms Description Language (FDL) to allow form compilation and job printing on a size of paper other than the paper size you select at sysgen. This allows you to specify nonstandard paper size for specific jobs.

Refer to the "Forms Description Language" chapter and the *Xerox 4050/4090/4450/4650 LPS Print Description Language (PDL) Reference* for more information about commands.

Virtual page

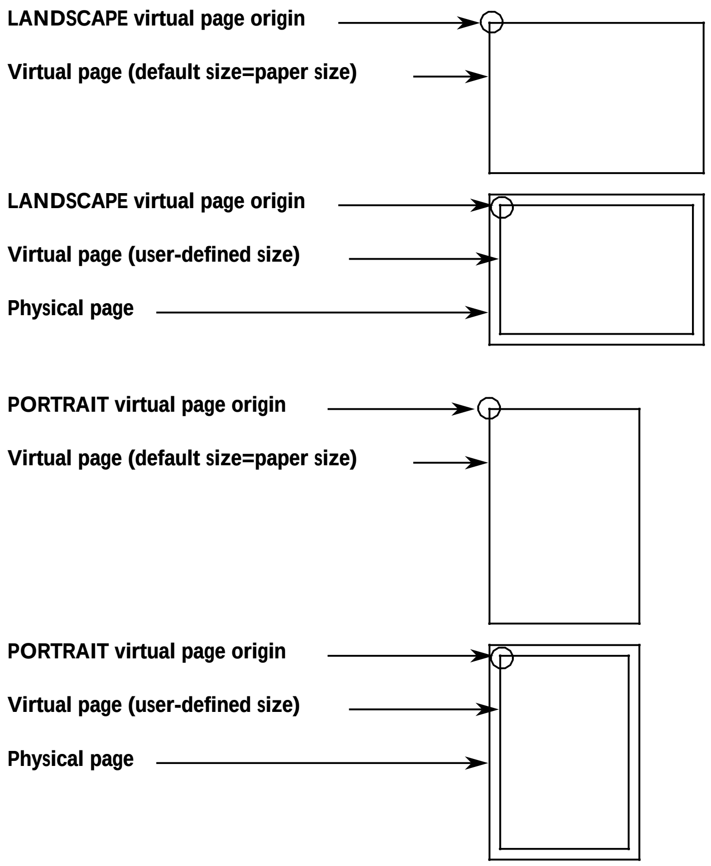
The virtual page refers to the dimensions of the page as specified in the software. The dimensions of the virtual page may be less than or equal to the dimensions of the physical page size, but not larger. The printer truncates larger values.

If you explicitly define virtual page size (using the LANDSCAPE/PORTRAIT command PAGE SIZE parameter), the defined area is centered relative to the physical page dimensions.

You can specify an orientation for the virtual page either with the LANDSCAPE/PORTRAIT command or by using the FMTn option of the GRID command. If an orientation is not specified, the virtual page is assigned a landscape orientation by default.

The upper left corner of the virtual page is called the “virtual page origin,” as shown in figure 1-5. The virtual page origin is also used to establish a form origin.

Figure 1-5. **Virtual page origin**


LANDSCAPE virtual page origin
Virtual page (default size=paper size)
LANDSCAPE virtual page origin
Virtual page (user-defined size)
Physical page
PORTRAIT virtual page origin
Virtual page (default size=paper size)
PORTRAIT virtual page origin
Virtual page (user-defined size)
Physical page

Edgemarking

The same coordinate system is used for printing on all Xerox printers. This limits the printing area in some cases and can cause you to lose data which begins near, or off, the edge of the physical page.

Edgemarking is the placement of marks along the edge of the page. These marks consist of graphic elements that bleed off the paper, tabs for section reference, or marks that denote changes made in redline drafts.

To accommodate edgemarking, the system page must be larger than the physical page. Edgemarking capability is limited on the LPS because the system page boundaries (such as the 8.6 by 14 inch maximum image size printing area) correspond to the physical page on at least two edges for all paper sizes.

CAUTION: Be careful when edgemarking. Printing a solid band on the leading edge of the paper may cause fuser jams.

Non-imaged elements

Elements, such as text and graphics, may begin at the edge of the physical page on two sides, and off the physical page on the top and on the left side (except with 8.5 by 14 inch paper).

However, if any part of a printed element begins off the system page, no part of the element images.

- If a line of variable data begins off the system page, no part of the line prints.
- If a ruled line begins off the system page, no part of the ruled line prints.
- A ruled line near the edge of the system page must hold a position of at least one-half the line thickness inside the system page to print. For example, a bold line is eight dots thick and, therefore, it must hold a position of at least four dots inside the system page leading edge.

One common cause of print elements accidentally beginning off the system page is the improper use of the OUTPUT SHIFT command. This command shifts the entire page contents relative to the boundaries of the system page. When you enter a negative shift value (as is often the case for the back side of duplex pages), and that value exceeds the left margin, no text element prints. When using a negative value for the SHIFT command, be sure that it is less than the value of the left margin.

Imaging error messages

If any part of a print line originates off the system page, the following message displays:

```
OS6905 DATA ORIGIN OFF PAGE -- CHECK OUTPUT
```

This message line appears only once during a print job. It indicates that a print line origin problem exists within the form description, or that an excessive SHIFT value has been specified.

Registration shift and skew

The registration of a printed image can appear shifted or skewed on a page if the sheet of paper is misaligned as it enters the printer. Because of the design of the LPS feeder, the image registration on each page can vary slightly both horizontally and vertically by up to .05 inches (1.0 mm). The image can also slant or skew slightly by up to .05 inches (1.0 mm) in opposite directions, for a maximum skew of 0.1 inches (2.0 mm).

Note that the following figures are the same specifications which have been rotated to show portrait and landscape orientations. The shift and skew variances described here are within allowable specifications. However, as this can affect the registration of variable data in preprinted forms and the placement of images close to the edge of the page, it is important to make allowances for this condition.

Figure 1-6. **Landscape orientation shift and skew (11 x 8.5 inches)**

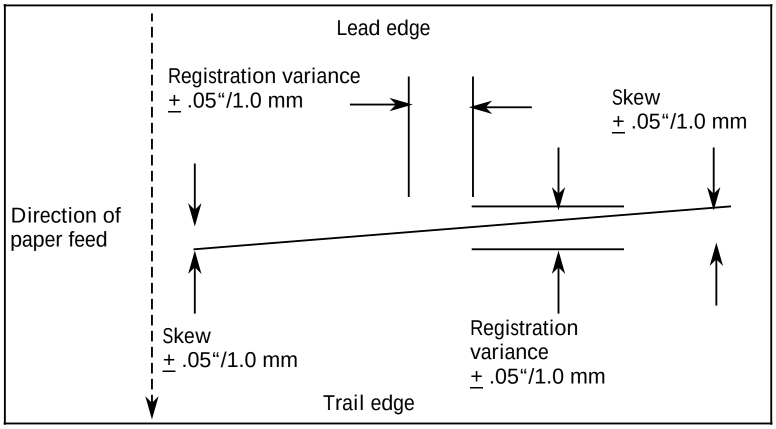
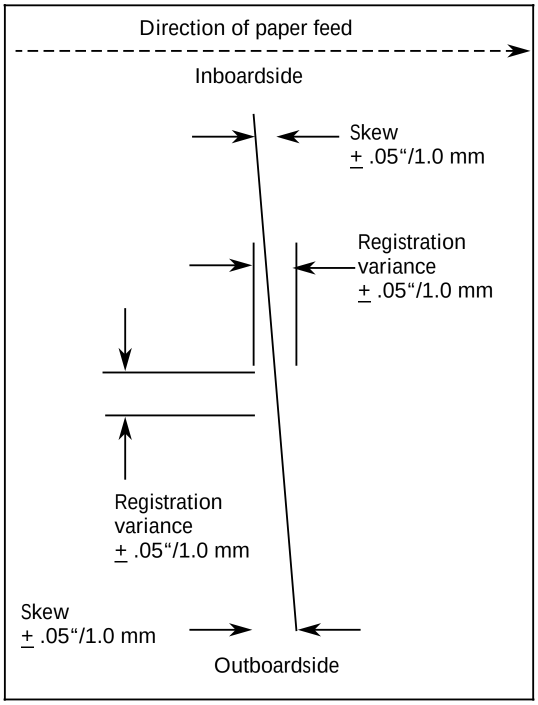
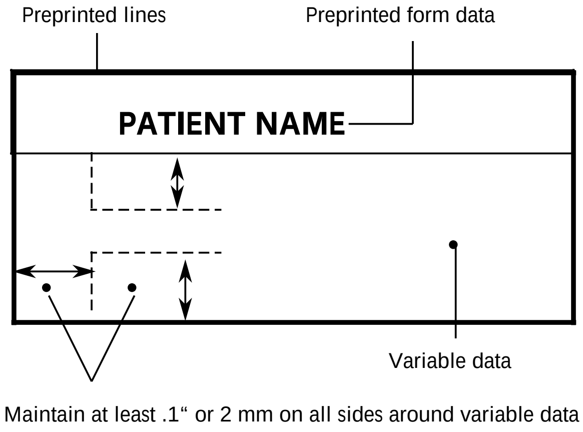


Figure 1-7. **Portrait orientation shift and skew (8.5 x 11 inches)**



For best results when designing preprinted forms, allow approximately .1 inches or 2.0 mm of space on all sides of any boxes, or above and below any lines onto which variable data is to be printed, as shown in figure 1-8.

Figure 1-8. **Maintaining margins in preprinted boxes to allow for registration and skew variations**


Preprinted lines
Preprinted form data
PATIENT NAME
Variable data
Maintain at least .1“ or 2 mm on all sides around variable data

Note: Figure 1-8 is enlarged for the purpose of illustration, and is not to scale.

Output performance considerations

The LPS has a rated speed of up to 50 (4050, 4450, and 4650) or up to 92 (4090) impressions per minute (an impression refers to one printed side of a sheet of paper). The actual output performance you experience depends greatly on the processing features invoked in the job and the print density of each page.

Actual output also varies according to the configuration of the LPS, such as the type of connection (offline, online, remote communication, and front end processor).

This section provides information on expected output performance when printing various types of jobs, applications, and hardware configurations. For more detailed information, consult your service representative.

Note: The term throughput refers to the print speed once pages start printing. The processing that occurs prior to the actual printing of the pages depends greatly on the complexity of the job.

Interpress

Interpress masters sent to the LPS must be processed by the Interpress decomposer function of the Operating System Software (OSS). The time required to print an Interpress job depends on the complexity of the image from page to page.

PostScript

PostScript masters sent to the LPS must first be converted to .IMG files in the front end processor. The time required to print a PostScript job depends on the complexity of the image from page to page.

Dynamic Job Descriptor Entries (DJDE)

The use of DJDEs adds processing time and slows the output. To maximize performance, restrict the use of DJDEs to the following commands: GRAPHIC, FORMAT, MODIFY, and FORM.

Print density

Full throughput estimates are based on pages with an average print density of approximately seven percent of the page. Pages which are very dense require more time to image and to print.

Highlight color

The LPS running V3.8 Color Compatibility Release or XDDI software is compatible with the 4850/4890 printer running V3.7, V4.0, or V5.0 highlight color software. Highlight color applications can be printed when using V3.8 or XDDI software on the LPS. Highlight color datastreams are fully supported and translate to black and shades of gray.

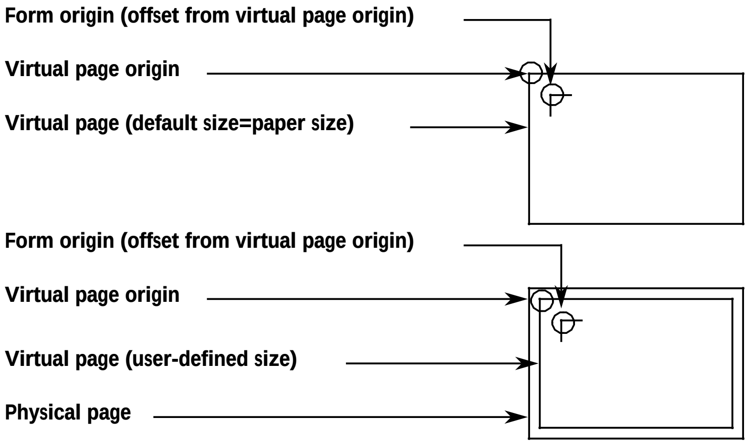
Color text printed over a solid black background or vice versa, disappear when printed on the LPS. There is no error message when this occurs. Light tints with isolated single pixels may not print on the LPS.

Form origin

All forms data described by FDL commands is positioned relative to a point called the "form origin," as shown in figure 1-9. This point offsets from the virtual page corner by horizontal and vertical displacement values, which you specify using the GRID command. If none are specified, standard default values are used to establish the form origin.

If variable data is merged with the form, set the form origin to coincide with the beginning position of the variable data so that the form and variable data coordinate accurately. Standard computer printing formats are stored on the system. Refer to the "Predefined formats" section, later in this chapter.

Figure 1-9. **Form origin**


Form origin (offset from virtual page origin)
Virtual page origin
Virtual page (default size=paper size)
Form origin (offset from virtual page origin)
Virtual page origin
Virtual page (user-defined size)
Physical page

Positioning form elements

The following elements may be placed on a form with FDL commands:

- Lines
- Boxes
- Fixed text
- Logos and signatures
- Images
- Sections.

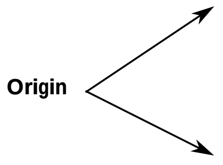
All of these elements are located in relation to the form origin at the upper left corner of the form. Each form element has an origin, a point used to position it relative to the form origin, as shown in table 1-2.

Table 1-2. **Form elements and corresponding origins**

Form element	**Element origin**
Vertical ruled line	Top of the line at the midpoint of the line thickness
Horizontal ruled line	Left end of the line at the midpoint of the line thickness
Box (outlined)	Upper left corner of the box at the midpoint of the outline thickness
Box (shaded)	Upper left corner of the box
Fixed text (single line)	Upper left corner of the first character cell when the line appears upright to the viewer
Fixed text (multiple lines)	Upper edge of the topmost character cell and the leftmost edge of the leftmost character cell when viewed in an upright position (illustrated in figure 1-10)
Graphics	Upper left corner of the image
Logos and signatures	Upper left corner of the first (or only) character cell (with a few exceptions)
Sections (of a form)	Upper left corner of the section

Figure 1-10 shows two text blocks, one using a portrait font and one using a landscape font. The text block origin is used to position the text block relative to the form origin.

Figure 1-10. **Text block origin**



Grids

The location of a form element on a page is specified in terms of its horizontal and vertical displacement from the form origin. The units of measurement used to define this displacement can be any of the following:

- Linear units—inches or centimeters
- Dots—300 per inch
- Xdots—600 per inch
- cpi and lpi—characters per inch horizontally and lines per inch vertically.

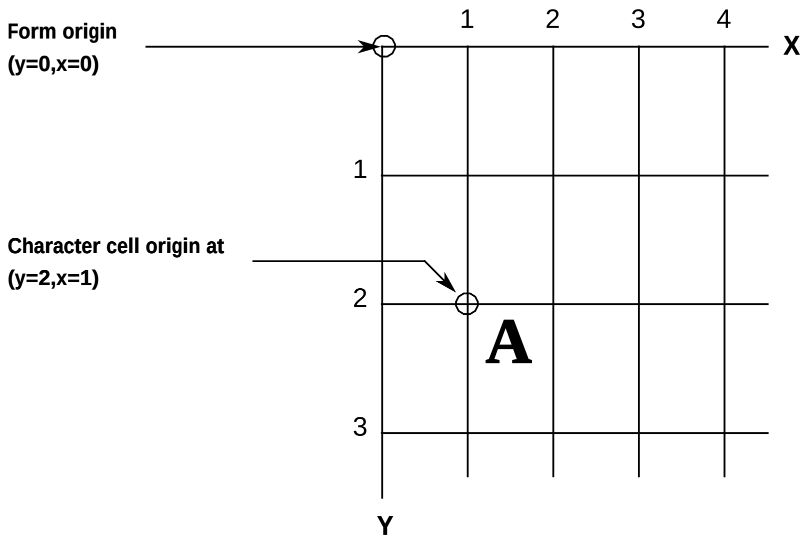
x and y coordinates

The y coordinate describes the vertical position on a grid. The x coordinate describes the horizontal position. When both coordinates are given together, the y coordinate is always specified first.

If you draw a horizontal and a vertical line through the form origin to create x and y coordinates, you would express the location of the form origin as y=0, x=0.

If you draw more lines to mark horizontal and vertical measurements away from the form origin so that the lines were one unit of measurement apart, you create a grid like the one shown in figure 1-11. You can then position form elements (lines, boxes, and so on) by specifying a grid location.

Figure 1-11. **Form grid**



Example

You placed the letter “A” at location (2,1). If you are measuring grid units in inches, the origin of the “A” character cell is located two inches down and one inch to the right of the form origin. If you are measuring the grid in cpi and lpi units, the origin of the “A” character cell is located two lines down and one character width to the right of the form origin. At 10 cpi and 6 lpi, the “A” is .33 inches down from the form origin and .10 inches to the right.

Negative coordinates

Negative x and y values also may be used to place form elements above and/or to the left of the form origin, as long as the values are within system page boundaries.

UNIT value

The unit value of the GRID command specifies the unit of measurement that the FDL commands use to position form elements on the page. Optionally, you can select a predefined format that automatically provides grid unit values. Individual FDL commands may override GRID unit values.

Predefined formats

A set of predefined print description entries or formats, having standard format specifications, is provided on the Operating System Software (OSS) tapes. You may use the standard formats or define your own to suit your specific needs.

Reference

Refer to the “Standard print formats” appendix for a list of the standard LPS print formats.

These standard formats provide commonly used impact printer conversion formats for use with specific page sizes and orientations. Use the Xerox design ruler to assist you in measuring character and line spacing. The ruler has eight scales that conform to the standard format grid.

Reference

Refer to the “Support tools and measurements” appendix for more information on the forms design ruler.

FMT1 (landscape) or FMT6 (portrait) is used by FDL to provide default values for page orientation, form origin, and grid unit dimensions, provided there are no explicit overriding parameters.

Unless overridden by an explicit orientation PAGE SIZE parameter, the virtual page size in a predefined format is always the sysgen-specified paper size. The virtual page origin is located at the upper left corner of the physical page.

Data types

Two types of data are used in creating and printing LPS forms, as shown in table 1-3.

Table 1-3. **Data types**

Data type	**Description**
Variable	Generally refers to computer-produced information that the LPS merges with a form. Typically this data varies from page to page.
Forms	Refers to information that is used to print the form, such as lines between columns and rows, boxes, and shading. Forms data also refers to information that is part of the form, such as titles, headings, captions, logos, and signatures. Forms data typically does not vary from page to page.

2. Forms Description Language

This chapter describes the function and use of each Forms Description Language (FDL) command in generating a form electronically.

The FDL commands discussed throughout this guide apply to all version 3 laser printing systems.

Reference Refer to the "FDL command syntax summary" appendix for a summary of all FDL commands and their syntax. The conventions used to present command syntax are listed in the "Introduction" and in the "FDL command syntax summary" appendix.

FDL command overview

FDL is a set of keyword commands that you use to generate an electronic form.

You first create a source file of FDL commands that describes the characteristics of your form. You then compile the file and store it as an electronic form file on the LPS.

The form can contain a variety of fonts, logos, and graphics, and it can be merged with variable data during printing. You can select any stored form for printing.

Command format

The following is true for each FDL command:

- Commands consist of a command identifier and various parameters and keywords associated with the function.
- Spaces and/or commas separate keywords and parameters.
- Commands are terminated by a semicolon.
- Command information is placed within the first 72 columns of each record.
- Multiple commands may appear in one record if separated by a semicolon.
- Commands can be continued on multiple lines before ending with a semicolon, with the exception of the LINE and BOX commands. For both of these commands, the following string must reside on one line:

  AT . . . IN *unit*

  Lines containing all blanks are ignored and may be used for separation.

Command summary

The five types of commands and the associated FDL commands are described in table 2-1.

Table 2-1. **FDL command summary**

Command types and commands	**Command function**
FORM/RESOLUTION	Identifies the name of a form in the forms library and the resolution at which the form should be compiled for printing.
PAPER	Identifies the paper size for which the form is designed.
LANDSCAPE/PORTRAIT	Specifies the page orientation and virtual page size.
GRID	Specifies the grid units used in describing the form and the origin of the form relative to the virtual page origin. In most cases, a standard format specification can be entered, which provides standard character and line spacing, page orientation, and form origin.
FONT	Specifies which fonts to use when creating a form.
LINE	Specifies the length, position, direction, and thickness (hairline, 0, 1, or 2) of lines.
BOX	Specifies the location of the upper left corner and the dimensions of square or rectangular boxes. All boxes in FDL are fixed-size. Backgrounds for text must use the BOX command.
TEXT AT	Specifies the positioning of text (written matter) such as form titles, headings, and labels in specific locations.
TEXT IN BOX	Specifies the positioning of text in a box.
LOGO	Specifies the positioning of logos and signatures.
GRAPHIC	Specifies a graphic image to be merged with the form and its placement and relative scale.
SECTION	Defines a portion of a form as a relocatable section.
END SECTION	Terminates a section.
DO SECTION	Invokes and places a previously defined section of a form.
COMMENT	Inserts comments.
END	Terminates a form description.

Form creation process

The following three basic steps are required to produce an electronic form:

1. Initiate an editing session.
2. Enter the FDL commands.
3. Compile and print the form.

Initiating an editing session

Use the editor utility to create and modify your Forms Source Library (.FSL) source files.

If you use your host editor utility, follow the instructions provided in your host documentation.

References

If you use the LPS editor, refer to your *Xerox 4050/4090/4450/4650 LPS Command Reference* for more information on editor commands.

Refer to the “FDL command syntax summary” appendix for an alphabetical list of each command and syntax.

All of the FDL commands are described in detail later in this chapter and are presented in the following order:

- Command
- Syntax
- Parameter options
- Default
- Considerations
- Example.

Compiling and printing forms

After you have entered all the FDL commands needed to describe your form, exit the editing session and invoke the forms compiler.

Refer to the “Compiling and printing forms” chapter for information on how to compile and print your form.

Setup commands

Before entering commands to describe a form, enter the setup commands in the following order:

FORM
PAPER
LANDSCAPE/PORTRAIT
GRID
FONT.

The FORM setup command is always required. If the other setup commands are not defined, the defaults are used.

The FONT command is required if text is to be included on the form.

Note: The commands IRESULT, ICATALOG, PALETTE, and INK are not included in this section, as they are meaningless on a black and white system. However, XDDI will accept .FSLs that are written on a color printer.

FORM/RESOLUTION

Defines the name and resolution of the form.

Naming the form

Defines the name of the form. Once the form is compiled and stored on the system disk, this is the name used by the LPS software to reference the form.

Syntax **FORM** *name*;

Parameter options *name*
A one- to six-character identifier that references the form.

Default None. A form name is mandatory.

Example FORM BLUBOX;

Considerations The FORM command must be the first command in the form definition and must be completely contained in the first record of the form definition.

Reserved words (such as FORM, GRID, FONT, TEXT, BOX, LOGO, and so on) cannot be used for the name. However, reserved words can be modified and used (for example, FORM1, FORM2, and so on).

Specifying resolution

The RESOLUTION parameter is an optional part of the FORM command that allows you to specify whether the form is created at 300 or 600 spots per inch (spi).

Syntax **FORM** *name RESOLUTION IS value SPI*;

Parameter options *name*
A one- to six-character identifier that references the form.

value
Specifies whether the form is created at 300 or 600 spi.

Default None.

Example FORM BLUBOX RESOLUTION IS 300 SPI;

PAPER

Identifies the paper size for which the form is designed. It is an optional command that enables you to select a paper size that is different than the sysgen-defined paper size.

Syntax

PAPER *SIZE IS value*;

Parameter options

value

USLETTER
8.5 by 11 inches/216 by 279 mm.

A4
8.27 by 11.69 inches/210 by 297 mm.

USLEGAL
8.5 by 14 inches/216 by 356 mm.

x unit BY *y unit*
Specifies nonstandard sizes. The *x* represents the virtual page width and the *y* represents the virtual page height. Units are optional and can be expressed in INCH or INCHES, CM or CENTIMETERS, DOTS, or XDOTS. The default is INCHES.

The *x* and *y* values must be positive numbers and may contain two decimal places for all units except DOTS.

Default

If a PAPER command is not present, and a predefined format is not specified, the sysgen-defined paper size in effect at run time is used as the paper size value.

Example nonstandard sizes

PAPER SIZE IS 16.54 INCHES BY 11.69 INCHES;

Example standard sizes

PAPER SIZE IS USLETTER;

Considerations

USLETTER and USLEGAL cannot be abbreviated.

You can specify paper size in a Job Source Library (JSL). When the JSL specifies PAPERSIZE using the keyword method, for example, USLETTER, A4, or USLEGAL, the .FSL must also use the same method. If the JSL specifies PAPERSIZE=8.5 by 14 and your .FSL specifies PAPER SIZE IS USLEGAL, one of the following error messages is displayed:

```
OS6670  Form paper size too small.  Form will not be printed.
OS6680  Form paper size too large.  Form will not be printed.
```

These errors appear only when you print the form. The messages do not appear when you compile the form without printing it.

Reference

The PDL PAPERSIZE command is explained in more detail in your *Xerox 4050/4090/4450/4650 LPS Print Description Language (PDL) Reference*.

Due to edgemarking considerations, the form created by specifying a paper size of USLEGAL is different from one specifying 8.5 by 14 inches.

The forms compiler is capable of compiling a number of paper sizes. Although a form file may be compiled without an error, it may not be printable on a particular system if the paper size exceeds the maximum feeder capacity of that system. Examples of these are A3, B4, and 11 by 17 inch paper sizes. If you attempt to print a form with an incompatible paper size, the following message is displayed on the system controller:

```
Paper size in cluster AUTO is too small
```

When coding .FSL applications, the PAPER command must precede the LANDSCAPE/PORTRAIT statement.

If a predefined format is specified in the GRID command, paper size is determined automatically, and the PAPER command is unnecessary. The PAPER command is required, however, any time the paper size is different from the sysgen default.

Note: The correct size paper must be loaded in the feeder. A paper size mismatch at run time causes an error message to be displayed. The form does not print, and the job may be aborted.

LANDSCAPE/PORTRAIT

Specifies the origin of the form and the virtual page size.

Syntax

orientation **PAGE** *SIZE IS n WIDE BY m HIGH***;**

Parameter options

orientation

LANDSCAPE

The form is oriented horizontally (like most paintings or photographs of landscape scenes).

PORTRAIT

The form is oriented vertically (like most portraits of people).

n

Specifies the virtual page width in DOTS, XDOTS, INCHES (IN), or centimeters (CM).

m

Specifies the virtual page height in DOTS, XDOTS, INCHES (IN), or centimeters (CM).

Default

LANDSCAPE is the default orientation, and the default units is INCHES.

Example

PORTRAIT;

Considerations

When coding .FSL applications, the PAPER command must precede the LANDSCAPE/PORTRAIT command.

If a PAGE SIZE parameter is specified, a virtual page of that size is centered relative to the paper. The virtual page origin is at the upper left corner of the centered virtual page.

If no PAGE SIZE parameter is specified, the virtual page size defaults to the paper size specified in the PAPER command; otherwise it defaults to the sysgen-defined paper size.

Only one LANDSCAPE or PORTRAIT command is allowed in a form description. If specified, the command must precede the GRID, BOX, LINE, LOGO, and TEXT commands, described later in this chapter.

Page width and height values must be positive numbers and may contain two decimal places for all units except DOTS.

GRID

Specifies how far apart to space the horizontal and vertical grid lines. This command also specifies the location of the form origin with respect to the virtual page origin. All FDL commands create and place form elements (lines, boxes, and so on) relative to the form origin.

Syntax

GRID *UNIT IS format id* **ORIGIN** *y unit x unit***;**
or
GRID *UNIT IS value* **ORIGIN** *y unit x unit***;**

Parameter options

format id

Name of a predefined format. The format may be one of the standard formats listed in the "Standard print formats" appendix or a user-defined format.

When a format is specified, it automatically provides page orientation, form origin, and grid unit dimensions. All predefined formats specify the grid units in lines and characters per inch. The BEGIN values of the predefined format are used to place the form origin, unless overridden by an ORIGIN parameter.

value

If a predefined format is not specified, *value* is used to indicate the number of inches (INCH or INCHES), centimeters (CM or CENTIMETERS), dots (DOTS or XDOTS), or characters per inch or lines per inch (CPI or LPI) that specify the size of a grid unit. Size in inches or centimeters represents the length of one side of a square grid unit.

If the *value* is omitted when DOTS are specified, 1 is assumed. If only one DOTS parameter is specified, the grid unit is the same number of dots in both the horizontal and vertical dimensions.

y

Specifies the offset value used to offset downward from the top of the virtual page. If *y* is not specified, the top edge of the form is located at the top edge of the virtual page.

unit

Specifies the measurement, in INCH or INCHES, CM or CENTIMETERS, DOTS or XDOTS, that the form origin is offset downward from the top of the virtual page. If inches, centimeters, or dots are not specified in this parameter, inches are assumed.

x

Specifies the offset value used to offset the form to the right of the left edge of the virtual page. The coordinate *x*=0 represents the left edge of the virtual page. If *x* is not specified, the left edge of the form is located at the left edge of the virtual page.

Default

If no grid units or predefined format is specified, FMT1 (landscape) or FMT6 (portrait) values are used. If no units value is specified, INCHES is the default.

Example

```
GRID UNIT IS 1 INCH;
```

Considerations

Inches and centimeters may have two decimal places. Dots must be expressed in integers only. The values *value*, *y*, and *x* must be positive numbers.

The GRID command, when specified in number of dots, allows a greater flexibility than more conventional methods of specifying the grid. For example, instead of being limited to two decimal places of accuracy when specifying inches or centimeters, the grid can be specified to the dot. This feature also eliminates any errors caused by rounding.

If the GRID command specifies explicit unit parameters and no ORIGIN is specified, the form origin coincides with the virtual page origin.

Grid unit dimensions may be overridden by the BOX, LINE, LOGO, and TEXT commands. Multiple GRID commands may be used within a set of FDL commands. A GRID command remains in effect until another is encountered.

Reference For illustrations of how virtual page and form origin are determined, see the “Command examples” appendix.

FONT

Identifies the character sets used when creating and printing forms data and variable data.

Syntax **FONTS** *id*$_1$ *id*$_2$ *id*$_3$...*id*$_{32j}$;

Parameter options *id*

Identifier of the standard or custom font you want to use. Multiple ids are separated by either a blank or a comma.

Example FONTS UN106A,UN104C,UN114A;

Considerations Fonts must be selected using the FONT command before text can be specified. FONT can be used only once.

When specifying multiple fonts, make sure that you enter the correct font in the font list. When an invalid font is encountered, compilation is suspended, and an FRM file is not produced. There are three possible cases for a “font not found” error:

- The font does not exist on the system disk, and the message `***USER SPECIFIED FONT NAME IS MISSING` is generated. No .FRM file is created.
- There is no such font index. For example, the FONTS command contains two font IDs and the user specifies TEXT USI FON 3... This generates an `***INVALID FONT INDEX` message, and an .FRM file is created with the text printed using FONT 1.
- No font index is specified in the TEXT command. For example, TEXT AT 1 1 `TEXT MESSAGE` will print with the last used font. If this is the first time the text has been used, FDL will default to FONT 1.

The number of fonts that can be specified depends on their size, the number of fonts used in the variable data, and the size of font memory in your system. However, the maximum number of fonts and logos allowed per form by the forms compiler is 32.

Description commands

Description commands specify the location, size, and characteristics of the following form elements: lines, boxes, logos, graphics, form sections, and text.

The following commands are used for entering descriptive form data:

- LINE
- BOX
- TEXT AT
- TEXT IN BOX
- LOGO
- GRAPHIC.

You can enter these commands in any sequence. For a discussion of the problems you may encounter when entering these commands, refer to the “Troubleshooting” chapter.

Location coordinates

Specify the locations in terms of the y and x axis coordinates, measured from the form origin specified in the GRID command. The form origin is generally set to coincide with the variable data origin, and the grid units correspond to the character and line spacing of the variable data. The form origin coordinates are specified as y=0, x=0.

You can specify both x and y coordinates, or just one coordinate along the y or x axis. If only one coordinate is given, the axis is implied in the command.

Symbols for coordinates

The following five symbols are used in the description commands to symbolize different coordinates:

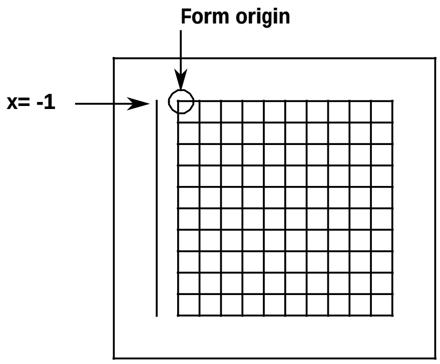
- c_o Origin coordinate
- c_s Start coordinate
- c_e End coordinate
- c_a Absolute coordinate
- c_i Incremental coordinate.

The coordinate parameter may be followed by the unit of measurement: inches (IN), centimeters (CM), or DOTS. If units of measurement are not given in the command, the coordinates are in grid units.

Negative coordinates

Negative coordinates may also be used. A negative y coordinate is measured upward from the form origin. A negative x coordinate is measured to the left of the form origin. For example, a vertical line starting at x=-1 would appear to the left of the form grid, as shown in figure 2-1. When you use negative numbers, be sure to stay within the boundaries of the system page.

Figure 2-1. **Use of a negative coordinate**



LINE

Specifies that one or more lines are to be drawn in the same direction. A LINE command defines the following:

- Point at which the line begins
- Direction of the line
- Length of the line
- Type of line
- Thickness of the line
- Number of times the same line is to be drawn, either from different origins or at specified intervals from the initial origin.

Syntax

AT *c_o unit DRAW n direction LINES IN unit FROM* c_s *unit* **TO** c_e *unit USING type thickness AND REPEAT repeat direction* **AT** c_a *unit* c_a *unit ...* **EVERY** *c_i unit***;**

Parameter options

c_o

The number representing the displacement from the form origin of the first or only point of origin, expressed in grid units or linear units. The remainder of the line command specifies the length and characteristics of a line to be drawn at this location.

If a horizontal line is to be drawn, the c_o displacement is measured on the y axis. If a vertical line is to be drawn, the c_o displacement is measured on the x axis. For example, if c_o is 6, a horizontal line is drawn under the sixth character row.

n

Number of lines to be drawn.

unit

Unit of linear measurement, expressed as inches (IN), centimeters (CM), or DOTS. If a linear unit is specified following IN, the c_o parameter is assumed to be in the same units, unless specified after c_o. If units are not specified, the measurement is in grid units.

direction

HORIZONTAL or VERTICAL.

c_s

The coordinate of the start of the line, measured on the x or y axis, depending on the direction of the line.

c_e

The coordinate of the end of the line, measured on the x or y axis, depending on the direction of the line.

type

SOLID An unbroken, straight line.

BROKEN The line is divided into many equal sections, separated by small amounts of space.

DOTTED The line consists of dots of equal size and spaced equally apart.

thickness

0 (invisible)
HAIRLINE
1
2

repeat direction

HORIZONTALLY or VERTICALLY.

c_a

Absolute x or y coordinate at which to start repetitive lines in a horizontal or vertical direction. Multiple *c_a* parameters can be specified. Whether *c_a* is measured on the y or x axis depends on the horizontal or vertical direction of the line.

c_i

An incremental number representing the grid units or linear units between repeated lines.

Default The system defaults for direction and type of line are horizontal and solid. The default option of REPEAT is used to repeat a horizontal line vertically and a vertical line horizontally to produce parallel lines. The default number of lines to be drawn is 1.

Example AT 3 DRAW LINE FROM 4 TO 10;

Reference Refer to the “Command examples” appendix for examples and illustrations about drawing lines.

BOX

Describes the size and shape of a square or rectangular box. The BOX command is similar to the LINE command. Like lines, boxes may be repeated either at fixed intervals or at specified locations. The origin of a box is its upper left corner at the midpoint of the outline thickness. The BOX command provides an option that allows you to draw the outline of a box (frame) and to fill in a box with shading.

Syntax **AT** *y unit x unit DRAW n* **BOX***ES IN unit p unit WIDE BY q unit HIGH USING type thickness SHADING density AND REPEAT direction* **AT** *c_a unit c_a unit* ... **EVERY** *c_i unit***;**

Parameter options

y

Coordinate on the y axis of the upper left corner of the box.

x

Coordinate on the x axis of the upper left corner of the box.

unit

Unit of linear measurement, expressed as inches (IN), centimeters (CM), or DOTS. If units are not specified, the measurement is in grid units.

n

Number of boxes to be drawn. the default is 1.

p

Width of the box.

q

Height of the box.

type

Line style making up the border of the box.

SOLID	An unbroken, straight line.
BROKEN	The line is divided into many equal sections, separated by small amounts of space.
DOTTED	The line consists of dots of equal size and spaced equally apart.

thickness

Thickness of the border of the box.

0	(invisible)
HAIRLINE	────────
1	━━━━━━━━
2	━━━━━━━━

density

Relative intensity of the shading.

LIGHT
MEDIUM
HEAVY.

direction

HORIZONTALLY
VERTICALLY.

c_a

Absolute x or y coordinate at which to start repetitive lines. Multiple c_a parameters can be specified.

c_i

An incremental number representing the grid units or linear units between repeated lines.

Default The default for LINES is SOLID 1; the default for REPEAT is HORIZONTALLY.

Considerations Specifying a line thickness of 0 is useful for positioning text in an invisible box. When using this technique, however, remember that 0 lines, although they are not printed, appear as lines internally.

A single BOX command can specify either an outlined box or a shaded box, but not both; that combination requires a second BOX command.

Example AT 4, 6 BOX 14 WIDE BY 4 HIGH;

Reference Refer to the “Command examples” appendix for examples and illustrations about drawing boxes.

TEXT

Two methods are available for specifying the text that is to be placed on forms. The TEXT AT command places the text at a specified location anywhere on the form; the TEXT IN BOX command places text inside a box.

TEXT AT

Allows you to print text in specific locations.

Syntax *direction* **TEXT** *SPACED d units PER LINE ALIGNED alignment USING* **FONT** *n* **AT** *y units x units 'text' 'text' ...* **;**

Parameter options

direction

HORIZONTAL
VERTICAL

d

Amount of vertical space occupied by a line of text. All specifications except lpi are actual line height measurements. An lpi value specifies line height in terms of lines per inch. The number must be positive and may have two decimal places for all units except DOTS. The default unit is DOTS.

units

Units of linear measurement, expressed as inches (IN), centimeters (CM), DOTS, XDOTS, POINTS (PTS), or lines per inch (LPI). If units are not specified, the measurement is in grid units.

alignment

LEFT
RIGHT
CENTER
TOP
BOTTOM

n

Index number of the font to be used. If omitted, the system uses the last font index specified in a TEXT command. If the font was omitted in all previous TEXT commands, the system uses the first font specified in the FONT command.

y

Coordinate on the y axis where the text origin is to be located.

x

Coordinate on the x axis where the text origin is to be located.

text

Text characters that are printed at the specified location. Multiple text strings can be specified by enclosing each text string in single quotation marks. Separate each text string with one or more spaces. (A string is a series of characters.) Each string is printed as one physical line of text. Text strings enclosed by single quotes (such as 'abcde') can be broken and continued onto the next input record; the FDL compiler skips all embedded spaces until it finds the first character of the next record.

Default

If direction and alignment are not specified, the defaults are HORIZONTAL and CENTER.

Considerations

FDL gives you control over vertical line spacings and horizontal character placement. The SPACED parameter in the TEXT command is used to control the amount of vertical space between two lines of text. Character spacing cannot be overridden. However, each proportionally spaced font contains six space characters of various widths to facilitate adjusting the line length for text applications.

At least one font must be specified before any text can be specified. The FONT command is used, and only one such command can be given for any one form. After the fonts are specified, they are referenced in the form description by an index number, beginning with 1 for the first font specified, 2 for the second, and so forth.

The number of fonts that may be specified depends on their size, the number of fonts used in the variable data, and the size of font memory. Once a font number is specified in a TEXT command, it remains in effect until a new font index is specified. If no font number is specified in any TEXT command, the system uses FONT 1 as the default.

Text line origins

The origin of a single line of text is the upper left corner of the first character cell when the line appears upright to the viewer. The origin of multiple lines of text is the upper edge of the topmost character cell and leftmost edge of the leftmost character cell when viewed in an upright position.

Text buffer capacity limits vary depending on the application. The buffer is 968 bytes in size. However, 968 bytes of text cannot be included in a line of text. There are a number of factors involved:

- Approximately 30 bytes are consumed for the processing of the command.
- Approximately 12 bytes are used for each individual text string that is specified in a command.
- One byte is consumed for each byte of the text string. Therefore, it takes fewer bytes to process ’1234567890’ than to process ’12’ ’3456’ ’678’ ’90’ in a TEXT command.

Using toggles

Text originally entered at a 9700/8700 keyboard may contain number signs (#). The number sign acted as a toggle to enable the user to alternate between lower and uppercase characters. Previously, this was the only way to specify a change from uppercase to lowercase and vice versa. The following is an example of the lowercase in a text string.

Entering:
    'R#ETAIL #D#ISTRIBUTION'

produces:
    Retail Distribution

Although the current keyboards provide lowercase capability, it is important to note that a form previously created on a 9700/8700 using toggles will compile successfully on a 4050, 4450, 4650, or 4090 LPS.

Examples of aligned text

Text in forms may be left-aligned, right-aligned, or centered.

Reference

Refer to the “Command examples” appendix for command syntax and illustrations for aligned text.

Other character-block orientations are shown in the “Command examples” appendix.

TEXT IN BOX

Allows you to place text within a box.

Syntax

direction **TEXT** *SPACED d units PER LINE ALIGNED alignment*
USING **FONT** *n* **IN** *position* **BOX** *y unit x unit ‘text’ ‘text’ ...*
IN *NEXT direction* **BOX** *‘text’ ‘text’ ...***;**

Parameter options

direction
HORIZONTAL
VERTICAL

d
Amount of vertical space occupied by a line of text. All specifications except lpi are actual line height measurements. An lpi value specifies line height in terms of lines per inch. The number must be positive and may have two decimal places for all units except DOTS. The default unit is DOTS.

units
Units of linear measurement, expressed as inches (IN), centimeters (CM), DOTS, XDOTS, points (PTS), or lines per inch (LPI). If units are not specified, the measurement is in grid units.

alignment
LEFT
RIGHT
CENTER
TOP
BOTTOM

n
Index number of the font to be used. If omitted, the system uses the last font index specified in a TEXT command. If the font was omitted in all previous TEXT commands, the system uses the first font specified in the FONT command.

position
TOP LEFT or LEFT TOP
TOP CENTER or CENTER TOP
TOP RIGHT or RIGHT TOP
LEFT CENTER or CENTER LEFT
CENTER CENTER or CENTER
RIGHT CENTER or CENTER RIGHT
BOTTOM LEFT or LEFT BOTTOM
BOTTOM CENTER or CENTER BOTTOM
BOTTOM RIGHT or RIGHT BOTTOM

y
Coordinate on the y axis where the box origin is to be located.

x
Coordinate on the x axis where the box origin is to be located.

text

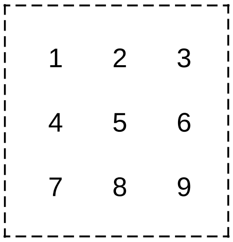
Text characters that are printed at the specified location. Multiple text strings can be specified by enclosing each text string in single quotation marks. Separate each text string with one or more spaces. (A string is a series of characters.) Each string is printed as one physical line of text. Text strings enclosed by single quotes (for example, 'abcde') can be broken and continued onto the next input record; the FDL compiler skips all embedded spaces until it finds the first character of the next record.

Default If direction and alignment are not specified, the defaults are HORIZONTAL and CENTER. The default for units is DOTS.

Considerations A box with matching coordinate values must be defined before the TEXT IN BOX command can reference it. Thus, the statement allows nine options for the position in a box where the text is to be placed.

Reference Refer to the position parameters and to the “Command examples” appendix for illustrations regarding text positioning.

Figure 2-2. **Text positioning**



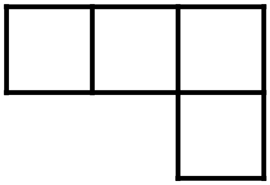
Note that except for CENTER, two keywords are required. If a location is not specified, the default is to place text in the center of the box. If the selected font causes the text to overflow the box or overflow the page, the system prints the form as specified and generates a message indicating the maximum size font, in points, that will fit in the allotted space.

Adjacent boxes The BOX position is specified by the coordinates of the upper left corner of the box in which the text string is to be placed. If text is to be placed in an adjacent box (either vertically or horizontally adjacent), this can be specified by an IN NEXT BOX parameter, in the following format:

IN NEXT *HORIZONTAL* BOX *‘text’ ‘text’* ...;

Adjacent boxes must have a common side. The keywords IN NEXT HORIZONTAL BOX specify the next horizontal box to the right of the current box. The keywords IN NEXT VERTICAL BOX specify the box beneath the current box. These adjacent boxes are shown in figure 2-3. The default is HORIZONTAL.

Figure 2-3. **Adjacent boxes**

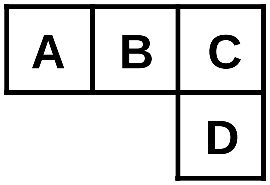


Assuming that the upper left corner of the first box above is located two grid units down from the form origin and one grid unit to the right of the form origin, you would use the following statements:

```
TEXT IN BOX 2,1 ‘A:                    TEXT IN BOX 2,1 ‘A‘
IN NEXT BOX ‘B‘                        BOX ‘B‘
                               or
IN NEXT BOX ’C’                        BOX ’C’
IN NEXT VERTICAL BOX ’D’;              VERTICAL BOX ’D’;
```

The results of either statement are shown in figure 2-4.

Figure 2-4. **Placing text in adjacent boxes**



LOGO

Use this command to place .LGO files. A complex figure called a logo up to two square inches in size can be digitized to order by the Xerox Font Center or Rank Xerox. This logo is a special font of one or more characters, which carries with it the relative position of the characters that make up the logo. Thus, while a logo may be made up of many characters, it is positioned as a single unit. For additional flexibility, a signature may be digitized and stored on the system as a logo.

Syntax **LOGO** *id* **AT** *y unit x unit*;

Parameter options

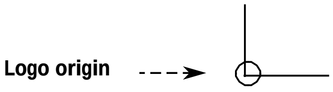
id
The logo identifier (one to six characters).

y
Coordinate on the y axis where the logo origin is to be located.

unit
Unit of linear measurement, expressed as inches (IN), centimeters (CM), or DOTS. If units are not specified, the measurement is in grid units.

x
Coordinate on the x axis where the logo origin is to be located.

Example LOGO EAGLE AT 10,12;



LOGO
: Keyword LOGO

EAGLE
: The name of the logo, a one- to six-character alphanumeric label, is given to the logo when it is digitized by the Xerox Font Center or Rank Xerox.

AT 10,12
: The keyword AT and the coordinates (*y*,*x*) indicating where the logo is to be placed.

Considerations Be sure that font memory capacity is not exceeded. Logos larger than two square inches may be used if they are the result of using smaller components of the logo to gain the desired effect.

Sample .FSL The LOGO command is typically inserted near the end of the .FSL, as illustrated in figure 2-5.

Figure 2-5. **Placing a logo**

```
HORIZONTAL TEXT USING FONT 2 IN CENTER CENTER
BOX 6,1  ’DATE’;
COMMENT *** PLACE LOGO ***;
LOGO EAGLE AT 1,26;
END;
```

GRAPHIC

You can use the GRAPHIC command to place your images at any location on the page. A form may consist solely of graphics (images). Each graphic to be associated with a form must be specified in the .FSL file.

Syntax **GRAPHIC** *name* **AT** *vpos unit hpos unit SCALE IS n/d*;

Parameter options

name
: Name of a graphic (.IMG) file, found on the system disk.

vpos
: Specifies the vertical position of the top edge of the graphic relative to the virtual page origin. This parameter is a decimal number with up to two decimal places (except for DOTS, which must be an integer). If no unit is specified, grid unit dimensions are used as the default.

unit
: Unit of linear measurement, expressed as inches (IN), centimeters (CM), or DOTS. If units are not specified, grid unit dimensions are used.

hpos
: Specifies the horizontal position of the left edge of the graphic, relative to the virtual page origin. The format of the specification is the same as for *vpos*.

n/d
Specifies the reference scale factor. Each parameter, *n* and *d*, must be an integer in the range of 1 to 8 to allow a reference scale factor in the range of 1/8 to 8. The reference scale factor is multiplied by that specified at the time the graphic was digitized, and the product is rounded to the nearest integer in the range of 1 to 8. That integer becomes the effective scale factor with which the graphic is imaged.

Default If no unit is specified, grid unit dimensions are used as the default.

Example GRAPHIC AFJ AT 10, 12;

Sample .FSL A GRAPHIC command is illustrated in figure 2-6.

Figure 2-6. **Placing a graphic**

```
AT 31.6,31.6 DRAW BOX 46.8 WIDE BY 21.8 HIGH
USING SOLID 2;
AT 31.9, 31.9 DRAW BOX 46.2 WIDE BY 21.2 HIGH
USING SOLID 2;
AT 32.2,32.2 DRAW BOX 45.6 WIDE BY 20.6 HIGH
USING SOLID 2;
GRAPHIC UNICRN AT 31.5,42;
TEXT USING FONT 1 AT 83.5,2.5'FORM SM105';
```

Considerations Up to 16 images per page are permitted. The Raster Image Processor (RIP), Interpress, and graphics capability (GVG2), enable the printing of more than 16 images per page as well as vector graphics.

SECTION

When a form consists of several identical sections, you can save time by defining only one section and treating it as a module, that is, having it repeated at desired locations.

Syntax *BEGIN* **SECTION** *id***;**

or

DO SECTION *id* **AT** *y unit x unit***;**

END SECTION;

Parameter options

id
An identifier (one to six characters) that is invoked when a section is to be defined.

y
Coordinate of the origin on the y axis of the section in relation to the origin of the form.

unit
Unit of linear measurement, expressed as inches (IN), centimeters (CM), or DOTS. If units are not specified, the measurement is in grid units.

x
Coordinate of the origin on the x axis of the section in relation to the origin of the form.

Default None.

Considerations SECTION can also be used to define an entire form as a section. Within the section, any other command, statement, or specification may be used except another SECTION command, DO SECTION command, FORM command, or END command. More than one section may be defined and invoked, but each section must be terminated with the END SECTION command before another section can be defined.

To invoke a section that has been defined, invoke the section with the DO SECTION command. A section must be defined before it can be invoked.

Example Figure 2-7 illustrates how the SECTION commands are invoked.

Figure 2-7. **Specifying a section**

```
FORM SEC 4;
PORTRAIT;
GRID FMT8;
FONT UN207B;
COMMENT *** CREATE PHONE MESSAGE PAD SECTION ***;
BEGIN SECTION PHONE;
AT 7 DRAW 7 HORIZONTAL LINES FROM 4 TO 33 USING SOLID 1 AND
REPEAT VERTICALLY AT 11,17,20,23,26,29;
HORIZONTAL TEXT USING FONT 1 AT 2,4 'PHONE MESSAGES';
HORIZONTAL TEXT USING FONT 1 AT 4,4 'CALLER:';
HORIZONTAL TEXT USING FONT 1 AT 8,4 'TIME:';
HORIZONTAL TEXT USING FONT 1 AT 12,4 'MESSAGE:';
END SECTION;
COMMENT *** PRINT MESSAGE PAD SECTION 4 TIMES ***;
DO SECTION PHONE AT 0,0;
DO SECTION PHONE AT 30,0;
DO SECTION PHONE AT 0,37;
DO SECTION PHONE AT 30,37;
END;
```

BEGIN SECTION PHONE;

BEGIN SECTION
Keywords

PHONE;
Name of the section. Rules for naming sections are identical to those for naming forms: one to six alphanumeric characters.

END SECTION;
Finishing command. Notice that the END SECTION command does not use the section name. Including a section name results in an error.

DO SECTION PHONE **AT** 0,0;
DO SECTION PHONE **AT** 30,37;

DO SECTION
Keywords.

PHONE
Section name. The section must previously have been defined by the BEGIN SECTION and END SECTION commands.

AT 0,0;
AT 30,37;
Coordinates of the origin of the section in relation to the origin of the form.

COMMENT

It is often helpful to use comments to include in the source statements a description of certain FDL commands and their functions. These comments are useful when debugging your program and can act as reminders if you or someone else modifies the .FSL later. When you use comments, they appear on the source statement only. They are not printed on your form, and do not affect the execution of your program.

Syntax

COMMENT *text***;**

Parameter options

text
Text to be treated as a comment.

Default

None.

Example

This sample illustrates a COMMENT that identifies the procedure that is to follow it:

COMMENT *** PLACE SECTIONS ***;
DO SECTION RSPNSE AT 0,0;
DO SECTION RSPNSE AT 7,0;
DO SECTION RSPNSE AT 14,0;

Comment nesting

/* begins a comment and */ ends a comment.

/* THIS IS THE START OF A NESTED COMMENT

/* WHEN TWO ENDING COMBINATIONS ARE FOUND */
THE COMMENT IS TERMINATED */

A syntax error results if /* does not begin a comment and */ does not end a comment. Each comment beginning (/*) and ending (*/) should be followed by at least one space character.

Considerations

A semicolon must be inserted at the end of the comment text; otherwise all of the following FDL commands are considered part of the comment text and are not executed. The FDL compiler ignores all comments up to the first encountered semicolon.

Asterisks or line spacing cause the COMMENT to stand out from the text.

END

Use the END command to terminate the description of a form.

Syntax **END;**

Parameters None.

Default None.

Example An .FSL file can contain more than one file. Therefore, if additional .FSL files follow an END command, the end of all .FSLs to be processed is indicated by two consecutive END commands. The command syntax is:

END;**END**;

3. Compiling and printing forms

Once the Form Source Library (.FSL) file has been created, the file can be stored on the laser printing system (LPS) system disk. The next step is to compile the file and print a copy of the form.

Form printing process

Follow these steps to print an electronic form on a Xerox laser printing system:

1. Enter the editor utility and create a file of FDL commands to describe the form. This file is called a Forms Source Library (.FSL) file. Refer to the “Forms Description Language” chapter for more information.

   The .FSL file contains FDL commands such as coordinates for placing lines, boxes, text, and so forth. You can create the .FSL file directly at the LPS keyboard and display, at a host computer input device, or through remote communications.
2. Save the .FSL file to the LPS system disk.
3. Compile the .FSL to create a printable electronic form file (.FRM).
4. Debug, modify, and recompile the file if necessary.
5. Print the form.

.FSL data transfer

Once you have created the .FSL file, you can send it to the system disk either offline or online.

Offline

In the offline mode, .FSL files can be transmitted to the system disk from magnetic tape or by using the LPS Editor.

Using magnetic tape

1. Create the source file at the host computer and store it on a magnetic tape.
2. Mount the tape on the LPS tape drive and copy the files electronically to the system disk.

Using the LPS Editor

The source code can also be entered directly to the LPS at the system user interface and transmitted electronically to the system disk.

Online

If your LPS is channel-attached to a host computer, enter the source code at the host terminal through the host editor facility. The file must be preceded by the necessary control record identifiers. Refer to your host reference documentation for details. The LPS HOSTCOPY utility enables you to download files from the host and store them on the LPS system disk.

Remote communications

The LPS can also receive forms data from a remote device on the Ethernet network.

Compiling a form

Once the file has been created, the next step is to enter the command that compiles the .FSL to an .FRM.

Multiple .FSLs contained in one file are paginated so that each new .FSL starts on the front side of a new page.

FDL compilation time

The time it takes to compile a form file depends on the position of the font file in its directory and the size and number of disks on the system. If your LPS has a large number of font files located on several disks, you may notice an increase in compilation time for forms that perform text handling. To ensure that your form files compile as quickly as possible, remove any unnecessary font files and use the COMPRESS utility to reorganize your files on the disk. This will shorten the font lookup time and use the disk space efficiently.

Invoking the forms compiler

To invoke the forms compiler, enter the following command at the LPS keyboard. The entire command must fit on one line.

FDL *filename NOPRINT TRAY DEBUG XPAN NOSOURCE PROOF SIMPLEX RES***=***spi*

The FDL compilation command includes any combination of the following options.

Parameter options

filename

Specifies the name of the .FSL to be compiled. The file extension, .FSL, may be included. No other extension is allowed. The file name cannot be a keyword option such as TRAY, DEBUG, XPAN, and so on. These are reserved names that could cause problems when you use a task outside of the forms compiler.

NOPRINT

Specifies that the .FSL source statements listing, form summary, and sample form will not be printed. However, if an error occurs during form processing, the listing and the summary are printed.

TRAY
Specifies that the sample form, source statement, and summary sheet will go to the sample tray instead of the currently active output stacker.

DEBUG
Specifies that no attempt to print the sample form will be made. This ensures that the source statement and summary sheet are printed even if the sample form cannot be printed.

XPAN
Specifies printing of the source statement of section expansions.

NOSOURCE
Specifies that disk source file creation will be suppressed when compiling from magnetic tape or disk when the form name is the same as the file name given.

PROOF
Specifies that the .FSL will be compiled and the source statement and/or summary sheet will be printed. No .FRM file is generated.

SIMPLEX
Specifies that the source statement or summary sheet generated with each compile is printed in simplex rather than duplex.

RES=spi
Specifies a 300 or 600 spots per inch (spi) resolution.

If the source file contains multiple form descriptions, the system does not start printing until all forms have been compiled.

Compiling 600 spi forms

A 600 spots per inch (spi) form can be compiled only on a 4650. It is important, however, that all 600 spi system fonts, logos, and image files are loaded on that system prior to compilation.

Compiling 4850 color forms and logos

V3.5 operating system software does not support any color references. Color forms created on a 4850 LPS using the IRESULT, ICATALOG, and PALETTE commands are accepted and can be printed successfully on the 4050, 4090, or 4650 LPS; however, problems occur when calling out color format LGOs and IMGs. A form or logo that was created and compiled on a 4850 can be printed (in monochrome black) only on a 4050, 4090, or 4650 LPS using V3.8 (or higher) operating system software releases.

When an .FSL is compiled and the name of the source input file differs from the name in the FORM command, an .FSL is created using the name from the FORM command. This newly created .FSL contains only those commands necessary for that form. However, if the input file has the same name as the one in the FORM command, the original .FSL file is not affected.

If there are multiple forms in the input source and the source input file name is used for any of the forms other than the first, an error occurs during compilation. Therefore, if you wish to use the source input file name as one of the form names, you must use it as the first form to be compiled. Typically, forms contained in a multiple-file .FSL do not have the same name as the source input file. An example of this is DC20.FSL.

If an .FSL with multiple forms has one form name which has the same name as another .FSL, this second .FSL will be overwritten when the first is compiled. For example, assume that file A.FSL contains forms X, Y, and Z. When it is compiled, files X.FRM, Y.FRM, and Z.FRM are produced, as are files X.FSL, Y.FSL, and Z.FSL. If there already is a file name X.FSL on the system, it is overwritten by X.FSL from the A.FSL file.

Summary sheet

If the compilation is successful, a summary sheet of statistics is printed with the following:

- Size of the source output file
- Size of the printable form file
- Size of the form image buffer
- Total amount of font memory used.

The summary sheet is printed duplex by default. If you want it printed simplex, include the SIMPLEX option in the task invocation line as follows:

FDL TRYIT SIMPLEX

Multiple .FSLs contained in one file are paginated so that each new .FSL starts on the front side of a new page.

Error checks

If the compilation fails, a list of error messages is printed. If a command extends over several lines, an error message may not appear on the next consecutive line following the error. This may result in two consecutive error messages at the end of a command. An example of this is the `CANNOT FIND THE BOX` message that may occur for a TEXT IN BOX command.

As the .FSL file is processed, it is automatically checked for the following errors.

- Unknown, illegal, or missing commands, keywords, or parameters
- Requests for items to be placed or drawn outside of box or page boundaries
- Invalid font or logo requests
- Illegal grid units or syntax.

Errors are flagged in the source statement with messages specifying the type of error. Refer to the *Xerox LPS Message Guide* for a description of error messages that may appear while forms are being compiled.

Using the compilation options

After communicating the .FSL to the LPS disk, you compile, debug, and modify (if necessary) the .FSL using the following options.

File storage

A large number of forms may be stored in the forms source directory (uncompiled) and form directory (compiled) on the system disks. Two files with the same name cannot be stored in the same directory. The number of forms that can be stored depends on the amount of data required to describe each form and the total amount of disk space allocated to the libraries.

The forms are filed in the system under their identifying names. The information stored in the file includes the identifier, the encoded form, and the list of specified fonts and logos. The original source statements that created the forms description are stored separately under the same identifier.

A list of all of the forms stored in the directory, a sample of each, and the source statement lists can all be obtained using operator commands.

PROOF

The forms compiler makes it possible to compile a form and delete the .FRM file after it has been printed. If you use this option, less disk space is consumed by resident form files. The PROOF option has the following format:

FDL *filename PROOF*

If the form is compiled without errors, the .FRM file and the source statement and/or summary sheet is printed. Since the PROOF option deletes it, there is no form file on the disk.

When you use the PROOF option, the form file that is created is given a pseudonym that differs from the one specified in the .FSL. Therefore, when TRYIT.FSL is compiled, for example, the form that is created is not automatically named TRYIT.FRM. The newly created .FRM file is given a different name, and it is this renamed form that is eventually deleted. Due to this safeguard, if a file named TRYIT.FRM already exists on the system disk, that form still exists after the new .FRM file is compiled and deleted.

Secured files

- If you attempt to overwrite a secured file while compiling a form, a security violation message displays, and the compilation process is aborted.
- If you attempt to overwrite a secured file having the same name on both the task invocation line and in the .FSL, a security violation message is displayed and the form is aborted.

  For example, TRYIT1.FSL is a secured file.

You enter:	**FDL TRYIT1 TRAY**

The .FSL contains:	FORM TRYIT1;
	GRID IS 1 INCH;
	END;END;

  In this case, a security violation message displays and compilation aborts.

- If the form names on the invocation line and in the .FSL are different, the compilation is aborted and a single sheet is printed. The sheet contains the heading for the page and the portion of the .FSL that was processed before the security violation was detected.

  For example, TRYIT1.FSL is a secured file.

  You enter: **FDL TRYIT TRAY**

  The .FSL contains:
  ```
  FORM TRYIT1;
  GRID IS 1 INCH;
  END;END;
  ```

  In this case, a security violation message still displays and the compilation aborts, but a single page is printed containing the page heading and the .FSL line “FORM TRYIT1;”.

Example 1 **FDL** *TRYIT TRAY*

This command compiles the .FSL named “TRYIT” (provided it does not contain errors), generates the source statement, prints a copy of the statement and the form, and delivers both to the SAMPLE tray.

If you do not include the word TRAY in your command, the printout is delivered to the currently active bin.

Example 2 If you want to compile the form, but you do not want a printout of the form just yet, enter the following:

FDL *TRYIT NOPRINT*

The .FSL compiles, but the form and the source statement do not print.

Printing a compiled form

Once a form has been compiled, the object code is stored on the system as an .FRM file. To print copies of the form, enter the SAMPLE command at the LPS keyboard. The format of the SAMPLE command is:

SAMPLE *filename***.FRM**

For example, to produce five copies of the form, enter the following:

SAMPLE TRYIT.FRM 5

When an FRM is compiled using FDL software version 2 (or later), the paper size is defined by the PAPER SIZE IS XX BY YY statement in the .FSL. If the paper size is not defined, the paper size defaults to the sysgened paper size. FRMs compiled prior to version 2 (before the paper size statement of FDL was implemented) use the sysgened paper size. If there are graphics in the form, FDL does not guarantee that the image fits on the page. If necessary, the following message appears:

```
OS6191 GRAPHIC xxxxxx OFF PAGE AND WILL NOT BE PRINTED
```

4. Troubleshooting

Physical printer constraints and forms compiler methods are factors that can affect form design. This chapter provides coding technique suggestions and hints and tips to help you avoid coding problems. This chapter also covers factors that may impact the following:

- Image complexity
- Boxes
- Shading
- Sections
- Rounding measurements.

Suggested coding techniques

Converting preprinted forms

Follow these steps to convert preprinted forms:

1. Print data, using an appropriate format, on the laser printing system.
2. Draw horizontal and vertical lines on the system output.
3. Use the forms design ruler to measure line and character spacings. Refer to the “Support tools and measurements” appendix.
4. Code the form.

Designing new forms

Follow these steps to design new forms:

1. Determine the appropriate format.
2. Use the forms design ruler to measure line and character spacings. Refer to the “Support tools and measurements” appendix.
3. Draw horizontal and vertical lines on a layout sheet. Use standard layout sheet forms FLSF1 through FLSF11 that are provided in the FDL software. Layout sheet forms and corresponding paper sizes are shown in table 4-1.
4. Define the x and y coordinates.
5. Code the form.

Table 4-1. **Layout sheet forms and paper sizes**

Layout sheet forms	**Paper size**
FLSF1 through FLSF11	8.5 x 11 inch/ 216 x 279 mm
FLSF1A and FLSF11A	A4
FLSF12 and FLSF13	8.5 x 14 inch/ 216 x 356 mm

Recommended coding sequence

The FDL compiler imposes a number of constraints on the sequence in which commands are coded. The form name must come first. Only one form orientation is permitted, and fonts and boxes must be implicitly or explicitly defined before they are referenced by TEXT commands. After that point, the sequence is not significant to the compiler. However, it is worthwhile to develop a sequence while debugging or making changes to a form. Use a method of sequencing commands similar to the following:

- Horizontal and vertical lines
- Boxes (if needed)
- Text
- Logo placement
- Shading.

Syntax ambiguities

Because FDL keywords can be abbreviated to the first three characters, and because certain two-character keywords can be interpreted in more than one way, the following known ambiguities exist:

- IN (preposition) is interpreted as IN (inch). For example:

  ```
  TEXT 1 IN BOX...;
  ```

  Also,

  ```
  TEXT SPACED 1 IN BOX...;
  ```

  The keyword IN is interpreted as INCH, while the required keyword IN (preposition) is detected as missing and an error message results. The solution to this situation is to write the following:

  `TEXT 1 IN IN BOX...;` or

  `TEXT 1 INCH IN BOX...;` or

  `TEXT 1 DOTS IN BOX...;`

- FMTn cannot be abbreviated.

- [DOT\TED is interpreted as [DOT\S. For example:

  ```
  AT 18 DRAW 5 HORIZONTAL LINES FROM 27.5 TO 37.5 DOT...;
  ```

  The keyword DOT is interpreted as DOTS, which is valid in this position. The keyword DOTTED is also valid in this position, but must be spelled out in full.
- [CEN\TER is interpreted as [CEN\TIMETERS. For example:

  ```
  TEXT 10 CEN IN BOX.....;
  ```

  The keyword CEN is interpreted as CENTIMETERS, which is valid in this position. The keyword CENTER is also valid in this position but must be spelled out in full.

Hints and tips

You can avoid coding problems by using the coding technique suggestions, hints, and tips shown in table 4-2.

Table 4-2. **Hints and tips**

Keywords	**Hints and tips**
Form id	• Develop a logical, systematic approach to naming conventions. • Take care not to choose a previously used form id.
GRID command	Choose a format that is compatible with the data.
Coding lines	• Use a COMMENT command. • Code all horizontal lines, then all vertical lines. Precede each set with a comment statement. • Code longer lines first. Then follow with the shorter segments that may overlay the basic long lines. • Code lighter lines first. Then code shorter segments that are heavier in density. • Code a SOLID 0 line first whenever you have a set of colinear segments, whether they are touching or not. • Use lines rather than characters of the form element font, whenever possible. • Avoid overlapping (superimposing) lines. • Avoid using too many dotted or broken lines because they create too much overhead in the printing process. • Avoid drawing unneeded lines across the longest side of the physical page.
Coding boxes	• Use a COMMENT command. • Use a BOX command only when the lines generated by that command are not duplicated by another command. • Do not use a REPEAT command when drawing lines that create boxes if you need to find the coordinates of those boxes later. • Use boxes rather than characters of the form element font, whenever possible. • Avoid overlapping (superimposing) boxes.
Use of shading	• Use a COMMENT command. • Avoid overlapping the boundary line of a box with shading. Set shading back from borders by three to five dots (or about 0.1 units for most coordinates). This conserves memory and results in a cleaner appearance. • Try to avoid shading on portrait forms.

Table 4-2. **Hints and tips** (continued)

Keywords	Hints and tips
Coding text	• Use a COMMENT command. Remember that different fonts of a given point size are not necessarily the same physical size. • Be aware that vertical error messages, generated when the system calculates that too much text has been specified for placement in a box, are an approximation. • Use the TEXT SPACED AT command to force exact text placement. • Avoid placing too many small characters in one area of the page. • Avoid overlapping characters to achieve bolding or other effects. Use the correct font whenever possible. • Avoid too many font switches on the same text line. This creates overhead in the printing process.
Coding sections	• Use a COMMENT command. • Use coordinates based at 0,0 when defining a section. Then place the section at the locations you want.
Source copy	If the source filename (.FSL) and the form name (the name that follows the FORM keyword) do not agree, an .FSL file is created that has the same name as the form name. Therefore, when you copy X.FSL to Y.FSL and compile Y.FSL without changing the form name in Y.FSL, the original X.FSL is deleted and a new X.FSL is created from the Y.FSL source. Furthermore, the form file (.FRM) that is created is X.FRM and not Y.FRM. If you wish to create a distinct source using another .FSL as a base, you need to change the form name to the same name as the source name, or to some other name that does not already exist. Two files with the same name and type cannot reside on the system.

Image complexity factors

Form design is limited by physical restrictions on the amount of image data (characters and lines) that can be printed on a scan line and on a page.

Line tables

Forms Description Language (FDL) line tables are internal FDL data structures that provide a record in memory of the lines to be drawn on a page. These tables allow the system to find the corners and edges of boxes when they are referenced later.

Since excessive amounts of memory would be required to store every line, the FDL compiler retains only the memory of the longest lines that pass through any given coordinate in a particular direction. FDL replaces dotted or broken lines with an invisible line of the same length.

Line table limits

The FDL line tables can store 1,999 vertical and 1,999 horizontal lines in memory. When you exceed either of these line table limits, the following message is displayed:

```
TOO MANY HORIZONTAL OR TOO MANY VERTICAL LINES
```

This message warns you that the new user-specified line cannot be retained in the table. The message is of no real consequence to you unless the new line is intended as the side of a box. In that case, the box is not found and your form may not compile.

Generally, the line table limits are reached because the form contains a large number of short line segments. The most probable reason for this is a series of vertical lines (for example, tick marks) or horizontal lines (for example, a series of long dashes). With either of these conditions, it is possible to reduce the number of entries in the line table as the form is being constructed.

Importance of orderly construction

One consideration in determining the orderliness of form construction is that the algorithm used in loading the line table is designed to check only the following two criteria before entering a new line in the line table:

- Is the new line contained within the boundaries of an existing line?
- Is the new line an extension of *one* of the existing lines?

If the new line is contained within the boundaries of an existing line, no change is made to the line table entries. If the new line is an extension of one of the existing lines, the boundaries of the first (and only the first) existing line are extended to include the new line. If neither of the criteria is met, a new entry is made in the line table.

Examples

The procedure of line extension results in an irregularity if lines are not specified in an orderly manner. For example, draw five line segments that are each five units in length. If the lines are drawn in an unreasonable or irregular manner, as shown below, the result is more entries in the line table than are necessary. Drawing line segments in the order 0 to 5, 10 to 15, 20 to 25, 5 to 10, and 15 to 20 creates a single visual line that FDL considers to be three lines. This is because the criterion of the line table allows the extension of only the first line segment with common coordinates to the new line. In this case, the three line entries in the line table would be 0 to 10, 10 to 20, and 20 to 25. Figure 4-1 shows examples of extraneous drawn lines.

Figure 4-1. **Example of extraneous drawn lines**

It is also possible to have the line table show more than one line passing in the same direction through a given coordinate. For example, draw three lines, each of which is five units in length (0 to 5, 10 to 15, and 20 to 25). Then draw two lines, each of which is nine units in length (3 to 12 and 13 to 22). The result is a single visual line for which FDL has three entries in the line table (0 to 12, 10 to 22, and 20 to 25). Figure 4-2 shows lines entered in unintended locations.

Figure 4-2. **Lines entered in unintended locations**

These two examples of lines entered in the line table result in lines that are visually contiguous but are not logically contiguous. As indicated in the following sections that describe problems with boxes, such conditions can result in a situation where FDL cannot find a box, or creates a box that has one or both of its dimensions equal to zero.

Suggested techniques for entering lines

To enter lines, draw the longest possible logical line first, then draw any shorter elements. If the logical line consists of different types of lines (for example, solid and dotted), draw a SOLID 0 line first, extending over the full range of the logical line. For example, the above example of five line segments of five units each might have consisted of alternating solid and dotted lines. In that case, the following is the most reasonable method of specifying the total line:

```
AT 0 LINE 0 TO 25 USING SOLID 0;
AT 0 LINE 0 TO 5 USING SOLID 2 AND AT 10, 20;
AT 0 LINE 5 TO 10 USING DOTTED 1 AND AT 15;
```

Figure 4-3 shows the resulting line.

Figure 4-3. **Line made up of different types of lines**

Scan line density

Scan line density depends on printer and imaging speed. Therefore, it can vary with each product and even with different configurations of the same product. The basic limitation is linked to dispatchable items, which become visible in character count and number of lines.

Line density errors

Both characters and lines contribute to the dispatchable item count. When one dispatchable item is superimposed over another dispatchable item, the result is considered to be two dispatchable items by the system. When too many dispatchable items are present on a scan line on the long axis of the paper, the LPS operating system displays the following line density error message:

```
OS6950 LINE DENSITY EXCEEDED
```

The hardware limitation of 320 dispatchable items per 300 spi scan line (640 for 600 spi) includes the required overhead of two dispatchable items. For example, a dispatchable item could be a maximum of 32 dots wide for 300 spi (64 dots for 600 spi), and thereby might be a full character (less than point size 8 or 9), a fraction of a character (greater than point size 8 or 9), or a line segment that is equal to or smaller than 32 dots in the scan direction.

Determining line density limitations

The following is a guide for determining 300 spi line density limitations. If printing at 600 spi, the same size character or same length line has twice as many dots, as follows:

- Every 32 dots (or fraction thereof) of a line drawn on the long axis of the paper are one dispatchable item.
- Each line drawn on the short axis of the paper is one dispatchable item.
- Each active character is at least one dispatchable item. (An active character includes all the space from the top of the character cell to the bottom of the character cell, even if there is only white space present on a given scan line.) If the dimension along the scan line is greater than 32 dots, the character consists of some multiple dispatchable items.

It is not possible to construct a form with two adjacent lines if both use the full count of 318 dispatchable items (320 minus the two required for overhead) resulting from text and lines. The imaging system requires a rest period of about four scan lines before it can image the second fully loaded line.

Landscape pages

Line density restrictions differ as a function of the mode (landscape or portrait) of the form. An 8-point or smaller landscape font is smaller than 32 dots for 300 spi and 64 for 600 spi. A vertical line is a single dispatchable item. A horizontal line is treated as a series of 32 dots in length, joined end-to-end.

For 300 spi, this means that a form using an 8-point or smaller font on a landscape page may have up to 318 characters (plus a two-item overhead, for a total of 320 dispatchable items) on a scan line. For example, when using a 6-point font, it is possible to have 132 characters, a line across the page under the text, and up to 90 vertical lines, without exceeding the line density limitations.

If a form requires a 9-point or larger font, the number of characters that may be imaged on a landscape page is reduced to 160 because the characters are generally more than 32 dots wide. While the dispatchable-item count remains 320 per line, fonts 9 points and larger use two dispatchable items per character. Since a character in a large font constitutes two dispatchable items, only half as many characters in a large font may be imaged on a scan line as is possible with a smaller font.

Portrait pages

Restrictions for a portrait page are significantly different from those for a landscape page because the system always images in the landscape direction. Therefore, if a page is formatted in portrait orientation, the hardware must reorganize the data into landscape prior to imaging.

On a 300 spi portrait page, a 12-point font drops the dispatchable-item count below the 320-character level. A form with a 12-point font cannot have more than 160 characters on a scan line.

When using an 8-point 300 spi font on a portrait page, the maximum dispatchable item count is approximately 200 per scan line. This limit falls off to 170 characters for a 6-point font, 150 characters for a 5-point font, and 120 characters for a 4-point font. (If printing at 600 spi, the same size character or length line has twice as many dots.)

Superimposed lines

Since lines superimposed over each other count as double the dispatchable items of a single line, they detract from the system capabilities. If printing at 600 spi, you see the following message:

```
EXCEEDED LINE DENSITY.
```

Page generation errors

Generally, a form is imaged along with variable data. It is possible to create a form that prints correctly when sampled but cannot successfully be overlaid on certain variable data pages.

The LPS may not have enough time to merge a complex form with a large amount of variable data within the limits of the throughput environment. In this case, either reduce the amount of variable data, or simplify the form.

Review the broken page to determine the approximate location of the failure, and try to reduce the number of characters and lines in that area. Most imaging problems are local density of information problems rather than page-wide problems.

Local density and page setup errors

One problem that may occur while a page is being imaged is a page setup error, displaying the following message:

```
OS9300 PAGE SET-UP ERROR
```

This message means that there was not enough time to image a page. This may be caused by an excessively large amount of data and forms to be imaged, disk errors, image generation problems, or a problem known as *local density*.

Even a form designed to avoid exceeding line density limitations may cause page setup errors because of local density. However, such problems are rarely encountered in readable forms. To have a problem area of local density, a form would have to have long lines of very closely spaced small text.

A local density problem occurs when the imaging hardware accepts and dispatches characters at two different rates. If a form structure imposes a dispatching load that is too heavy, the hardware may run out of input before the data processing is finished.

Considerations

If a form you described causes page setup errors, examine the form and variable data to see if there are many lines or a large amount of text in a small area. If there are, you can reduce the density of this area by spreading out the material or by deleting parts of the form.

To determine possible causes of page setup errors due to local density, look for the following items:

- Large amounts of closely spaced text in a small font; that is, long lines of solid text with minimum spacing, especially if a form is portrait.
- Large amounts of text in an orientation different from the defined form orientation; for example, portrait text in a landscape form.
- A large number of lines drawn on the short axis of the paper; that is, vertical lines on a landscape form.

Using boxes

You can draw boxes with a single BOX command or construct them with commands on a line-by-line basis.

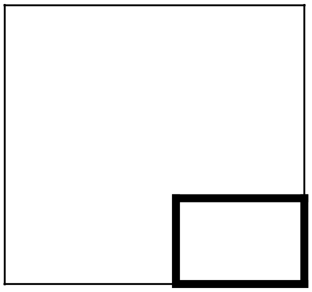
A line density problem can occur if a single BOX command is used to specify a box that is adjoined to another box by a single side. When two BOX commands are issued in this manner, one line of a box is superimposed over another along the adjoined side. Since two lines are drawn between the same pair of coordinates, a line density problem may occur.

When to use the BOX command

To avoid this situation, use the BOX command only for the following conditions when designing a form:

- The box is fully isolated from any other lines.
- The line type of a box is different from any other lines that share its boundaries, for example a SOLID 2 box sharing a small portion of a SOLID 1 edge, as shown in figure 4-4.

Figure 4-4. **SOLID 2 box sharing part of a SOLID 1 box edge**



Text in boxes

When text is entered for placement within a box, the system attempts to determine whether the given text exceeds the largest font size that can fit within the boundaries of the box. If FDL computations indicate that the entered text may not fit within the box, the following error message is displayed:

```
TEXT WILL NOT FIT IN THE BOX
```

The system checks the horizontal and vertical directions of the box. If an error is detected in one or both directions, an attempt is made to indicate an approximate value for the largest font.

Locating the closest box

When you specify text to be placed in a box, the system locates the closest box within a ten-dot square of the specified point.

Example

If text is to be placed in a box located two grid units by two grid units from the origin of the form, the system selects the box closest to this point and within ten dots square. The upper left corner of this box becomes the relative origin for subsequent text placement.

- If text is to be placed in the next box horizontally, FDL begins searching at the upper right corner of the box in which previous text was placed.
- If text is to be placed in the next box vertically, the search begins at the lower left corner.

Error calculations

Horizontal errors

The calculations made for horizontal errors (for example, too many characters in a line) are usually accurate. FDL uses the following formula for reporting horizontal errors:

S	= P * (B/T)
S	target point size
P	original font point size
B	width of the box in dots
T	width of the text in dots.

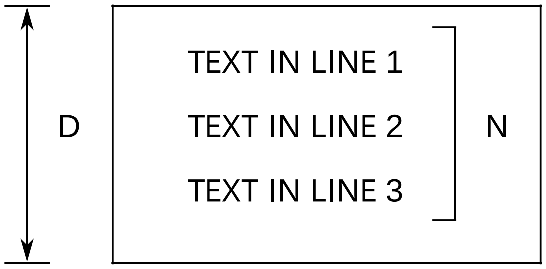
Vertical errors

The calculation made by FDL for vertical errors (for example too many lines in the box) is a rough approximation of the actual size of text, and the computation may, in fact, be larger than the font for which an error message was displayed. This is because the FDL calculation does not take into account the leading used within the font or provided by line spacing specifications.

The following formula is used by the error-handling routine to compute text size when the box is too small in a vertical direction:

S	= (72/300) * (D/N)
S	target point size
72	number of points in an inch
300	number of dots in an inch
D	distance between top and bottom of the box (in dots)
N	number of lines that are involved.

Figure 4-5. **Measurements used in computing vertical box**



The result of this equation is rounded up and displayed in the error message. Thus, what the error message actually signifies is the largest font that could be accommodated within the box if no leading were involved.

Correcting text-in-box errors

If an error is detected, you have the following choices:

- Make the box larger
- Reduce the number of lines
- Use a smaller font
- If text fits visually, use a TEXT AT command rather than a TEXT IN BOX command.

Centering text in boxes

FDL uses line spacing as the vertical unit of size in centering text within a box. In a small box, text that may not appear to be properly centered may actually be centered accurately if line spacing is considered. FDL cannot evaluate the aesthetics of the final printed product. Therefore, it is up to you to create an appropriate appearance for centered text.

Specifying line spacing within boxes

Most often, it is easiest to allow FDL to position text within boxes. In cases where the result is not satisfactory, you can do the following:

- Specify an overriding line spacing value.
- Exercise more control over text placement and assure satisfying aesthetic requirements with the SPACED AT option, possibly used with blank lines, or the TEXT AT command (that is, specifically positioning text).
- If overriding the line spacing does not achieve a satisfactory appearance in a form, specify a line spacing that is smaller than the natural spacing of the font. A line spacing smaller than the height of the characters can be used with blank lines.

Example

Text might be spaced at four dots, while the line spacing is really 59 dots. It seems paradoxical to designate that text be spaced at four dots and create a form that actually has 59 dots of spacing. However, you can do this by using blank lines. A small line spacing along with blank lines allows you to get positioning control and forces visual centering of text within a box.

The following statements provide an example of how this technique is used (b̸ represents a blank line).

```
TEXT SPACED AT 4 DOTS IN BOX 10, 10
   b̸
   b̸
   b̸
‘TEXT LINE 1’
   b̸
   b̸
   b̸
‘TEXT LINE 2’
   b̸
   b̸
   b̸
```

As many blank lines may be used before, between, and after lines of text as are needed to obtain the desired visual effect.

Shading factors

You may sometimes want to use shading in a form, but it requires using a large amount of the form image buffer. Also, the space used increases if portrait rather than landscape shading is used.

Landscape shading

The basic element used in shading is a 32-by-32-dot character for dots. This character can be repeated in a landscape direction up to 32 times for dots. This means that in a landscape direction, the system can shade any area from 0.1 to 3.4 inches wide with no difference in the space used by the shading.

This facility is not available when shading is done in a portrait direction. Portrait shading is performed on a character-by-character basis.

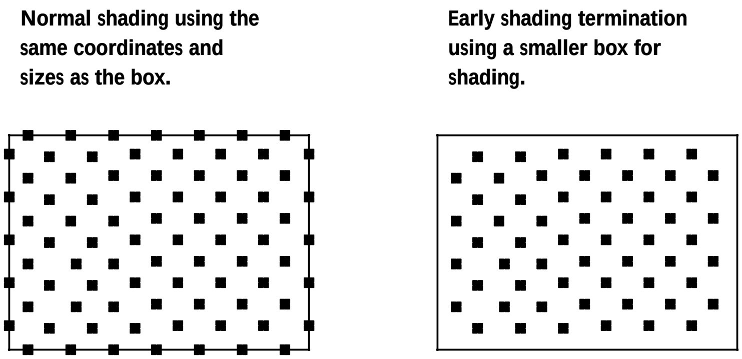
Portrait shading

To reduce shading and improve the visual effect of the form, end shading before the boundary line. Separate the shading from the surrounding lines by 0.1 to 0.2 line or character units. This makes the shading 0.2 to 0.4 units smaller than the surrounding box and is centered in that box. (Units referred to are lpi and cpi units.) This sets shading back from the borders by 3 to 5 dots.

Avoiding boundary line density problems

Terminating the shading before reaching the boundary line helps to avoid line density problems, conserves space in the form file and in the form image buffer, and enhances the appearance of the form.

Figure 4-6. **Terminating shading to avoid line density problems**



Normal shading using the same coordinates and sizes as the box.

Early shading termination using a smaller box for shading.

Section factors

You can create sections to duplicate identical information on a page. However, you should take into account the form image buffer limitations and potential line density problems whenever you use this feature.

A form that is made up of many sections often takes up more space in the form image buffer than a form created without sections. This occurs because a single long line requires less buffer space than many short lines. When you create a form by invoking defined sections, there is a tendency to begin and end lines at section boundaries, even when they are continuous through a series of sections. This is a much less efficient way to create forms than by taking the long lines out of the sections and drawing them as continuous lines.

A less obvious inefficiency of using the form image buffer may occur when you have a line that switches from solid to dotted and vice versa. The common method of creating this type of line is to draw short segments of solid and dotted lines. This is an inefficient use of the form image buffer even if a SOLID 0 line is drawn first. A SOLID 0 line is useful in saving space in the line tables, but cannot help save buffer space.

To save form image buffer space efficiently, draw a continuous dotted line and overlay a series of short, solid line segments. This technique makes best use of the form image buffer space, but does not reduce the load on the imaging section of the system. Refer to the “Scan line density” section in this chapter for more information. In a form where there is a problem with exceeding both form image buffer and line density restrictions, you may have to use logos or a specialty form font.

Rounding measurement factors

Laser printing systems use only dot units when actually compiling forms. Therefore, as long as all positioning commands within FDL are defined in terms of dots or an integral number of dots, there are no rounding problems.

Converting other unit values to dots

You can define positions in decimal-value inches, in centimeters, in lines per inch, and in characters per inch. The LPS converts all of these commands to dots while the form is being compiled.

Many of the possible defined values (lines per inch, centimeters, and so forth) cannot be reduced to an integral number of dots. For example, if a coordinate system uses 13.6 characters per inch (cpi), that number may be translated to approximately 22.058823 dots per character unit. The compiler rounds the converted number to the nearest whole dot before starting to compile the form.

Example

The following example illustrates the problems encountered using the 13.6 cpi coordinate system:

```
AT 4 DRAW 1 HOR LINE FROM -1 TO 132 USING SOLID 1;

AT 5 DRAW 1 HOR LINE FROM -1 TO 132 USING SOLID
HAIRLINE;

AT 8 DRAW 15 VER LINES FROM 4 TO 5 USING HAIRLINE
AND REPEAT HOR EVERY 8;
```

In theory, this form description technique creates 14 boxes that can be found simply by addressing the appropriate coordinates. In fact, the coordinates of the boxes are not exactly those expected. The boxes can be found by using the IN NEXT BOX parameter of the TEXT IN BOX command.

The IN NEXT BOX parameter works properly because it specifies the next adjacent box, but does not specify the coordinates of that box. The problem in addressing coordinates is that the FDL statement requires vertical lines every 176.47058 dots, which is rounded down by the system to 176.00000 dots.

This difference makes it impossible for the LPS to find box 14 at the coordinates 4, 112. There are two ways to draw the form to overcome this problem. One way is to draw 13 lines with the REPEAT parameter and then specify lines at 112 and 120. Another way is to change the final statement in the following manner:

```
AT 8 DRAW VER LINE FROM 4 TO 5 USING HAIRLINE AND
AT 16, 24, 32, 42, 48, 56, 72, 80, 88, 96, 104, 112, 120;
```

Unless a form is described with a coordinate system of only dots or an integral number of dots, the REPEAT parameter cannot be used to draw boxes that must be referenced by their coordinates.

Rounding variable data

Alignment problems

Under certain circumstances, a form and variable data do not align properly, even though it appears that both use the same line spacing. This may be the result of the effects of rounding on the line spacing.

As an example, construct a form with a grid unit of 13.6 cpi and 9 lpi. Horizontal lines are specified at 0, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, and 67. The data is printed with an override line spacing of “9.”

The natural assumption is that the form and the variable data line up. However, when the variable data is merged with the form, it tends to drift up the page. The reason for this is rounding. Specifying 9 lines per inch for the variable data means that the LPS is requested to place data at approximately 33.333333 dots. The system rounds this number down to 33 dots per line.

Meanwhile, in FDL, rounding does not take place until it is time to resolve specifications for the form to a dot address.

Note that variable data has a line spacing value that is computed as dots per line, and rounding is done on that value. In FDL, the rounding takes place only when it is needed to resolve to a dot address and, therefore, might involve more than one line at a time.

For example, the line drawn at 43 is assigned to scan line 1433 using the following formula:

$$(43 * 300) / 9 = 12900 / 9 = 1433.3333 \text{ or } 1433$$

The equivalent line positioning for the variable data is computed with the following method:

$$43 * (300 / 9) = 43 * 33 = 1419$$

This yields an error that increases as calculation proceeds down the page.

Furthermore, in the example form, if we had drawn lines with a REPEAT EVERY 3 LINES command, the uneven dot value (33.333333 dots per line) would not have been rounded off because rounding would not have been performed until it was time to resolve the specification to a dot address. The dot address for three lines is an even 100 dots. So, the lines for the form would be drawn at exactly 100 dots, and the variable data, on the other hand, would be using a 99-dot spacing.

Avoiding imperfect alignment

The best way to ensure that a form and variable data share the same coordinate system is to define both in terms of an integral number of dots. It is also important to know when rounding will affect the alignment of the variable data and the form. In the example, the only way to make the form match the lines of data is to set the line spacing for both at 33 dots.

If variable data does not line up properly with a form, and it appears that both are using the same line spacing, find out what the dot value is. It is most likely in such cases that the difficulty is a variation in defining the coordinate system resulting from rounding, and is not a software problem.

FDL statistics

If a form is compiled successfully, the following FDL statistics are displayed on the summary sheet.

- Size of the source output file (FSL)
- Size of the printable form file (FRM)
- Size of the form image buffer
- Amount of font memory used by the form.

Grid unit scaling

Table 4-3 shows grid unit scaling specifications when the grid parameters are omitted or specified.

Table 4-3 **Grid unit scaling specifications**

Grid unit specification	**System response**
Omitted: default scaling	When the system receives the FORM id command, it sets grid scaling to that of FMT1; if it subsequently receives the PORTRAIT command, it sets the scale to that of FMT6.
Specified in GRID command	Replaces default scaling.
Specified in BOX or LINE command (IN unit)	Replaces GRID command scaling for that command only (becomes the default scaling).

Specified for a parameter	Overrides any scaling specified via GRID, BOX, or LINE commands for the parameter only. Examples:
	`GRID 1 INCH;`
	`AT 2 CM LINE FROM 3 TO 1500 DOTS;`
	`COMMENT EQUIVALENT TO: AT 2 CM LINE`
	`FROM 3 INCHES TO 1500 DOTS;`
	`AT 2 LINE IN CM FROM 3 INCHES TO 1500 DOTS;`
	`COMMENT EQUIVALENT TO: AT 2 CM LINE FROM 3 INCHES TO`
	`1500DOTS;`

A. FDL command syntax summary

This appendix contains an alphabetized summary of the Forms Description Language (FDL) commands syntax described in this guide.

The conventions and definitions used to describe the commands are shown in table A-1.

Table A-1. **FDL command syntax conventions**

Syntax	Meaning
UPPERCASE BOLD BLUE	Required words (keywords*) in the command syntax appear in uppercase bold blue.
...	Ellipses indicate that you can repeat a parameter option, or list a series of parameter options.
Lowercase black italics	Word, character, or phrase, (variable information) in lowercase black italic to be replaced by a value.
UPPERCASE BLUE ITALIC	Optional required words (keywords) in the command syntax appear in uppercase blue italic.
	The carat character represents a required space.

***** Keywords may be abbreviated to the first three characters (except for FMT*n*). Refer to the “Syntax ambiguities” section in the “Troubleshooting” chapter.

Table A-2. **FDL command syntax**

Command	**Syntax**
BOX	**AT** *y unit x unit DRAW n* **BOX***ES IN unit p unit WIDE BY q unit HIGH USING type thickness SHADING density AND REPEAT direction* **AT** *c_a unit c_a unit ...* **EVERY** *c_i unit*;
COMMENT	**COMMENT** *text*;
END	**END**;
FONT	**FONTS** *id*;
FORM/ RESOLUTION	**FORM** *name*; **FORM** *name RESOLUTION IS value SPI*;
GRAPHIC	**GRAPHIC** *name* **AT** *vpos unit hpos unit SCALE IS n/d*;
GRID	**GRID** *UNIT IS format id* ***ORIGIN*** *y unit x unit*;
LANDSCAPE/ PORTRAIT	*orientation* **PAGE** *SIZE IS n WIDE BY m HIGH*;
LINE	**AT** *c_o unit DRAW n direction LINES IN unit FROM* c_s *unit* **TO** c_e *unit USING type thickness AND REPEAT repeat direction* **AT** c_a *unit ...* **EVERY** *c_i unit*;
LOGO	**LOGO** *id* **AT** *y unit x unit*;
PAPER	**PAPER** *SIZE IS value*;
SECTION	*BEGIN* **SECTION** *id*; or **DO SECTION** *id* **AT** *y unit x unit*; or **END SECTION** *id*;
TEXT AT	*direction* **TEXT** *SPACED d units PER LINE ALIGNED alignment USING* **FONT** *n* **AT** *y unit x unit 'text' 'text' ...*;
TEXT IN BOX	*direction* **TEXT** *SPACED d units PER LINE ALIGNED alignment USING* **FONT** *n* **IN** *position* **BOX** *y unit x unit 'text' 'text' ...* IN *NEXT direction* **BOX** *'text' 'text' ...*;

Reference Refer to the "Forms Description Language" chapter for a detailed explanation of each command syntax.

Compiling commands syntax

To invoke the forms compiler, enter the following command at the LPS keyboard. The entire command must fit on one line.

```
FDL filename NOPRINT TRAY DEBUG XPAN NOSOURCE PROOF SIMPLEX RES=value
```

To print a stored form, enter the following:

SAMPLE *filename***.FRM**

Reference Refer to the "Compiling and printing forms" chapter for more information on compiling commands.

B. System default summary

This appendix lists the default parameters that the system automatically substitutes when specifications are omitted in FDL commands. Grid unit dimensions are rounded to the nearest tenth.

The grid and origin substitutions made when printing on 8.5 by 11 inch/216 by 279 mm paper are shown in table B-1.

Table B-1. **Grid and origin substitutions for 8.5 by 11 inch/216 by 279 mm paper**

Specification	Substitution
FMT1	LANDSCAPE; GRID UNIT IS 13.6 CPI, 8.1 LPI, ORIGIN 0.18 INCH, 0.66 INCH;
FMT2	LANDSCAPE; GRID UNIT IS 15 CPI, 8.1 LPI, ORIGIN 0.18 INCH, 0.50 INCH;
FMT3	LANDSCAPE; GRID UNIT IS 13.6 CPI, 10.7 LPI, ORIGIN 0.14 INCH, 0.66 INCH;
FMT4	LANDSCAPE; GRID UNIT IS 15 CPI, 10.7 LPI, ORIGIN 0.14 INCH, 0.50 INCH;
FMT5	LANDSCAPE; GRID UNIT IS 10 CPI, 6 LPI, ORIGIN 0.17 INCH, 0.50 INCH;
FMT6	PORTRAIT; GRID UNIT IS 13.6 CPI, 8.1 LPI, ORIGIN 0.57 INCH, 0.58 INCH;
FMT7	PORTRAIT; GRID UNIT IS 12 CPI, 6 LPI, ORIGIN 0.50 INCH, 0.50 INCH;
FMT8	PORTRAIT; GRID UNIT IS 10 CPI, 6 LPI, ORIGIN 0.50 INCH, 0.50 INCH;
FMT9	LANDSCAPE; GRID UNIT IS 20 CPI, 10 LPI, ORIGIN 0.25 INCH, 0.25 INCH;
FMT10	PORTRAIT; GRID UNIT IS 17.6 CPI, 12.5 LPI, ORIGIN 0.22 INCH, 0.51 INCH;
FMT11	PORTRAIT; GRID UNIT IS 20 CPI, 12.5 LPI, ORIGIN 0.57 INCH, 0.39 INCH;

The grid and origin substitutions made when printing on 8.5 by 14-inch/216 by 356 mm paper are shown in table B-2.

Table B-2. **Grid and origin substitutions for 8.5 by 14 inch/216 by 356 mm paper**

Specification	Substitution
FMT12	LANDSCAPE; GRID UNIT IS 13.6 CPI, 8.1 LPI, ORIGIN 0.18 INCH, 0.66 INCH;
FMT13	PORTRAIT; GRID UNIT IS 13.6 CPI, 8.1 LPI, ORIGIN 0.57 INCH, 0.58 INCH;

The grid and origin substitutions made when printing on 8.27 by 11.69 inch/A4 paper are shown in table B-3.

Table B-3. **Grid and origin substitutions for 8.27 by 11.69 inch/A4 paper**

Specification	Substitution
FMT1A	LANDSCAPE; GRID UNIT IS 12.5 CPI, 8.3 LPI, ORIGIN 0.46, 1.45 CM; (0.18, 0.57 INCH)
FMT2A	LANDSCAPE; GRID UNIT IS 14.3 CPI, 8.3 LPI, ORIGIN 0.46, 1.53 CM; (0.18, 0.60 INCH)
FMT3A	LANDSCAPE; GRID UNIT IS 12.5 CPI, 11.1 LPI, ORIGIN 0.46, 1.45 CM; (0.18, 0.57 INCH)
FMT4A	LANDSCAPE; GRID UNIT IS 14.3 CPI, 11.1 LPI, ORIGIN 0.46, 1.53 CM; (0.18, 0.60 INCH)
FMT5A	LANDSCAPE; GRID UNIT IS 10 CPI, 6 LPI, ORIGIN 0.56, 2.16 CM; (0.22, 0.85 INCH)
FMT6A	PORTRAIT; GRID UNIT IS 13.6 CPI, 8.1 LPI, ORIGIN 2.32, 1.17 CM; (0.91, 0.46 INCH)
FMT7A	PORTRAIT; GRID UNIT IS 12 CPI, 6 LPI, ORIGIN 2.16, 1.00 CM; (0.85, 0.39 INCH)
FMT8A	PORTRAIT; GRID UNIT IS 10 CPI, 6 LPI, ORIGIN 2.16, 1.00 CM; (0.85, 0.39 INCH)
FMT9A	LANDSCAPE; GRID UNIT IS 20 CPI, 10 LPI, ORIGIN 0.36, 2.16 CM; (0.14, 0.85 INCH)
FMT10A	PORTRAIT; GRID UNIT IS 17.6 CPI, 12.5 LPI, ORIGIN 1.45, 1.00 CM; (0.57, 0.39 INCH)
FMT11A	PORTRAIT; GRID UNIT IS 20 CPI, 12.5 LPI, ORIGIN 1.44, 1.00 CM; (0.57, 0.39 INCH)

Substitutions made for all paper sizes are shown in table B-4.

Table B-4. **Grid and origin substitutions for all paper sizes**

Specification	**Substitution**
FORM *id*;	FORM *id*; GRID FMT1;
FORM *id*; PORTRAIT;	FORM *id*; PORTRAIT; GRID FMT6;
Page orientation not specified	Landscape
PAPER SIZE not specified	Sysgen-specified paper size is assumed
PAPER SIZE not specified	Virtual page size is set to sysgen-specified paper size
Explicit GRID UNIT measurement is specified, and ORIGIN is not specified	Form origin is set to virtual page origin
GRID format-id is specified, and ORIGIN is not specified	Form origin is set to specified format-id BEGIN values
No GRID UNIT or format-id is specified, and ORIGIN is specified	Grid unit dimensions are set by FMT1 (landscape) or FMT6 (portrait)
No GRID command is specified	Grid unit dimensions and form origin are set by FMT1 (landscape) or FMT6 (portrait)
No unit specified in the ORIGIN parameter of the GRID command or the PAGE SIZE parameter of the LANDSCAPE or PORTRAIT command	Inches
No line direction	Horizontal and repeat vertically
No line/box thickness	SOLID 1
No direction for box repeat	Repeat box horizontally
No text direction	Horizontal text
No box text alignment	Aligned centered in the box
No font index specified in the TEXT command	Current font in use
Unit not specified in the SPACED parameter of the TEXT command	Dots
No units specified in the LOGO command	Grid unit

C. Sample form creation

This appendix reviews the commands discussed earlier in this guide, and illustrates a sample form along with the entire Forms Source Library (FSL) that created it.

Practice entering the Forms Description Language (FDL) commands that instruct the LPS to produce a sample form accurately. Refer to the command definitions discussed earlier in this guide as needed. Enter the commands as shown in the sample FSL to produce the form.

You must be familiar with the LPS Editor utility or the editor at your host.

The sample form that you create is shown in figure C-1, in reduced size; your form will be actual size.

Figure C-1. **Earnings register**

Writing the setup commands

Recall that the setup commands precede the form description commands for lines, boxes, and text. In general, the setup commands specify the parameters which describe the form.

Invoke the Editor utility and enter the commands shown in figure C-2.

Figure C-2. **Setup commands**

```
FORM 1STFRM;
GRID FMT1;
FONTS UN114A,UN106A,UN104C;
```

Notice that the PORTRAIT or LANDSCAPE command and the PAPER command are omitted. These commands are optional, and, when omitted, the system uses the default values.

Using the COMMENT command

Comments enable you to include messages or reminders in your source statement that help you organize your FDL commands logically. These comments are not printed on the form but can be useful if you or someone else modifies the form later.

If the semicolon is omitted, the forms compiler cannot determine where the comment ends and may treat commands as comments.

Enter the COMMENT shown in figure C-3. The comment indicates that horizontal lines are coded next.

Figure C-3. **COMMENT command**

```
COMMENT *** DRAW HORIZONTAL LINES ***;
```

Drawing lines

LINE commands are used to construct horizontal and vertical lines which, in turn, are used to construct boxes.

Drawing horizontal lines

Enter the horizontal line commands shown in figure C-4. You have the option of abbreviating the commands to the first three characters.

Figure C-4. **HORIZONTAL LINE command**

```
COMMENT *** DRAW HORIZONTAL LINES ***;
AT 7 DRAW 18 LINES FROM 0 TO 132 USING HAI AND REPEAT EVE 3;
AT 8 DRAW 18 LINES FROM 0 TO 24 USI HAI AND REPEAT EVE 3;
AT 9 DRAW 18 LINES FROM 0 TO 24 USING HAI AND REPEAT EVE 3;
```

Drawing vertical lines

Insert another COMMENT to indicate that vertical lines are to be coded next, then enter the vertical line commands shown in figure C-5.

Figure C-5. **VERTICAL LINE command**

```
COMMENT *** DRAW VERTICAL LINES ***;
AT 24 DRAW VER LINE FROM 5 TO 61 USING HAI;
AT 32 DRAW 11 VER LINE FROM 5 TO 61 USING HAI AND REPEAT EVE 10;
AT 29 DRAW VER LINE FROM 10 TO 61 USI BRO HAI;
AT 38 DRAW 10 VER LINE FROM 10 TO 61 USI BRO HAI AND REPEAT EVE 10;
AT 8 DRAW 18 VER LINE FROM 8 TO 9 USI HAI AND REPEAT VER EVE 3;
AT 19 DRAW 18 VER LINE FROM 8 TO 9 USI HAI AND REPEAT VER EVE 3;
```

Drawing boxes

Use the BOX command to construct individual, standalone boxes or boxes that share common sides. You can also create a shaded area or construct an invisible box to place “floating” text such as titles conveniently.

Enter the following COMMENT and BOX command, as shown in figure C-6.

Figure C-6. **BOX command**

```
COMMENT *** DRAW BOXES ***;
AT 2,2 DRAW BOX 35 WIDE BY 2 HIGH USI HAIRLINE;
AT 2,82 DRAW BOX 50 WIDE BY 2 HIGH USI HAI;
AT 5,0 DRAW BOX 132 WIDE BY 56 HIGH USI HAI;
AT 5.1,0 BOX 132 WIDE BY 1.8 HIGH USI SHADING;
AT 10.1,0 DRAW 9 BOXES 132 WIDE BY 2.8 HIGH USI SOL HAI
 INK 'BLUE' AND FILL USING INK 'XEROX.PICTORIAL.PALE BLUE'
 AND REPEAT VER EVE 6;
```

Placing text at a location

Use the TEXT AT command to place text at an exact location.

Enter the COMMENT and TEXT AT command, as shown in figure C-7.

Figure C-7. **TEXT AT command**

```
COMMENT *** TEXT AT COMMAND ***;
TEXT USING FONT 2 AT 2,2.5 'COMP.';
TEXT USING FONT 2 AT 2,11 'BR.';
TEXT USING FONT 2 AT 2,14 'DEPT.';
TEXT USING FONT 2 AT 2,22 'DATE';
TEXT USING FONT 2 AT 2,30 'PP';
TEXT USING FONT 2 AT 2,34 'PAGE';
TEXT USING FONT 1 INK 'BLUE' AT 3,47 'EARNINGS REGISTER';
TEXT USING FONT 2 AT 61,0 '7860-143-1';
VER TEXT USING FONT 3 AT 66,-5 'F8662';
```

Placing text in a box

The TEXT IN BOX command allows you to place text at a particular location within a box that was previously described. Enter the COMMENT and TEXT IN BOX commands, as shown in figure C-8.

Figure C-8. **TEXT IN BOX command**

```
COMMENT *** TEXT IN BOX COMMANDS ***;
TEXT USI FONT 2 IN BOX 5.1,24 'THIS PAY' BOX 'REGULAR' BOX
'OVERTIME';
TEXT USI FONT 2 IN BOX 7,0 'NAME'
  BOX 'GROSS' 'ADJ. NET' 'NET PAY'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'
  BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT';
TEXT USI FONT 2 IN BOX 8,19 'EMP.##';
TEXT USING FONT 2 IN LEFT CENTER BOX 9,0 'SAL/RATE';
TEXT USING FONT 2 IN BOX 9,0 'GROSS YTD';
```

Using the END command

The END command is the final command. Enter **END;** and you are done!

Figure C-9. **END command**

```
END;
```

Compiling the form

This exercise gives you practice using most of the FDL commands discussed throughout this guide.

The next step is to compile the .FSL which produces a sample of the form, provided there are no syntax errors. The summary statement also prints any errors.

After you have entered the END command, SAVE, CLEAR, and END the editing session, as shown in figure C-10.

Figure C-10. **SAVE, CLEAR, and END commands**

```
END;
SAVE 1STFRM.FSL
CE
FDL 1STFRM,TRA
```

CE is an abbreviation for CLEAR and END.

Do not be surprised if you inadvertently omit a semicolon or misspell a word. The system indicates where the error occurred and you can easily go back into the form and correct the error.

If there are errors, at the `OS1000 READY FOR COMMANDS` message on the LPS user interface, enter the following:

EDIT 1STFRM.FSL

The .FSL file is displayed. When you identify where the error occurred, modify that record, then SAVE, CLEAR, and END the editing session. Since this FSL already exists, use the abbreviated method to SAVE, CLEAR, and END (SCE), as shown in figure C-11.

Figure C-11. **SAVE, CLEAR, and END (SCE) commands**

```
END;
SCE
FDL 1STFRM,TRA
```

When the form compiles error-free, your form prints successfully. Figure C-12 illustrates the complete .FSL.

Figure C-12. **Source statement (1STFRM.FSL)**

```
FDL VERSION B03   13:13  30-APR-XX  PAGE   1
DISK-ID:   ARIEL  VX.7  R9.7  REL #5  XX/XX/XX
      1  FORM 1STFRM;                                                             000010
      2  GRID FMT1;                                                               000020
      3  FONTS UN114A,UN106A,UN104C; COMMENT ***DRAW HOR LINES***;                000030
      4  AT 7 DRAW 18 LINES FROM 0 TO 132 USING HAI AND REPEAT EVE 3;             000040
      5  AT 8 DRAW 18 LINES FROM 0 TO 24 USING HAI AND REPEAT EVE 3;              000050
      6  AT 9 DRAW 18 LINES FROM 0 TO 24 USING HAI AND REPEAT EVE 3;              000060
      8  COMMENT *** DRAW VERTICAL LINES ***                                      000080
      9  AT 24 DRAW VER LINE FROM 5 TO 61 USING HAI                               000090
     10  AT 32 DRAW 11 VER LINE FROM 5 TO 61 USING HAI AND REPEAT EVE 10;         000100
     11  AT 29 DRAW VER LINE FROM 10 TO 61 USING BRO HAI;                         000110
     12  AT 38 DRAW 10 VER LINE FROM 10 TO 61 USI BRO HAI AND REPEAT EVE 10;      000120
     13  AT 8 DRAW 18 VER LINE FROM 8 TO 9 USI HAI AND REPEAT VER EVE 3;          000130
     14  AT 19 DRAW 18 VER LINE FROM 8 TO 9 USI HAI AND REPEAT VER EVE 3;         000140
     15  COMMENT ***DRAW BOXES ***;                                               000150
     16  AT 2,2 DRAW BOX 35 WIDE BY 2 HIGH USI HAIRLINE;                          000160
     17  AT 2,82 DRAW BOX 50 WIDE BY 2 HIGH USI HAI;                              000170
     18  AT 5,0 DRAW BOX 132 WIDE BY 56 HIGH USI HAI;                             000180
     19  AT 5.1,0 BOX 132 WIDE BY 1.8 HIGH USI SHADING;                           000190
     20  AT 10.1,0 DRAW 9 BOXES 132 WIDE BY 2.8 HIGH USI SOL HAI                  000200
     21  INK 'BLUE' AND FILL USING INK 'XEROX.PICTORIAL.PALE BLUE'                000210
     22  AND REPEAT VER EVE 6;                                                    000220
     23  COMMENT *** TEXT AT COMMAND ***;                                         000230
     24  TEXT USING FONT 2 AT 2,2.5 'COMP.';                                      000240
     25  TEXT USING FONT 2 AT 2,11 'BR.';                                         000250
     26  TEXT USING FONT 2 AT 2,14 'DEPT.';                                       000260
     27  TEXT USING FONT 2 AT 2,22 'DATE';                                        000270
     28  TEXT USING FONT 2 AT 2,30 'PP';                                          000280
     29  TEXT USING FONT 2 AT 2,34 'PAGE';                                        000290
     30  TEXT USING FONT 1 INK 'BLUE' AT 3,47 'EARNINGS REGISTER';                000300
     31  TEXT USING FONT 2 AT 61,0 '7860-143-1';                                  000310
     32  VER TEXT USING FONT 3 AT 66,-5 'F8662';                                  000320
     33  COMMENT *** TEXT IN BOX COMMANDS ***;                                    000330
     34  TEXT USI FONT 2 IN BOX 5.1,24 'THIS PAY' BOX 'REGULAR' BOX 'OVERTIME';   000340
     35  TEXT USI FONT 2 IN BOX 7,0 'NAME'                                        000350
     36          BOX 'GROSS' 'ADJ. NET' 'NET PAY'                                 000360
     37          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'                000370
     38          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'                000380
     39          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'                000390
     40          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'                000400
     41          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'                000410
     42          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'                000420
     43          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'                000430
     44          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'                000440
     45          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT'                000450
     46          BOX 'UNITS-UNITS YTD' 'CURRENT AMT.' 'YTD AMOUNT';               000460
     47  TEXT USING FONT 2 IN BOX 8,19 'EMP.##';                                  000470
     48  TEXT USING FONT 2 IN LEFT CENTER BOX 9,0 'SAL/RATE';                     000480
     49  TEXT USING FONT 2 IN BOX 9,0 'GROSS YTD';                                000490
     50  END;                                                                     000500
```

D. FDL capacity limits

The available memory space imposes the following maximums for use, as shown in table D-1:

Table D-1. **Capacity limits**

Item	**Maximum**	
Text	Buffer capacity: Lines per TEXT statement:	512 bytes 64
Space allocation	TEXT AT command: TEXT IN BOX command:	16 bytes + S1 + S2 . . . S*n* 18 bytes + S1 + S2 . . . S*n* (1st box) 6 bytes + S1 + S2 . . . S*n* (second and all succeeding boxes)
	. . .where	
	n bytes	is fixed overhead.
	S	is number of characters > 2 in a text string, rounded to a multiple of two.
Sections	Definitions: Invocations:	8 per form No limit
Lines	Horizontal: Vertical:	2000 2000
Fonts and logos	84	

This number may vary, depending on memory capacity and use; however, you cannot exceed 84 fonts and logos.

E. Standard print formats

Predefined print formats that provide commonly used impact printer conversion formats for use with specific page sizes and orientations are provided on the Operating System Software (OSS).

Table E-1. **Standard LPS print formats**

Format ID	No. of lines	No. of columns	lpi	cpi	Point size[1]	Page size and orientation[2]	BEGIN values (y,x)	Default font ID
FMT1	66	132	8.1	13.6	9	11 x 8.5 in.	(.18,.66)	L0112B
FMT2	66	150	8.1	15	9	11 x 8.5 in.	(.18,.50)	L0212A
FMT3	88	132	10.7	13.6	7	11 x 8.5 in.	(.14,.66)	L0312A
FMT4	88	150	10.7	15	7	11 x 8.5 in.	(.14,.50)	L0412A
FMT5	49	100	6	10	12	11 x 8.5 in.	(.17,.50)	L0512A
FMT6	80	100	8.1	13.6	9	8.5 x 11 in.	(.57,.58)	P0612A
FMT7	60	90	6	12	12	8.5 x 11 in.	(.50,.50)	P07TYA
FMT8	60	75	6	10	12	8.5 x 11 in.	(.50,.50)	P0812A
FMT9	80	200	10.0	20.0	7	11 x 8.5 in.	(.25,.25)	L0912A
FMT10	132	132	12.5	17.6	6	8.5 x 11 in.	(.22,.51)	P1012A
FMT11	132	150	12.5	20	6	8.5 x 11 in.	(.22,.50)	P1112A
FMT12	66	172	8.1	13.6	9	14 x 8.5 in.	(.18,.66)	L0112B
FMT13	104	100	8.1	13.6	9	8.5 x 14 in.	(.57,.58)	P0612A
A4 formats								
FMT1A	66	132	8.3	12.5	9	297 x 210 mm	(.18,.57)	R112BL
FMT2A	66	150	8.3	14.3	9	297 x 210 mm	(.18,.60)	R212BL
FMT3A	88	132	11.1	12.5	7	297 x 210 mm	(.18,.57)	R312BL
FMT4A	88	150	11.1	14.3	7	297 x 210 mm	(.18,.60)	R412BL
FMT5A	48	100	6	10	12	297 x 210 mm	(.22,.85)	R512BL
FMT6A	80	100	8.1	13.6	9	210 x 297 mm	(.91,.46)	R612BL
FMT7A	60	90	6	12	12	210 x 297 mm	(.85,.39)	R7TIBP
FMT8A	60	75	6	10	12	210 x 297 mm	(.85,.39)	R812BP
FMT9A	80	200	10.0	20.0	7	297 x 210 mm	(.14,.85)	R912BL
FMT10A	132	132	12.5	17.6	6	210 x 297 mm	(.57,.39)	RA12BP
FMT11A	132	150	12.5	20.0	6	210 x 297 mm	(.57,.39)	RB12BP

[1] Point size is approximate.

[2] First dimension given is the horizontal dimension. Therefore, 11 by 8.5 inches is landscape orientation, while 8.5 by 11 inches is portrait orientation. For A4 paper, 297 by 210 mm is landscape, and 210 by 297 mm is portrait orientation.

F. Support tools and measurements

There are two separate functions of form creation: forms design and forms description. Any form can be converted to an electronic form stored on the system by describing it in Forms Description Language (FDL).

Forms design involves laying out and measuring a form and is only a peripheral concern of this guide. A forms design ruler is provided for the forms designer.

Forms design ruler

The forms design ruler is used for the following:

- Measuring character and line spacings
- Converting forms from one type of paper to another.

The ruler has eight scales, four on the front and four on the back, as shown in table F-1.

Table F-1. **Standard formats and spacings**

Side 1	Formats/spacing
Scale 1–10/inch	Standard computer output character spacing; can also be used for measuring inches, graduated in tenths.
Scale 2–6/inch	Standard computer output line spacing (6 lpi).
Scale 3–8/inch	Standard computer output line spacing (8 lpi).
Scale 4–12/inch	Can be used for 12 cpi or 12 lpi.

Side 2	Formats/spacing
Scale 5–13.6/inch	Default character spacing on Xerox laser printing systems.
Scale 6–8.1/inch	Default line spacing on Xerox laser printing systems (66 lines per landscape page).
Scale 7–10.7/inch	Line spacing on Xerox laser printing systems (88 lines per landscape page).
Scale 8–15/inch	Can be used for 15 cpi or 15 lpi.

The scales can be used for either character spacing or line spacing. For example, scale 1 can be used for either 10 characters per inch (cpi) or 10 lines per inch (lpi).

Side 1

Side 1 of the ruler is typically used for measuring impact-printed computer output reports in which the spacing is 10 cpi (scale 1) and either 6 lpi (scale 2) or 8 lpi (scale 3).

Side 2

Side 2 should be used for measuring laser printing systems output.

Default spacing

The default spacings on the system are 13.6 cpi (scale 5) and 8.1 lpi (scale 6); they were chosen for optimal readability for the standard computer format of 132 columns by 66 lines.

Reference

Refer to the “Standard print formats” appendix for a complete list of standard formats and spacings.

G. Command examples

The examples presented in this appendix illustrate the functions of the FDL commands. Use these examples together with the command information in the “Forms Description Language” chapter.

GRID examples

The following examples illustrate how virtual page and form origins are determined.

Reference Refer to the “Grids” section in the “Basic concepts” chapter and the “GRID” section in the “Forms Description Language” chapter for more information.

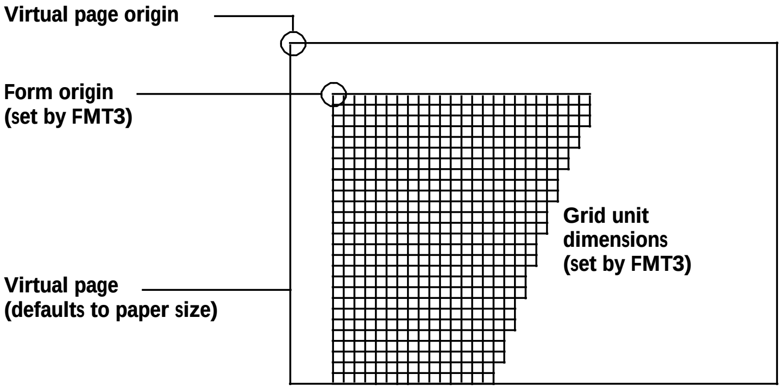
Example 1

```
LANDSCAPE;
GRID [UNIT] [IS] FMT3;
```

In this example, page size is not specified, and the virtual page defaults to paper size.

FMT3 in the GRID command provides the grid size and form origin (which is offset from the virtual page origin).

Figure G-1. **Form results with grid specified, but no page size or origin**


Virtual page origin
Form origin (set by FMT3)
Grid unit dimensions (set by FMT3)
Virtual page (defaults to paper size)

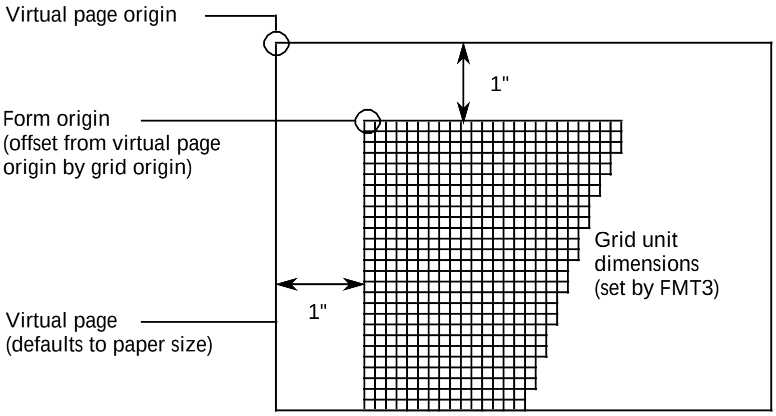
Example 2

```
LANDSCAPE;
GRID ([UNITS] [IS] FMT1 ORIGIN [IS] 1 INCH 1 INCH;
```

In this example, the ORIGIN parameter in the GRID command specifies a form origin that is offset from the virtual page origin by one inch vertically and one inch horizontally.

Grid unit dimensions are set by FMT1.

Figure G-2. **Form results with origin offset one inch from virtual page origin**

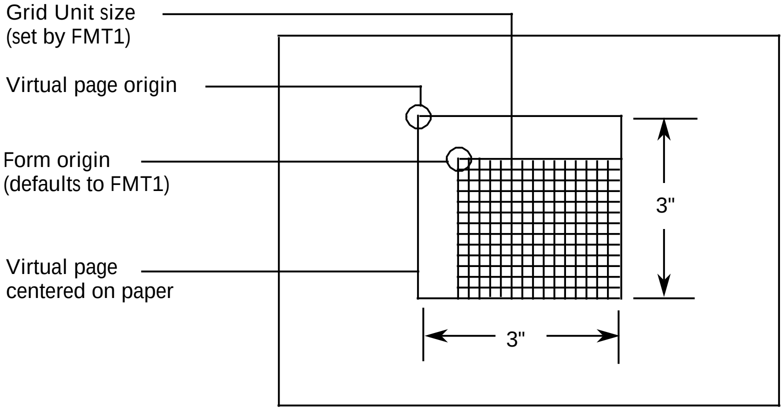


Example 3 LANDSCAPE PAGE SIZE IS 3 INCH 3 INCH;

In this example, the landscape-oriented virtual page is centered on the paper in accordance with the parameters in the LANDSCAPE PAGE SIZE command.

Grid size and form origin default to FMT1.

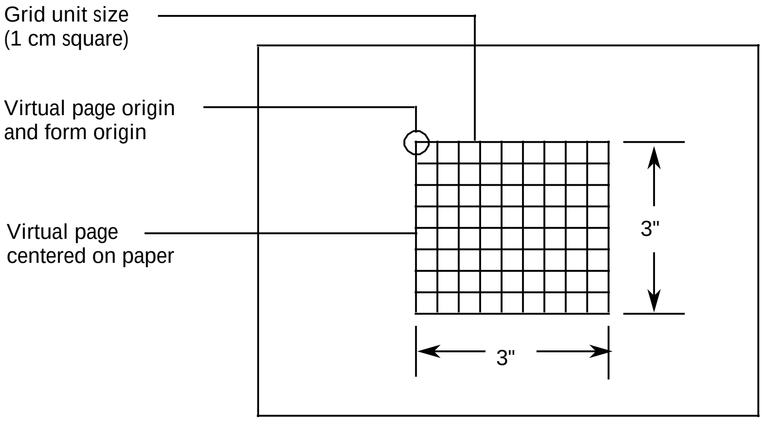
Figure G-3. **Form results with page size specified, but no origin or grid**



Example 4 LANDSCAPE PAGE SIZE IS 3 INCH 3 INCH;
GRID [UNIT] [IS] 1 CM;

In this example, explicit grid unit dimensions are set by the GRID command, and no ORIGIN parameter or predefined format is specified. This causes the form origin to coincide with the virtual page origin.

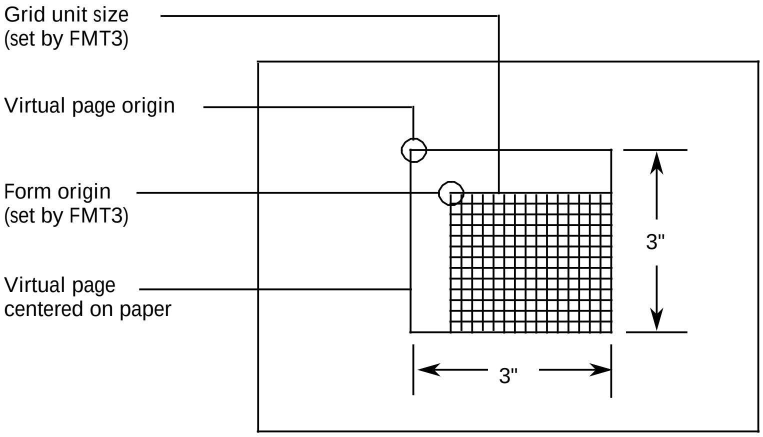
Figure G-4. **Form results with grid specified, but no origin or format**



Example 5 LANDSCAPE PAGE SIZE IS 3 INCH 3 INCH;
GRID [UNIT] [IS] FMT3;

In this example, FMT3 provides both the grid unit dimensions and the form origin.

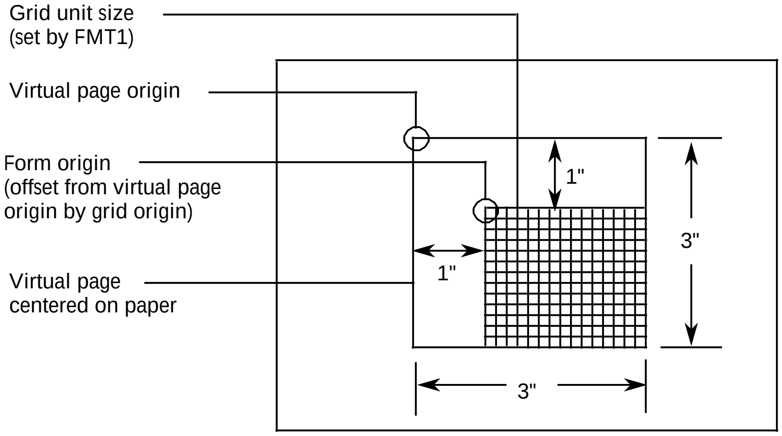
Figure G-5. **Form results with grid and page size specified**



Example 6 LANDSCAPE PAGE SIZE IS 3 INCH 3 INCH;
GRID [UNIT] [IS] FMT1 ORIGIN IS 1 INCH 1 INCH;

In this example, the location of the virtual page origin is determined by the PAGE SIZE command. The form origin is offset from the virtual page origin by one inch vertically and one inch horizontally.

Figure G-6. **Form results with grid, origin, and page size specified**



LINE examples

Example 1 AT 3 DRAW LINE FROM 4 TO 10;

AT 3	Keyword AT and the location down the page at which the line will be placed.
DRAW	Keyword DRAW.
LINE	Keyword LINE or LINES. (When the number of lines is omitted, one solid line at the default is assumed.)
FROM 4 TO 10	Keyword FROM and the coordinates indicating the beginning and end of the lines.

This command specifies the drawing of a horizontal line three grid units down from the form origin, starting four grid units to the right of the form origin and ending 10 grid units to the right of the form origin.

Figure G-7. **Drawing a horizontal line (rows and columns)**

Example 2

AT 3.5 DRAW LINE IN INCHES FROM 4 TO 10;

This command specifies the drawing of a horizontal line 3.5 inches down from the form origin, beginning four inches to the right of the form origin and ending 10 inches to the right of the form origin.

Figure G-8. **Drawing a horizontal line (inches)**

Example 3

AT 2 DRAW 5 VERTICAL LINES FROM 5 TO 10 AND REPEAT EVERY 2;

This command specifies the drawing of five vertical lines. The first line begins two horizontal grid units to the right of the form origin and five grid units down from the form origin, and ends ten grid units down from the form origin. This line is repeated every two horizontal grid unit intervals.

Figure G-9. **Drawing parallel vertical lines**

Example 4

```
AT 4 DRAW 5 LINES FROM 2 TO 4 AND REPEAT HORIZONTALLY
EVERY 4;
```

This command specifies five short lines to be drawn, each two grid units long, with each starting point spaced four grid units apart and separated two grid units from the end of the preceding line.

Figure G-10. **Drawing repeated horizontal lines**

BOX examples

Example 1

```
AT 4, 6 BOX 14 WIDE BY 4 HIGH;
```

This command specifies a box 14 grid units wide and four grid units high, with the upper left corner four grid units down from the form origin and six grid units to the right of the form origin.

Figure G-11. **Drawing a box**

Example 2

```
AT .5,0 DRAW 4 BOXES IN INCHES 5 WIDE BY .5 HIGH USING
SHADING AND REPEAT VERTICALLY EVERY 2;
```

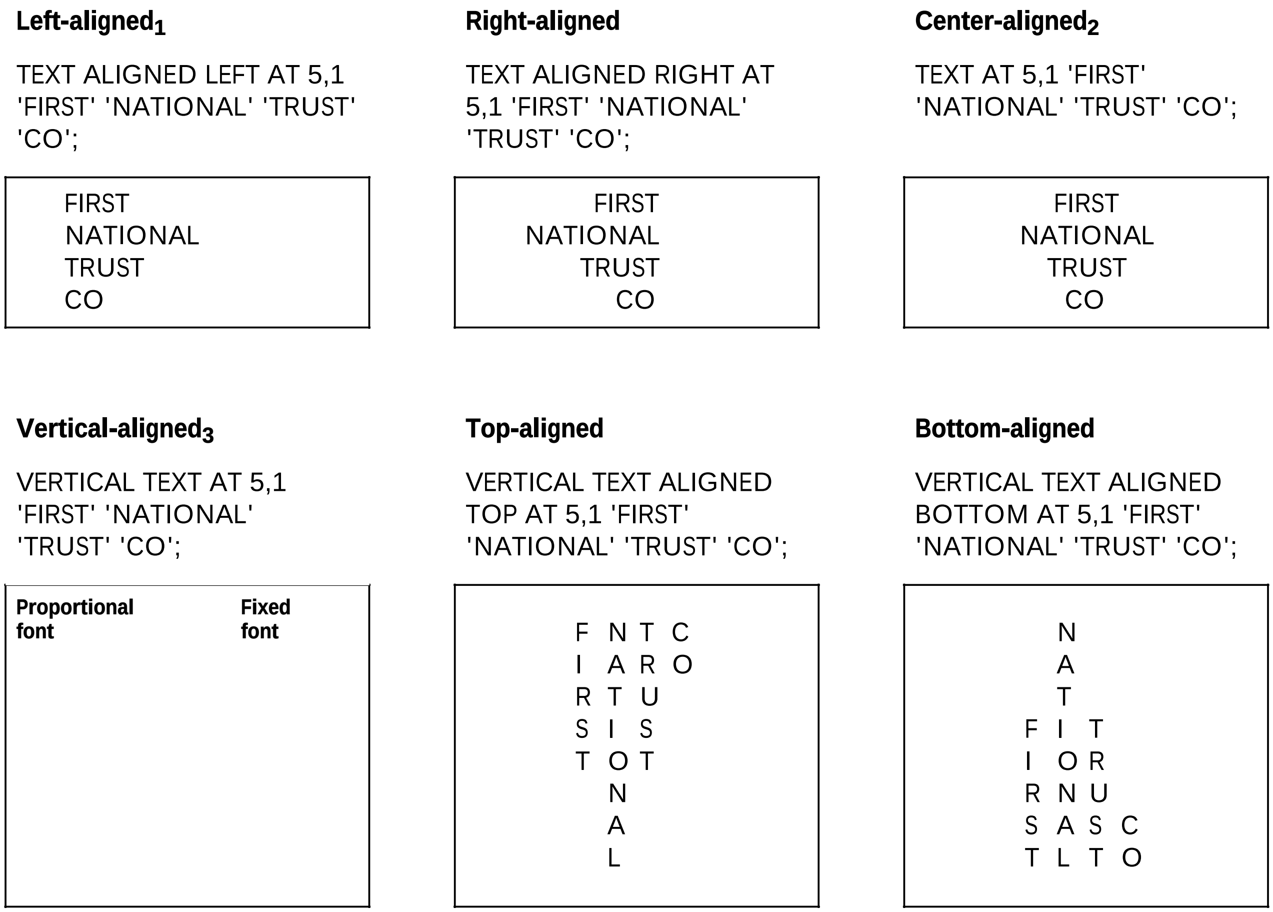
This command specifies four 5-inch wide, .5-inch high bars placed with the top edges at .5 inches, 2.5 inches, 4.5 inches, and 6.5 inches.

Figure G-12. **Drawing boxes**

TEXT AT examples

Figure G-13 gives the command syntax for and demonstrates aligned text.

Figure G-13. **Aligned text**



Left-aligned[1]

```
TEXT ALIGNED LEFT AT 5,1
'FIRST' 'NATIONAL' 'TRUST'
'CO';
```

```
FIRST
NATIONAL
TRUST
CO
```

Right-aligned

```
TEXT ALIGNED RIGHT AT
5,1 'FIRST' 'NATIONAL'
'TRUST' 'CO';
```

```
   FIRST
NATIONAL
   TRUST
      CO
```

Center-aligned[2]

```
TEXT AT 5,1 'FIRST'
'NATIONAL' 'TRUST' 'CO';
```

```
 FIRST
NATIONAL
 TRUST
  CO
```

Vertical-aligned[3]

```
VERTICAL TEXT AT 5,1
'FIRST' 'NATIONAL'
'TRUST' 'CO';
```

Top-aligned

```
VERTICAL TEXT ALIGNED
TOP AT 5,1 'FIRST'
'NATIONAL' 'TRUST' 'CO';
```

```
F N T C
I A R O
R T U
S I S
T O T
  N
  A
  L
```

Bottom-aligned

```
VERTICAL TEXT ALIGNED
BOTTOM AT 5,1 'FIRST'
'NATIONAL' 'TRUST' 'CO';
```

```
  N
  A
  T
F I T
I O R
R N U
S A S C
T L T O
```

[1] This command produces stacked, left-aligned output beginning five grid units down from the form origin and one grid unit to the right of the form origin, as follows.

[2] To center the stacked words (the default option), an alignment need not be specified. Horizontal printing is the default. If vertical printing is desired, it must be specified.

[3] Centering is automatic. Notice how the fixed font gives a more uniform appearance.

Figure G-14. **Character block orientations for portrait and landscape pages**

This character indicates the positioning origin of the text block.

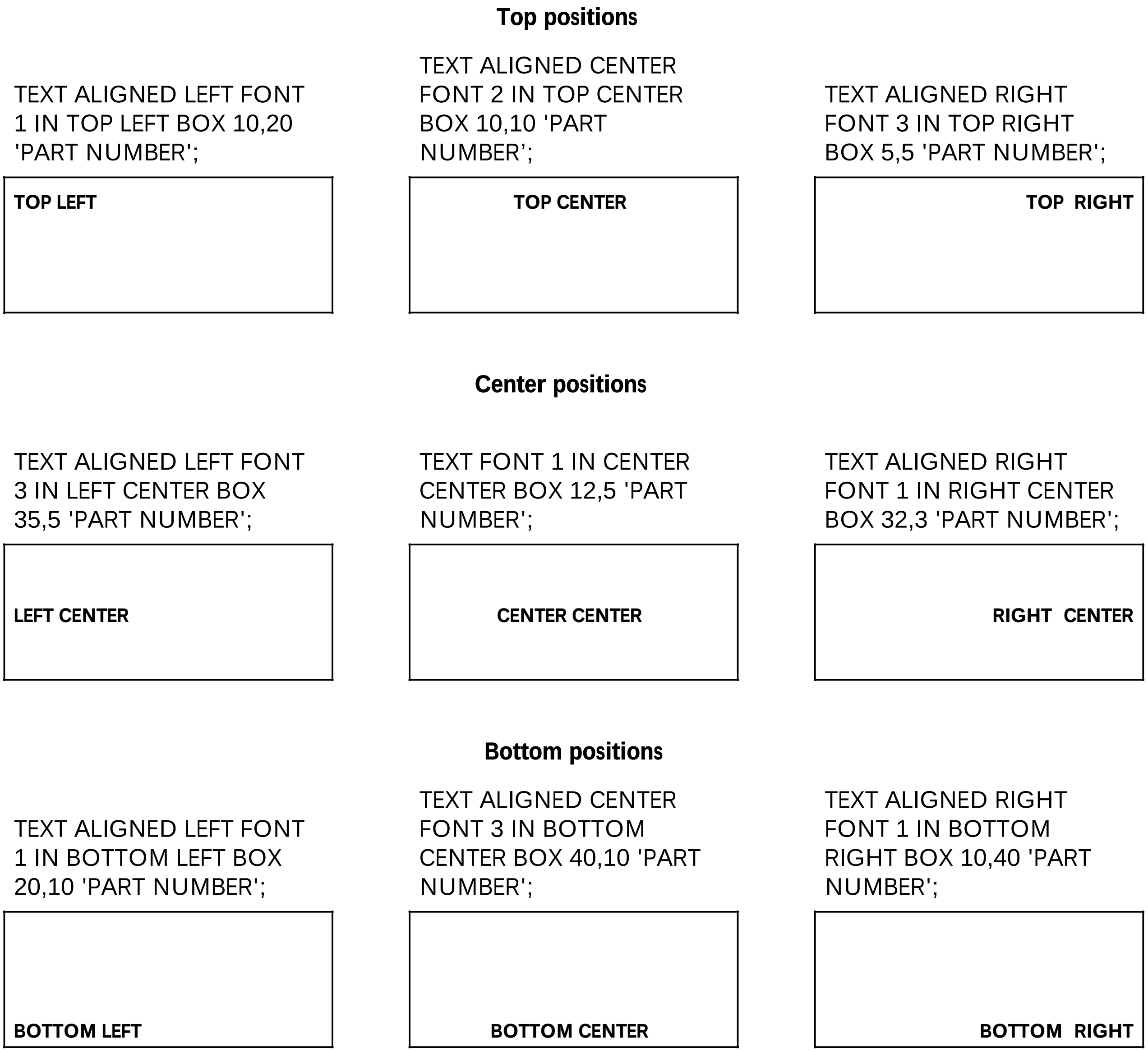
If the font and page have the same orientation, letters appear upright. They appear sideways or upside down if orientations differ. Text is aligned horizontally or vertically relative to page orientation, not relative to the font.

Portrait and inverse portrait fonts may be used with landscape page orientation (for example, to insert labels or captions). Likewise, landscape and inverse landscape fonts may be used with portrait page orientation. Portrait, landscape, inverse portrait, and inverse landscape fonts are listed in the *Xerox Laser Printing Systems Standard Font Library Font User Guide*.

TEXT IN BOX examples

The following examples give the command syntax and demonstrate the nine positions in a box where text can be placed.

Figure G-15. **Text positions**



Top positions

```
TEXT ALIGNED LEFT FONT
1 IN TOP LEFT BOX 10,20
'PART NUMBER';
```

```
TEXT ALIGNED CENTER
FONT 2 IN TOP CENTER
BOX 10,10 'PART
NUMBER’;
```

```
TEXT ALIGNED RIGHT
FONT 3 IN TOP RIGHT
BOX 5,5 'PART NUMBER';
```

Center positions

```
TEXT ALIGNED LEFT FONT
3 IN LEFT CENTER BOX
35,5 'PART NUMBER';
```

```
TEXT FONT 1 IN CENTER
CENTER BOX 12,5 'PART
NUMBER';
```

```
TEXT ALIGNED RIGHT
FONT 1 IN RIGHT CENTER
BOX 32,3 'PART NUMBER';
```

Bottom positions

```
TEXT ALIGNED LEFT FONT
1 IN BOTTOM LEFT BOX
20,10 'PART NUMBER';
```

```
TEXT ALIGNED CENTER
FONT 3 IN BOTTOM
CENTER BOX 40,10 'PART
NUMBER';
```

```
TEXT ALIGNED RIGHT
FONT 1 IN BOTTOM
RIGHT BOX 10,40 'PART
NUMBER';
```

Glossary

A3 International paper size measuring 297 by 420 mm or 11.69 by 16.54 inches.

A4 International paper size measuring 210 by 297 mm or 8.27 by 11.69 inches.

B4 International paper size measuring 250 by 353 mm or 9.84 by 13.9 inches.

batch processing Process that allows for repetitive operations to be performed sequentially on batched data without much involvement from the computer operator.

BCD Binary coded decimal.

bitmap Visual representation of graphic images in which a bit defines a picture element (pixel) and a matrix of bits defines an image. For example, if a bit is 1, the corresponding pixel is printed.

blocking Process of combining two or more records into a single block of data which can moved, operated upon, stored, and so on, as a single unit by the computer.

block length Number of characters or bytes contained in a block of data (the block is treated as a unit within the computer). Block length is usually invariable within a system and may be specified in units such as records, words, computer words, or characters.

BOF Bottom of form.

BOT Beginning of tape.

bpi Bits per inch.

CCID Character Code Identifier. Code associated with the universal identifier “Xerox” to indicate the version of the Xerox character code standard used to code Interpress strings.

character set Set of all characters defined in a font, including alphabet, numeric, and special characters such as symbols.

cluster Group of related feeder trays, usually containing the same size and type of paper (stock). Each cluster has a name, consisting of one to six alphanumeric characters.

CME Entry modifying the output printing characteristics of a report on a copy-to-copy basis.

compiler Software that translates instructions written in high-level language into machine language for execution by a system.

Copy Modification Entry See *CME*.

copy-sensitive Job in which multiple copies of a report contain different data, such as paychecks and banking statements.

cpi Characters per inch.

default Value assigned to a field by the system if no input is received from the operator. You can change the default value of a field.

DJDE Dynamic Job Descriptor Entry. Command within an input data stream used to modify the printing environment dynamically.

dot Picture element (pixel) imaged by a printer. The number of dots imaged per inch measures printer resolution, for example, 300 dots per mich (dpi). See also *spot*.

dpi Dots per inch. Indicates the number of dots per inch displayed on a terminal screen or printed to form a character or graphic.

dry ink Minute particles of resin and carbon black that can accept an electrical charge and create images. Resin and carbon black or color pigment toner are combined with developer to form the dry ink.

duplex 1. Ability of a data communications system to send and receive information simultaneously. 2. In printing, duplex means printing on both sides of the paper.

Dynamic Job Descriptor Entry See *DJDE.*

edgemarking Use of graphic objects (usually lines or boxes) that bleed off the edge of the physical page. See also *physical page*.

embedded blanks Blank spaces within a command line.

ENET Ethernet network.

EOT End of tape.

Ethernet Xerox local area network (LAN) that allows transmission of data by cable from one device to another.

FCB Forms Control Buffer. Controls the vertical format of printed output.

FCP File Control Parameter.

FCU File Conversion Utility.

FDL Forms Description language. LPS-resident source language used to design electronic forms. See also *FSL* and *form.*

FDR File directory.

FIS Font Interchange Standard. Defines the digital representation of fonts and character metrics for the generation of an entire series of Interpress fonts.

floating accent Nonspacing accent characters that can be combined with characters and printed as a composite.

font Complete set of characters of a particular font family having the same point size, weight, stress, and orientation.

Font Interchange Standard See *FIS.*

form 1. Compiled .FSL file. 2. Specific arrangement of lines, text, and graphics stored in an electronic version. Forms can be printed without variable data or merged with variable data during the printing process. See also *FDL* and *FSL*.

Forms Control Buffer See *FCB.*

Forms Description Language See *FDL.*

Forms Source Library See *FSL.*

FSL Forms Source Library. Uncompiled collection of user-created files containing FDL commands. See also *FDL* and *form*.

hexadecimal Numbering system with a base of 16. The numbers 10 through 15 are represented by A through F.

highlight color Printing with black plus another color. A range of colors, tints, and shades is printed by varying the percentage of black dots, colored dots, and the white space between the dots.

HIP Host Interface Processor.

image area Area on a physical page that may contain text or graphics.

initialize 1. To prepare a blank diskette so it can accept data. This is usually accomplished when a program is booted. 2. To set all information in a computer system to its starting values.

Interpress Industry-standard page description language developed by Xerox. Interpress documents can be printed on any sufficiently powerful printer equipped with Interpress print software.

JCB Job Control Block.

JCL Job Control Language.

JDE Job Descriptor Entry. Collection of job descriptions.

JDL Job Description Library. Collection of compiled job descriptions. See also *JSL*.

JID Job Identifier.

job Synonymous with a START command, a job is a group of print data sets called reports. A job may contain one or multiple reports.

job control Program called into storage to prepare each job or job step to be run.

Job Descriptor Entry See *JDE.*

Job Descriptor Library See *JDL.*

job management Collective functions of job scheduling and command processing.

Job Source Library See *JSL.*

JSL Job Source Library. Collection of uncompiled job descriptions. See also *JDE* and *JDL*.

keyword Required part of a command.

label Reference to a file saved on tape or disk, a record indicating the file name or date created, or other control information.

landscape Orientation in which text and images are positioned parallel to the long edge of the paper.

legal size Paper size measuring 8.5 by 14 inches or 216 by 356 mm.

letter size Paper size measuring 8.5 by 11 inches or 216 by 279 mm.

line feed Control character that (unless set to be interpreted as a line end) causes the printing system to begin printing in the current character position of the next line.

literal Alphanumeric character beginning with a letter, including an asterisk, period, colon, or slash, and not enclosed in single quotes.

logical page In Xerox printing systems, a logical page is a formatted page that is smaller than the physical page. A logical page is defined by an origin, thus allowing more than one logical page to be placed on a physical page.

lpi Lines per inch.

LPS Laser printing system.

mask Selection of bits from a storage unit by use of an instruction that eliminates the other bits in the unit. In accessing files, a file name mask is used to reference one or more files with similar file-id (identifier) syntax. In Interpress, a mask serves as a template, indicating the shape and position of an object on a page.

metacode Method of controlling the image generator. The character dispatcher uses these codes to generate scan line information. This information is sent in the form of character specifications to the image generator, which uses it to compose the bit stream that modulates the laser. Also called native mode.

monochrome Printing in one color only.

nesting Subroutine or set of data, such as a comment, contained sequentially within another set of data.

object file Source file converted into machine language (binary code).

octal System of representing numbers based on 8.

offset To place printed output sets in slightly different positions from each other in an output bin for easy separation of collated sets.

operand That which is acted upon, for example, data, in an operation or process.

operating system Software that controls the low-level tasks in a computer system, such as input or output and memory management. The operating system is always running when the computer is active.

orientation In reference to image area, describes whether the printed lines are parallel to the long edge of the paper (landscape) or the short edge of the paper (portrait).

origin In reference to image area, the upper left corner of a sheet.

overprint ratio Maximum number of variable data and form characters that can be intersected by a single scan line.

packet A group of DJDE records terminated by an END command.

page end Command character (form feed) to terminate the current page.

palette Predefined set of colors or inks. Different versions are provided with the printer and with host- or PC-based application software.

parameter Part of a command, other than the keyword. See *keyword*.

parse To read or interpret a command; to build up a parameter list from information within a command.

PCC Printer Carriage Control.

PDE Page Description Entry.

PDL Print Description Language. Language used to describe printing jobs to a laser printing system. PDL describes the input (type, format, characteristics), performs the processing functions (logical processing), and describes the output (type, format, font selection, accounting options).

PE Phase encoded.

physical page Actual page size your printer uses to print a form.

pitch Width of a fixed-pitch font expressed in characters per horizontal inch.

pixel Acronym for picture element. Smallest addressable point of a bitmapped screen that can be independently assigned color and intensity.

point In Xerox laser printing systems, a unit of measurement equal to 0.0139 inch. Points are always used to express type, size, and leading. There are 12 points to a pica and about 72 points to an inch.

portrait Orientation in which text and images are positioned parallel to the short edge of the paper.

ppm Pages per minute.

Print Description Language See *PDL.*

print file Portion of the system disk memory (up to 4 MB) reserved for temporary storage of formatted pages for printing. Pages are retained until they are delivered to the output tray.

PSC Printer Subsystem Controller.

query Request for data or other information, entered by an operator while the system is processing.

record A line of data as defined in the RECORD command.

report A single output data set, delimited by an RSTACK command or as a file. In setting a separation boundary, reports are subsets of a job.

resolution Number of dots per inch (dpi) or spots per inch (spi). The greater the number of dots, the higher the resolution and the clearer the image. The terms dots, spots, and pixels are synonymous.

scale To adjust font or image size according to given proportions.

sequential 1. In numeric sequence, usually in ascending order. 2. A file structure in which records are written one after another and cannot be randomly accessed.

set Multiple copies of the same report.

simplex printing Printing on one side of the page.

spi Spots per inch. See *resolution*.

spot A picture element imaged by the printer. Synonymous with *dot* and *pixel*.

statement Detailed instructions in a program step, written according to specific rules called syntax.

stock User-defined name in the JSL that specifies a certain type of paper for printing a job.

stockset Collection of stocks to be used on a print job. See also *stock*.

string Connected sequence of alphanumeric characters treated as one unit of data by a program.

syntax Rules governing the structure of expressions in a programming language.

system page Maximum area in which text and graphics can be imaged on a printing system.

tape density Expression of the format of a magnetic tape measured in number of bytes that can be stored per inch of tape.

TOF Top of form.

two-up Printing two logical pages on one side of a physical page.

UCSB Universal Character Set Buffer.

UCS Universal Character Set.

variable data Changeable information which is merged with a standard document to create specialized or personalized versions of that document. Variable data is not a part of a form design, but varies from page to page.

virtual page Page area selected by a forms designer for printing.

vpos Vertical positioning.

wildcard Character (usually an asterisk *) which can be inserted into a command string to indicate that it may represent one or more characters in that position.

XDDI Xerox Dynamic Document Interface.

xdot Unit of measurement representing a fraction of an inch. May also be referred to as a picture element (pixel) or spot; for example, 1/600 spots per inch (spi).

xerographic mode Either of two possible printer configurations: 1. Black mode which allows printing with black dry ink only. 2. Highlight mode which enables both highlight color and black printing.

XNS Xerox Network Systems.

XPAF, XPF Xerox Printer Access Facility.

Index

Symbols
.FSL data transfer, 3-1 to 3-2

Numerals
300 spi, 1-1, 2-4, 4-7
600 spi, 1-1, 2-4, 3-3, 4-7
4850 color
  forms, 3-3 to 3-4
  logos, 3-3 to 3-4

A
abbreviations, 4-2 to 4-3
absolute coordinate symbol, 2-9
alignment, 4-15

B
boundary line, 4-13
BOX command, 2-11 to 2-12, 4-9 to 4-10
boxes, using, 1-1, 2-15 to 2-17, 4-9 to 4-12, C-5, G-6 to G-7

C
capacity limits, FDL, D-1
channel-attached, 3-2
character
  case, 2-14
  cells, 1-2, 2-14
  spacing, 1-2 to 1-3, 2-14
characters per inch, see *cpi*
coding techniques, 4-1 to 4-4
Color Compatibility Release software, 1-10
command summary, 2-2
COMMENT command, 2-21, C-2
communicating, remote device, 3-2
compilation options, 3-4 to 3-6
compiling forms, 3-1 to 3-6
COMPRESS utility, 3-2
conventions, document, vii
converting
  preprinted forms, 4-1
  unit values, 4-14
coordinates
  location, 1-1, 2-9
  negative, 1-13, 2-9
  symbols, 2-9
  system, 1-6
cpi, 1-12

D
data
  transfer, FSL, 3-1 to 3-2
  types, 1-14
defaults, system, B-1 to B-3
density, print, 1-9
description commands, FDL, 2-9 to 2-22
designing forms, 4-1 to 4-2, C-1 to C-6
device, communicating, 3-2
dispatchable items, 4-6 to 4-8
displacement values, 1-10
DJDEs, restricting, 1-9
DO SECTION command, 2-19 to 2-21
documentation, viii
dots, 1-12
Dynamic Job Descriptor Entries, see *DJDEs*

E
edgemarking, 1-6, 2-5
editor utility, 2-3, 3-1
END command, 2-22, C-5
end coordinate symbol, 2-9
END SECTION command, 2-19 to 2-21
error
  checks, compiling, 3-4
  messages, imaging, 1-7
Ethernet network, 3-2

F
FDL
  basic concepts, 1-1 to 1-14
  capacity limits, FDL, D-1
  command
    examples, G-1 to G-10
    format, 2-1
    overview, 2-1
    summary, 2-2
    syntax summary, A-1 to A-2
  description commands, 2-9 to 2-22
  forms creation process, 2-3
  PROOF, 3-5
  setup commands, 2-3 to 2-8
  statistics, 4-16
file
  secured, 3-5 to 3-6
  storage, 3-5
fixed fonts, 1-2 to 1-3
FMT1, 2-7
FMT6, 1-13, 2-7
FONT command, 2-8, 2-14
fonts
  character set, 1-2, 2-8
  definition, 1-2
  fixed, 1-2 to 1-3
  maximum, 2-8
  memory, 1-4
  orientation 1-3
  proportional, 1-2 to 1-3

typefaces, 1-3
FORM command
definition, 2-4
RESOLUTION parameter, 2-4
form image buffer, 4-12 to 4-13
forms
compiler, 2-6, 2-8, 3-2 to 3-5
compiling, 3-1 to 3-6, C-6 to C-7
creating, 2-3, C-1 to C-7
design ruler, 1-13, F-1
elements, 1-11 to 1-13, 2-7
naming, 2-4
new, designing, 4-1 to 4-2
origin, 1-10 to 1-13, 2-7
printing, 3-1 to 3-6
formats, standard, 1-13, E-1
Forms Description Language, see *FDL*
Forms Source Library, see *FSL*
FSL
compiling, 3-3 to 3-5
data transfer
offline, 3-1
online, 3-2
modifying, 2-3
fuser jams, 1-6

G
GRAPHIC command, 2-18 to 2-19
graphics capability, see *GVG2*
GRID command, 1-5, 1-10, 2-6 to 2-7, G-1 to G-4
grid unit scaling, 4-16
grids, 1-12 to 1-13
GVG2, 2-19

H
hardware limitations, 4-7
highlight color, 1-10
host computer, 3-2
hostcopy utility, 3-2

I
image
complexity factors, 4-4 to 4-9
error messages, 1-7
hardware limitation, 4-7
non-printing, 1-7
registration, 1-7 to 1-9
size, 1-4 to 1-7
incremental coordinate symbol, 2-9
Interpress, 1-9, 2-19

J
Job Source Library, see *JSL*
JSL, 2-5

L
landscape
definition, 1-2
density, 4-7
FMT6, 1-13, 2-7
font, text block origin, 1-11
image registration, 1-7 to 1-9
shading factors, 4-12
see also *page*
LANDSCAPE command, 1-5 to 1-6, 2-6
layout sheet forms, 4-2
LINE command, 2-10 to 2-11
line
density, 4-6 to 4-9
drawing, C-3
examples, G-4 to G-6
superimposed, 4-8
tables, 4-4 to 4-6
types, 1-1
linear units, 1-12
lines per inch, see *lpi*
LOGO command, 2-17 to 2-18
logos, 3-3 to 3-4
lowercase toggle, 2-14
lpi, 1-12
LPS Editor, 3-1

M
maximum image area, 1-4
magnetic tape, 3-1
measurement
factors, rounding, 4-14 to 4-15
scales, F-1
unit, 1-13
memory, font, 1-4

N
naming, form, 2-4
negative coordinates, 1-13
non-imaged elements, 1-7

O
Operating System Software, see *OSS*
orientation, see *font; landscape; page; portrait*
origin coordinate symbol, 2-9
OSS, 1-9, 1-13
output performance, 1-9 to 1-10
OUTPUT SHIFT command, 1-7

P
page
generation errors, 4-8
orientation, 1-2
physical, 1-5, 1-13
setup errors, 4-8 to 4-9
system, 1-4, 1-7
virtual, 1-5 to 1-6, 1-13, 2-6
see also *landscape; portrait*
Page Description Language, see *PDL*
paper
selecting, 2-5
sizes, 1-4, 4-2
types, 1-4
PAPER command, 1-5, 2-5 to 2-6
PAPERSIZE command, 1-5
PDL, 1-5
physical page, 1-5
portrait
definition, 1-2 to 1-3

density, 4-7 to 4-8
FMT1, 2-7
font, text block origin, 1-11
image registration, 1-7 to 1-9
shading factors, 4-12
see also *page*
PORTRAIT command, 2-6
PostScript, 1-9
predefined formats, 1-13, 2-6 to 2-7
print density, 1-9
printing forms, 3-1 to 3-6
procedures
form
converting preprinted, 4-1
designing, 4-1
printing, 3-1
offline, transferring data, 3-1
proportional fonts, 1-2 to 1-3
publications, related, viii

R
Raster Image Processor, see *RIP*
registration, image, 1-7 to 1-9
remote devices, 3-2
resolution, specifying, 2-4
RIP, 2-19
rounding
measurement factors, 4-14
variable data, 4-15

S
SAMPLE command, 3-6
scaling, grid unit, 4-16
scanning line density, 4-6 to 4-8
SECTION command, 2-19 to 2-21
section factors, 4-13
setup commands, FDL, 2-3 to 2-8, C-2
shading, 2-11, 4-12 to 4-13
shift, image, 1-7 to 1-9
skew, image, 1-7 to 1-9
spi, 1-1, 2-4, 3-3, 4-7
spots-per-inch, see *spi*
standard formats, 1-13, 2-7, E-1
standard print formats, see *standard formats*
start coordinate symbol, 2-9
superimposed lines, 4-8
summary sheet, 4-16
syntax
ambiguities, 4-2 to 4-3
summary, A-1 to A-2
system
defaults, B-1 to B-3
page, 1-4, 1-7

T
text
boxes, 2-15 to 2-17, 4-10 to 4-12, C-5
buffer, 2-14
placing, C-4
text block origin, 1-11
TEXT command
definition, 2-13
AT, 2-13 to 2-14, G-8 to G-9
IN BOX, 2-15 to 2-17, G-10
troubleshooting, 4-1 to 4-16

U
UNIT value, 1-13
uppercase toggle, 2-14
USLEGAL, 2-5
USLETTER, 2-5

V
variable data
non-imaged, 1-7
rounding, 4-15
vector graphics, 2-19
virtual page
definition, 1-5 to 1-6
origin, 1-6, 1-13, 2-7
size, 1-13, 2-6

X
x coordinate, 1-12 to 1-13, 2-9
XDDI software, 1-10
xdots
grids, 1-12
size, 1-1

Y
y coordinate, 1-12 to 1-13, 2-9