Xerox DocuPrint 180 Laser Printing System Forms Creation Guide

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Related publications

The *Xerox DocuPrint 180 Laser Printing System Forms Creation Guide* is part of the ten manual reference set for your laser printing system. The entire reference set is listed in the table below. Several other related documents are also listed for your convenience. For a complete list and description of available Xerox documentation, refer to the Xerox Documentation Catalog (Publication number 610P17417) or call the Xerox Documentation and Software Services (XDSS) at 1-800-327-9753.

Table 1. **Related Publications**

Publication	**Number**
Xerox DocuPrint 180 Laser Printing System Operator Guide	721P85490
Xerox DocuPrint 180 Laser Printing System Operations Reference	721P85500
Xerox DocuPrint 180 Laser Printing System Message Guide	721P85550
Xerox DocuPrint 180 Laser Printing System PDL Reference	721P85530
Xerox DocuPrint 180 Laser Printing System Forms Creation Guide	721P85520
Xerox DocuPrint 180 Laser Printing System System Generation Guide	721P85510
Xerox DocuPrint 180 Laser Printing System Installation Planning Guide	721P85480
Xerox DocuPrint 180 Laser Printing System Operator Command Summary Card	721P85560
Xerox DocuPrint 180 Laser Printing System PC UI Reference	721P85540
Xerox DocuPrint 180 Laser Printing System Product Reference	721P85570
Xerox Laser Printing Systems Tape Formats Manual	600P86175
X*erox Laser Printing Systems Standard Font Library Font User Guide*	600P86174
Helpful Facts About Paper	721P82492

Notice

This publication may contain descriptions of concepts and features not currently available for your Xerox Laser Printing System. Consult your Xerox sales representative or your operating system software program description for additional information.

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Introduction

The *DocuPrint 180 Laser Printing System Forms Creation Guide* is intended for forms designers who have a basic knowledge of the DocuPrint 180 Laser Printing System (LPS). You may have received on-site training, or you may have attended a Xerox FDL training course.

The forms designer's tasks consist of writing FDL commands to produce electronic forms. These tasks include entering source code into the LPS to create new electronic forms, as well as updating, revising, and printing the forms on the LPS. If you are also responsible for printing variable data on the forms in addition to performing other operations on the laser printer, refer to the related documents provided with your laser printing system.

The DocuPrint 180 Laser Printing System Forms Creation Guide is one of eight manuals which make up the DocuPrint 180 LPS Reference Set. This guide explains the use of Forms Description Language (FDL) commands that are used to create forms. Its purpose is to do the following:

- Describe the FDL commands necessary to create any desired form with the correct page orientation, fonts, line widths, and positioning of captions and logos
- Explain fundamental printing terms and techniques
- Describe the use of support tools in simplifying the creation of forms.

About the reference set

This document is part of a reference set designed to help you receive maximum benefit from your DocuPrint 180 laser printing system.

To help you select the appropriate document for your needs, the following section identifies the documents in the set and describes the information contained in each.

DocuPrint 180 Laser Printing System document set

The DocuPrint 180 LPS document set includes the following:

DocuPrint 180 LPS Operator Guide

This reference contains the following information:

- System overview
- Paper facts and procedures
- Operating procedures
- Maintenance
- Problem solving
- Supplies
- Meter reading and reporting

DocuPrint 180 LPS PDL Reference

This reference contains the following information:

- Print Description Language components and processes
- Input processing functions
- Output processing functions
- PDL command summary
- Page formatting guidelines
- Character code assignment tables
- PDL programming information with step-by-step instructions

DocuPrint 180 LPS System Generation Guide

This reference contains the following information:

- Configuration options
- Commands
- OSS software installation, upgrade, and modification

DocuPrint 180 LPS Operations Reference

This reference contains the following information:

- Command syntax for operator and system administrator procedures
- LPS defaults
- LPS resources
- Command summaries
- Communication and graphics on the LPS
- Command files

DocuPrint 180 LPS Forms Creation Guide

This reference contains the following information:

- Basic concepts for creating forms
- Coding and compiling for LPS Forms Description Language
- Sample form setup command sets
- Tips for successful forms creation

DocuPrint 180 LPS Operator Command Summary Card

This reference provides a quick reference of commonly-used commands.

DocuPrint 180 LPS Message Guide

This reference contains the following information:

- OSS and other messages
- Meaning and recovery procedures

DocuPrint 180 LPS Installation Planning Guide

This reference contains the following information:

- LPS basic components and options
- Tasks that must be accomplished before installation
- Preinstallation requirements
- Installation process
- Postinstallation activities

DocuPrint 180 LPS PC UI Reference

This reference contains the following information:

- PC UI procedures
- Hierarchy of PC UI windows

DocuPrint 180 LPS Product Reference

This reference contains the following information:

- Product overview
- Hardware and software
- LPS connections
- User considerations
- LPS comparisons

Tape Formats Manual

This reference contains the following information:

- Characteristics of different formats
- File organization
- Data formats
- Carriage control conventions

DocuPrint 180 LPS Standard Font Library Font User Guide

This reference contains the following information:

- Font naming conventions
- Listing of standard fonts
- Data Sheets
- Glossary to typography terminology

Helpful Facts About Paper

This reference contains the following information:

- Selection and guidelines
- Storage
- Specifications for different printers

What this guide contains

The DocuPrint 180 Laser Printing System Forms Creation Guide shows how to create electronic forms by describing them in words and numbers. FDL is not complicated; it requires performing a few dimensional measurements and learning some easy-to-follow rules. The guide is divided into six chapters and six appendices as follows:

Chapter 1: Overview. Contains an explanation of the general functions and advantages of the Forms Description Language plus an introduction to laser printing technology.

Chapter 2: Basic concepts. Explains the fundamental printing terms and techniques that you need to know before starting to create a form.

Chapter 3: Forms description language. Gives the name, function, and detailed format of each FDL command that can be used in setting up and describing a form.

Chapter 4: Compiling and printing forms. Explains how FDL source code is compiled and stored on the system disk for printing.

Chapter 5: Forms layout considerations. Explains the ambiguities and constraints inherent in the Forms Description Language.

Chapter 6: Coding a complex form. Gives the step-by-step procedure for creating a sample form.

Appendix A: FDL command summary. Gives a format-only listing of all the FDL commands described in this manual.

Appendix B: FDL-generated messages. Lists all the status and error messages that may appear during compilation.

Appendix C: System default summary. Lists the system default values that are automatically supplied when keywords are omitted from the commands.

Appendix D: Hierarchy of grid unit scaling. Explains the system’s defaults and overrides in response to various grid scaling specifications.

Appendix E: FDL capacity limits. Describes the various maximums, in terms of lines, buffers, and space allocation, imposed by the memory space limits.

Appendix F: Support tools and measurements. Describes the forms design ruler that is used to lay out and measure a form.

Glossary: Defines the technical terms used in the manual.

Conventions used in this guide

This guide uses the following conventions:

< > Angle brackets are used for keys on the PC User Interface keyboard.

{ } Braces indicate that one of the items stacked inside must be entered.

... Ellipses indicate that you can repeat a parameter or list a series of parameters.

[ ] Square brackets are used for optional command characters.

| Vertical bars are used to separate parameters in a series. The vertical bar stands for ”or.”

bold Bold is used for characters you enter at the command line.

italics Italics are used for variable information.

TERMINAL FONT Terminal or monospace font is used to display system responses.

underline System default parameters are underlined.

UPPERCASE Uppercase letters represent data that must be entered as shown; however, a keyword may be abbreviated to the first three letters.

1. Overview

The laser printing system (LPS) provides the capability to create electronic forms tailored to meet your individual requirements. You create electronic forms using Forms Description Language (FDL). This simple-to-learn, easy-to-use language enables you to design and alter forms in minutes. FDL eliminates the need for preprinted forms and the expense of forms obsolescence. It also eliminates the delays associated with stocking forms and overlays.

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 such elements as lines, logos, images, signatures, shading, and different font styles and sizes to make full use of laser printing system features and capabilities. FDL provides an easy and quick means of achieving maximum visual impact and readability.

Advantages of FDL include the following:

- Lines can be drawn at specified intervals without being re-defined each time.
- You have only to 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.
- When defining a location on a page, you are not restricted to lines and character positions. You can specify coordinates in inches, centimeters, dots and xdots, with a resolution of 1/300 inch or 1/600 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 spot per inch (spi) form on a 300 spi LPS.

- Once forms have been created, they can be stored on the system and printed—as many as you need and as often as you need.
- You can use three types of lines (solid, broken, or dotted) in four thicknesses (invisible [0], hairline, medium [1], or bold [2]). You can also mix fonts and arrange text in many ways, all with simple FDL commands.

Laser printing technology

Before you learn about the actual forms creation process, an introduction to the printing system will be helpful.

Xerox laser printing systems are sophisticated nonimpact printers that use a combination of laser, digital, and xerographic technologies for their imaging and printing processes. These advanced technologies allow the LPS to avoid optical constraints such as form overlays and limited character fonts. All control functions are carried out electronically; the software commands requesting these functions are given in keywords, phrases, or sentences.

A digitally controlled laser beam is directed at a photoreceptor belt to create the xerographic image. The beam can be controlled with an accuracy of 1/300 inch or 1/600 inch (depending upon the type of system). This enables it to faithfully reproduce complex logos, signatures, and virtually any desired font at a consistently high level of quality.

Paper

The DocuPrint 180 can use a wide variety of paper sizes and types. They are listed below:

Paper sizes

The DocuPrint 180 LPS prints on the following standard 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)
- A3 (16.54 by 11.69 inch, 420 by 297 mm)
- B4 (10.12 by 14.33 inch, 257 by 364 mm)
- B5 (7.17 by 10.12 inch, 178 by 254 mm)

x BY y specifies nonstandard sizes

Paper types

A large variety of paper types can also be used on all printing systems:

- Label stock
- Transparencies
- Predrilled
- Perforated
- Colored

Finished reports can be offset from one another in the output stacker to permit easy separation.

Fonts

A set of standard LPS fonts are provided free of charge at installation time. (Font is a publishing term referring to a set of characters with the same type style, type size, and orientation.)

Note: Additional fonts, whether standard or custom designed, may be special ordered from the Xerox Font Center or Xerox Limited. You can also order digitized logos and signatures. Refer to your *DocuPrint 180 LPS Installation Planning Guide* for information on ordering fonts.

Printing at maximum density, the system can produce almost 40,000 characters per page. Moreover, laser printing systems can change fonts at any time (for example, for captions, titles, and italicized words) without interrupting or delaying the printing process. This font-switching capability extends to fonts whose characters are turned 90 or 180 degrees from the normal character orientation. The system also permits editorial changes, such as font changes and deletions, to selected copies of a report.

Forms creation

You enter forms into the system as data, using straightforward, descriptive terms and language. Forms are stored on a system disk and are called when needed, providing nonstop operation. This advanced concept has a decided advantage over systems that require interruption of printing to change overlays and preprinted forms. A large number of forms may be stored on disk, and multiple forms may be loaded into forms memory for each job (the exact number depends on the complexity of the forms). A form may be used for all copies or selected copies of a report with each page being produced as an original.

Since forms are created without overlays, transparencies, or masters, there is no risk of misalignment, blurring, or scratch marks. Forms are merged with the data stream from a host computer or magnetic tape, ensuring perfect registration between form and data each time the form is printed. Character splitting, line splitting, and other precise positioning can be accomplished with complete accuracy. In addition, laser printing systems provide flexibility not previously feasible on impact printers.

FDL is easy to learn and easy to use. Whenever you choose to redesign your form, a few simple commands enable you to completely change the appearance and function of the form. Modifications to existing electronic forms can be made easily and inexpensively using the LPS editing facility or your own.

Take a moment to review the many LPS publications that are available. They are listed in the front of this guide under “Related publications.” These documents are designed to assist you in making the most effective use of your LPS. They include a complete reference set that discusses the functional characteristics of your LPS and provide helpful information to assist the LPS Operator, System Administrator, and Programmer.

2. Basic concepts

Certain basic concepts are required to understand the forms creation process on laser printing systems. These involve 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.

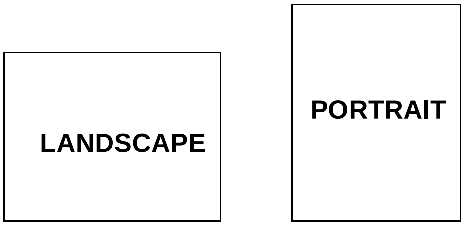
Page orientation

There are two types of page, or text orientation:

- Portrait page
- Landscape page

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 2-1.

Figure 2-1. **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 effective information presentation.

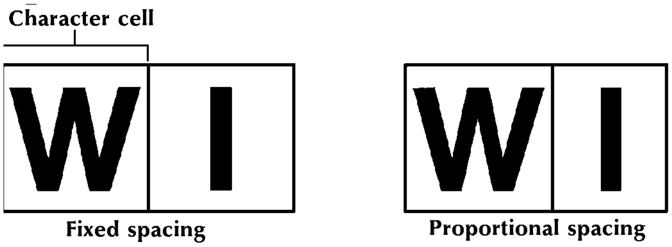
Fonts

Fonts are character sets, each having a unique type style, type size, and orientation.

Fixed and proportional spacing

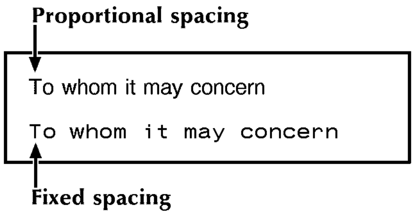
Fixed and proportionally spaced fonts are available for use on laser printing systems. Each character occupies an area on the form called a character cell. With fixed fonts, all character cells in the set are the same width. With proportional fonts, character cells vary in width, as shown in figure 2-2.

Figure 2-2. **Character spacing**



Because the length of a line printed with a proportional font is relatively unpredictable, fixed fonts are used for variable data on a report to avoid overprinting forms data with variable data. Proportional fonts are normally used for forms data, that is, titles, headings, and so forth. A letter is an example of the use of proportional fonts for variable data. The differences in width are illustrated in figure 2-3.

Figure 2-3. **Character spacing examples**



Fonts are available in various typefaces (for example, OCR and Titan), sizes, styles (for example, serif and sans serif), and weights (for example, medium and bold). For specific font size information, refer to your *DocuPrint 180 LPS Product Reference*.

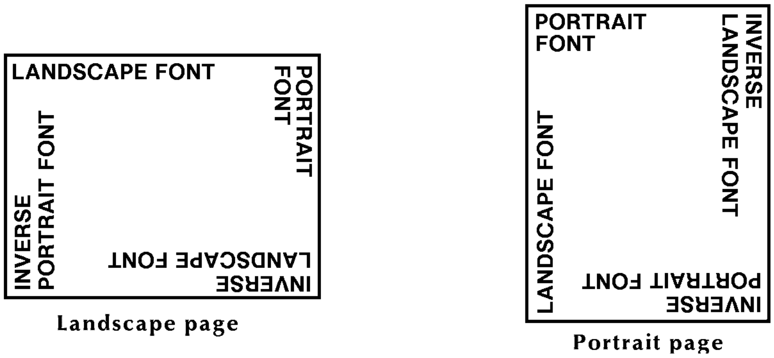
Font orientation

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

- Landscape
- Portrait
- Inverse landscape
- Inverse portrait

The font orientation, as shown in figure 2-4, is relative to the physical page.

Figure 2-4. **Font orientation**



Landscape page

Portrait page

Note that even though type style and size are the same, four different fonts are used, each with a unique orientation. The inverse portrait font could be used for certain types of titles or labels on a landscape form. Conversely, the inverse landscape font could be used for titles on a portrait form.

The Xerox Laser Printing Systems Standard Font Library Font User Guide and the Xerox 4850 HighLight Color and 4135 Laser Printing Systems Font User Guide (refer to the “Related publications” section of this guide) list the standard fixed and proportional fonts provided with the LPS. Special fonts not included in the standard font library may be ordered from the Xerox Font Center or Xerox Limited. (Refer to your *DocuPrint 180 LPS Installation Planning Guide* for information on ordering fonts.)

Page frames

A page frame is a set of boundaries associated with a page as a unit of printing or imaging. Three page frames are defined in this guide:

- Physical page
- System page
- Virtual page

Physical page

The paper on which a form is printed is the “physical page.” The default paper size used on an LPS is defined during system generation (sysgen). The following paper sizes may be specified:

- 8.5 by 11 inches (USLETTER, 216 by 279 mm)
- 8.5 by 14 inches (USLEGAL, 216 by 356 mm)
- 8.27 by 11.69 inches (A4, 297 by 270 mm)
- 16.54 by 11.69 inches (A3, 297 by 420 mm)
- 10.12 by 14.33 inches (B4,257 by 364 mm)
- 7.17 by 10.12 inch (B5, 178 by 254 mm)
- 8.0 by 10.02 inches (203 by 254 mm)
- 8.0 by 10.5 inches (203 by 266 mm)
- 8.0 by 13.0 inches (203 by 330 mm)
- 8.27 by 10.63 inches (210 by 270 mm)
- 8.27 by 13.0 inches (210 by 330 mm)
- 8.37 by 10.78 inches (212 by 273 mm)
- 8.46 by 10.83 inches (214 by 275 mm)
- 8.46 by 12.40 inches (214 by 314 mm)
- 8.46 by 14.02 inches (214 by 356 mm)
- 8.50 by 10.75 inches (215 by 273 mm)
- 8.50 by 13.0 inches (215 by 330 mm)

The DocuPrint 180 supports the 11 by 17-inch and 16.54 by 11.69-inch sizes as sysgen options.

The PAPER command may be used to identify the paper size. If it is not present, the sysgen value is assumed.

When variable data is to be merged with a form, the paper size for both must match and the correct size paper must be loaded.

System page

The maximum area in which graphics and text can be imaged is called the “system page.”

Edgemarking

To accommodate edgemarking, which is the placement of marks along the edge of the physical page, the system page must be larger than the physical page. The edgemarking capability is limited because the system page boundaries correspond to the physical page on at least two edges for all paper sizes. Refer to your *DocuPrint 180 LPS Product Reference* for additional information on edgemarking considerations.

Virtual page

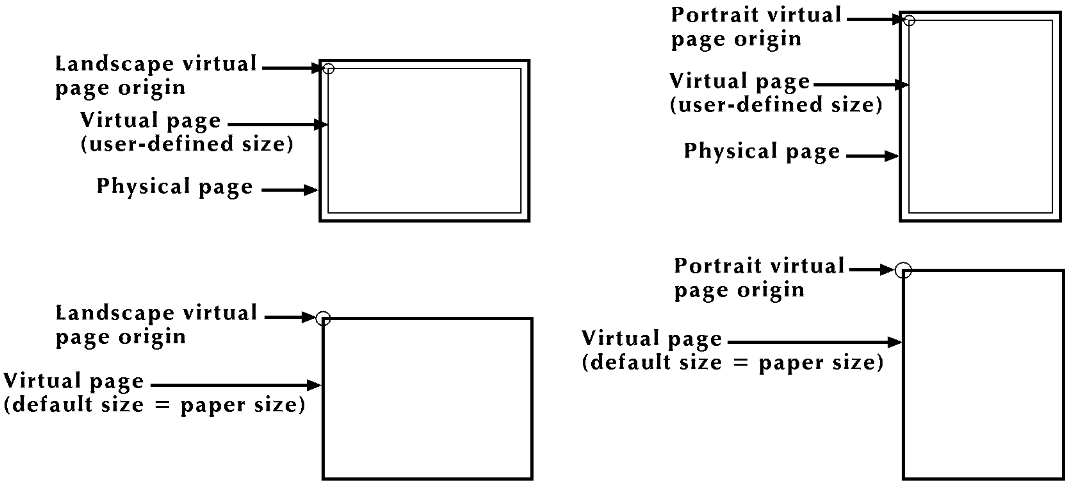
The area chosen for printing is called the “virtual page” and may or may not be as large as the system page. If you do not define its dimensions explicitly, the virtual page dimensions are, by default, the same as the sysgen-specified paper size or as the PAPER command paper size.

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. (The physical page, system page, and defined virtual page relationships are illustrated in your *DocuPrint 180 LPS Product Reference*.)

The virtual page is assigned a landscape orientation by default, or you can specify an orientation either with the LANDSCAPE/ PORTRAIT command or using the GRID command's FMTn option.

The upper left corner of the virtual page is called the “virtual page origin.” The virtual page origin is also used to establish a form origin.

Figure 2-5. **Virtual page origin**

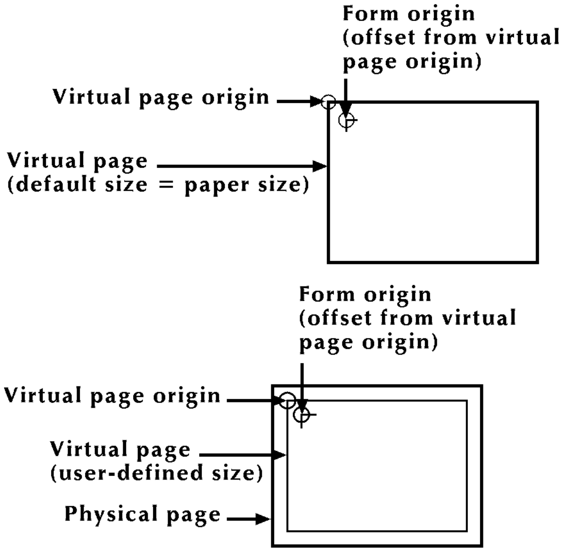

Landscape virtual page origin
Virtual page (user-defined size)
Physical page
Portrait virtual page origin
Virtual page (user-defined size)
Physical page
Landscape virtual page origin
Virtual page (default size = paper size)
Portrait virtual page origin
Virtual page (default size = paper size)

Form origin

All forms data described by FDL commands is positioned relative to a point called the “form origin.” This point is offset 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, the form origin should generally be set to coincide with the beginning position of the variable data so 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 2-6. **Form origin**



Positioning form elements

Elements that may be placed on a form with FDL commands are the following:

- 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.

Table 2-1. **Form element origin**

Form element	Element origin
Vertical ruled line	Top of the line at midpoint of line thickness
Horizontal ruled line	Left end of the line at midpoint of 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 with the line 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 a upright position
Graphics	Upper left corner of the image
logos and signatures	Upper left corner of the first (or only) character cell (with exceptions)
Sections (of a form)	Upper left corner of the section

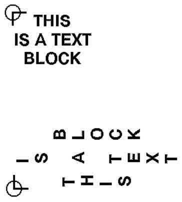
The following symbol in figure 2- 7 shows where the text block origin is located.

Figure 2-7. **Text block origin symbol**

Figure 2-8 shows two text blocks, one using a portrait font and one using a landscape font.

This is the point used to position the text block relative to the form origin.

Figure 2-8. **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 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)

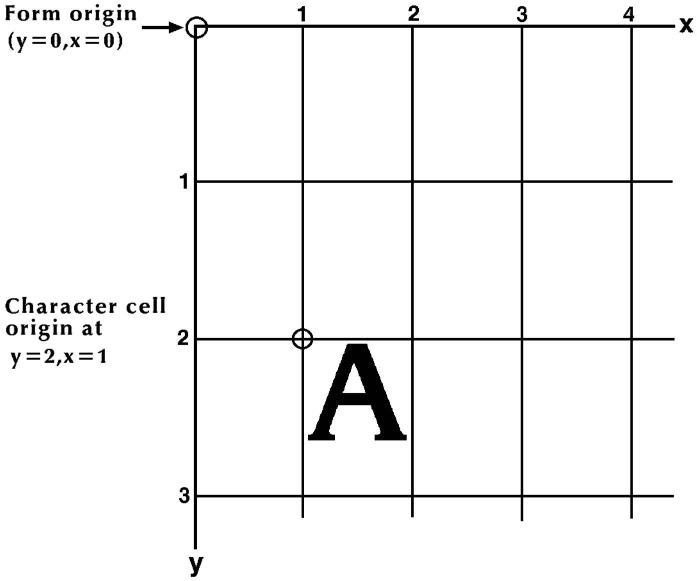
x and y coordinate

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 2-9. You can then position form elements (lines, boxes, and so on) by specifying a grid location.

Figure 2-9. **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 inch down from the form origin and .10 inch 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 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, are provided on the operating system software (OSS) tapes. You may use these standard print formats or define your own to suit your specific needs. 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. (Refer to table F-1.)

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.

Note: 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.

Table 2-2 lists the standard LPS print formats.

Table 2-2. **Standard LPS print formats**

Format ID	**No of lines**	**No of columns**	**lpi**	**cpi**	**Approx. point size**	**Page size and orientation***	**Begin values (y,x)**	**Default font ID**
FMT1	66	132	8.1	13.6	9	11 by 8.5 in	(.18,.66)	L0112B
FMT2	66	150	8.1	15.0	9	11 by 8.5 in	(.18,.50)	L0212A
FMT3	88	132	10.7	13.6	7	11 by 8.5 in	(.14,.66)	L0312A
FMT4	88	150	10.7	15.0	7	11 by 8.5 in	(.14,.50)	L0412A
FMT5	49	100	6.0	10.0	12	11 by 8.5 in	(.17,.50)	L0512A
FMT6	80	100	8.1	13.6	9	8.5 by 11 in	(.57,.58)	P0612A
FMT7	60	90	6.0	12.0	12	8.5 by 11 in	(.50,.50)	P07TYA
FMT8	60	75	6.0	10.0	12	8.5 by 11 in	(.50,.50)	P0812A
FMT9	80	200	10.0	20.0	7	11 by 8.5 in	(.25,.25)	L0912A
FMT10	132	132	12.5	17.6	6	8.5 by 11 in	(.22,.51)	P1012A
FMT11	132	150	12.5	20.0	6	8.5 by 11 in	(.22,.50)	P1112A
FMT12	66	172	8.1	13.6	9	14 by 8.5 in	(.18,.66)	L0112B
FMT13	104	100	8.1	13.6	9	8.5 by 14 in	(.57,.58)	P0612A
A4 formats								
FMT1A	66	132	8.3	12.5	9	297 by 210 mm	(.18,.57)	R112BL
FMT2A	66	150	8.3	14.3	9	297 by 210 mm	(.18,.60)	R212BL
FMT3A	88	132	11.1	12.5	7	297 by 210 mm	(.18,.57)	R312BL
FMT4A	88	150	11.1	14.3	7	297 by 210 mm	(.18,.60)	R412BL
FMT5A	48	100	6.0	10.0	12	297 by 210 mm	(.22,.85)	R512BL
FMT6A	80	100	8.1	13.6	9	210 by 297 mm	(.91,.46)	R612BP
FMT7A	60	90	6.0	12.0	12	210 by 297 mm	(.85,.39)	R7TIBP
FMT8A	60	75	6.0	10.0	12	210 by 297 mm	(.85,.39)	R812BP
FMT9A	80	200	10.0	20.0	7	297 by 210 mm	(.14,.85)	R912BL
FMT10A	132	132	12.5	17.6	6	210 by 297 mm	(.57,.39)	RA12BP
FMT11A	132	150	12.5	20.0	6	210 by 297 mm	(.57,.39)	RB12BP

* 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.

Data types

Two types of data are used in LPS forms creating and printing:

- Variable data
- Forms data

The term “variable data” generally refers to computer produced information that the LPS merges with a form. Typically this data varies from page to page.

The term “forms data” 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.

3. Forms description language

This chapter describes the function and use of each forms description language (FDL) command in generating a form electronically.

FDL command overview

FDL is a set of keyword commands that you can use to generate an electronic form. To do this, you create a source file of FDL commands that describes the characteristics of your form. The form can contain a variety of fonts, logos and graphics, and it can be merged with variable data during printing. This file is then compiled and stored as an electronic form file on the LPS printer. You can select any stored form for printing.

Command summary

The following commands are available for creating a form:

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 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 length, position, direction, and thickness (hairline, 0, 1, or 2) of lines.

BOX Specifies location of upper left corner and dimensions of square or rectangular boxes. All boxes in FDL are fixed-size. Backgrounds for text must use the BOX command.

TEXT Specifies text (written matter) such as form titles, headings, and labels.

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.

The “FDL command summary” appendix contains a complete list of FDL command formats. Each format is explained separately later in this chapter.

Command format

The following is true for each FDL command:

- The command consists of a command identifier and various parameters and keywords associated with the function.
- Spaces or commas separate keywords and parameters.
- A command is 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 command. For both these commands, the string

  AT . . . IN [unit]

  must reside in one line. Lines containing all blanks are ignored and may, therefore, be used for separation.

Steps to creating a form

There are three basic steps 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

The editor utility is used 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.

If you use the LPS editor, refer to your *DocuPrint 180 LPS Operations Reference* for detailed instructions.

Entering the FDL commands

There are five basic setup commands that specify the parameters in which the form is described. Beginning at the first line of your source file, enter the setup commands in the following order:

1. FORM
2. PAPER
3. LANDSCAPE/PORTRAIT
4. GRID
5. FONT

These setup commands precede the form description commands which include:

Compiling and printing the form

After you have entered all the FDL commands needed to describe your form, exit the editing session and invoke the forms compiler. The “Compiling and printing forms” chapter explains how to compile and print your form.

Setup commands

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

- FORM command
- PAPER command
- LANDSCAPE/PORTRAIT command
- GRID command
- FONT command

Of the setup commands, only the FORM command is always required. The others are optional. (If they are not defined, the defaults are used.) The FONT command is also required if text is to be included on the form.

FORM command

The FORM command 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.

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.

Naming the form

The FORM id portion is mandatory. The format is as follows:

FORM id;

The “**id**” portion is a one- to six-character identifier that references the form. Reserved words (for example, FORM, GRID, FONT, TEXT, BOX, LOGO, and so forth) cannot be used for the id. However, reserved words can be appended and used as the id; for example, FORM1, FORM2, and so forth.

Example:

```
FORM 3BOXES;
```

PAPER command

This command 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.

Specifying paper size

The format of the command for specifying standard paper sizes is as follows:

```
PAPER [SIZE] [IS]  USLETTER    ;
                  { A4        }
                  { USLEGAL   }
                  { A3        }
                  { B4        }
                  { B5        }
                  { x BY y    }
```

OPTION	DESCRIPTION
USLETTER	8.5 by 11 inches (216 by 279 mm)
A4	8.27 by 11.69 inches (210 by 279 mm)
USLEGAL	8.5 by 14 inches (216 by 356 mm)
A3	16.54 by 11.69 inches (420 by 297 mm)
B4	10.12 by 14.33 inches (257 by 364 mm)
B5	7.17 by 10.12 inches (178 by 254 mm)

x BY y specifies nonstandard sizes

Note: USLETTER and USLEGAL cannot be abbreviated.

The PDL programmer can specify paper size in a JSL (Job Source Library). 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 message 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.

USLETTER and B4 are the only exceptions to this rule; the keyword and x,y method do not create any incompatibilities.

Due to edgemarking considerations, the form created by specifying a paper size of USLEGAL is different from one specifying 8.5 by 14.0.

Important: When coding FSL applications, the PAPER SIZE command must precede the LANDSCAPE/PORTRAIT statement. The PDL PAPERSIZE command is explained in more detail in your *DocuPrint 180 LPS PDL Reference*.

Using B4 paper size

When B4 size paper is specified in centimeters, the value should be rounded off to 25.71 CM. This is only necessary when your GRID statement is GRID [UNIT] [IS] INCHES.

Using B5 paper size

B5 (7.17 by 10.12 inch) paper size capability is an option which requires a retrofit kit. When any paper size of less than the minimum (7.17 by 10 inches) or greater than the maximum (17 by 14.33 inches) is specified in the FSL, the form does not compile and the following error message appears:

```
Invalid paper size
```

When no paper size is specified

When there is no PAPER [SIZE] command specified in the FSL, the DocuPrint 180 uses the sysgened paper size as the default. The sysgen process does not check for the minimum nor the maximum paper size. Therefore, if you sysgen the DocuPrint 180 with less than the minimum or greater than the maximum paper size than its IOT can support, the DocuPrint 180 compares the sysgened paper size to the IOT-supported minimum/maximum paper size and if the sysgened paper size is out of the IOT-supported minimum/maximum paper size range, the following error message appears:

```
Sysgened paper size is out of range
```

Loading unsupported paper sizes

If an FRM file specifies a paper size that is not supported by the IOT, the DocuPrint 180 aborts the job before any printing takes place and displays the following error message:

```
Invalid paper size
```

Specifying TAB as a form

To define a form to be used as a tab, specify the following:

PAPER [SIZE] [IS] 9 BY 11;

Refer to your *DocuPrint 180 LPS PDL Reference* for a detailed explanation of the Ordered and Tab Stock feature.

Specifying non-standard sizes

The format of the command for specifying nonstandard paper sizes is as follows:

```
PAPER   [SIZE] { x [ INCHES       ] [BY] y [ INCHES       ] }
                   [ CM           ]        [ CM           ]
                   [ CENTIMETERS  ]        [ CENTIMETERS  ]
                   [ DOTS         ]        [ DOTS         ]
                   [ XDOTS        ]        [ XDOTS        ]
```

The x and y represent the decimal paper size that may be specified if a form is to be printed on nonstandard size paper. Units are optional. The default is inches.

Example:

PAPER SIZE IS USLETTER;

The DocuPrint 180 supports paper sizes of up to 17 by 14.33 inches by implementing a Short Edge Feed (SEF) scheme. SEF refers to the direction the paper is fed when using paper sizes larger than 14.33 inches in length. This feature enables you to print paper size up to 17 by 14.33 inches while retaining the current definition of landscape and portrait orientation. Refer to your *DocuPrint 180 LPS Operations Reference* for additional information on the SEF capability.

With predefined formats

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.

Default paper size

If no PAPER command is present, and no predefined format is specified, the sysgen-defined paper size in effect at run time is used as the form’s paper size value.

Caution: 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 command

Specifying page orientation and virtual page size

The LANDSCAPE/PORTRAIT command tells the system the orientation of the form.

LANDSCAPE

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

PORTRAIT

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

The LANDSCAPE/PORTRAIT command also specifies the virtual page size and origin of the form.

The format of the LANDSCAPE/PORTRAIT command is as follows:

```
{ LANDSCAPE }[ PAPER [SIZE] [IS] n [ DOTS        ] [WIDE][BY] m [ DOTS        ] [HIGH] ] ;
{ PORTRAIT  }[                     [ XDOTS       ]              [ XDOTS       ]        ]
             [                     [ INCH[ES]    ]              [ INCH[ES]    ]        ]
             [                     [ CM          ]              [ CM          ]        ]
             [                     [ CENTIMETERS ]              [ CENTIMETERS ]        ]
```

n virtual page width

m virtual page height

Example:

LANDSCAPE;

- Page width and height values must be positive numbers and may contain two decimal places for all units except dots. Centimeters may be expressed as CM. The default is inches.
- If neither the LANDSCAPE nor the PORTRAIT command is used, landscape orientation is assumed.
- If no PAGE SIZE parameter is specified, virtual page size defaults to the paper size specified in the PAPER command; otherwise it defaults to the sysgen-defined paper size. The virtual page origin is therefore located at the upper left corner of the physical page.
- 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.
- Only one LANDSCAPE or the 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.

  Refer to your *DocuPrint 180 LPS Product Reference* to determine the maximum virtual page size for your system.

GRID command

Specifying grid unit size and form origin

The GRID command tells the system 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 forth) relative to the form origin.

The format of the GRID command is as follows:

Example:

GRID IS 1 INCH;

format-id

Name of a predefined format. The format may be one of the standard formats listed in table 2-1 or a user-defined format.

```
GRID [UNIT] [IS] { format-id                 } [ ORIGIN [ INCH[ES]     ] x [ INCH[ES]     ] ] ;
                 { n INCH[ES]                }        [ CM           ]   [ CM           ]
                 { CM                        }        [ CENTIMETERS  ]   [ CENTIMETERS  ]
                 { n CENTIMETERS             }        [ DOTS         ]   [ DOTS         ]
                 { n CPI n LPI               }        [ XDOTS        ]   [ XDOTS        ]
                 { [n] DOTS [[n] DOTS]       }
                 { [n] XDOTS [[n] XDOTS]     }
```

n Number of inches, centimeters, dots, xdots, or cpi and lpi that specifies the size of a grid unit. Size in inches or centimeters represents the length of one side of a square grid unit. If n is omitted when dots or xdots is 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 dimension.

y Number of inches, centimeters, dots, or xdots that the form origin is offset downward from the top of the virtual page. The coordinate y=0 represents 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. If inches, centimeters, dots, or xdots are not specified in this parameter, inches are assumed.

x Number of inches, centimeters, dots, or xdots that the form origin is offset 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. If inches, centimeters, dots, or xdots are not specified in this parameter, inches are assumed.

- Inches and centimeters may have two decimal places. Dots and xdots must be expressed in integers only. The values n, y, and x must be positive numbers.
- The GRID command specified in number of dots allows a greater flexibility than the 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 or xdot. This feature also eliminates any errors caused by rounding.

- The GRID command may specify the name of a format, which automatically provides page orientation, form origin, and grid unit dimensions. (Refer to table 2-1.) All predefined formats specify the grid units in lines and characters per inch. The predefined format's BEGIN values are used to place the form origin, unless overridden by an ORIGIN parameter.
- If the GRID command specifies explicit unit parameters and no ORIGIN is specified, form origin coincides with virtual page origin. If no grid units or predefined format are specified, FMT1 (landscape) or FMT6 (portrait) values are used by default.
- 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.

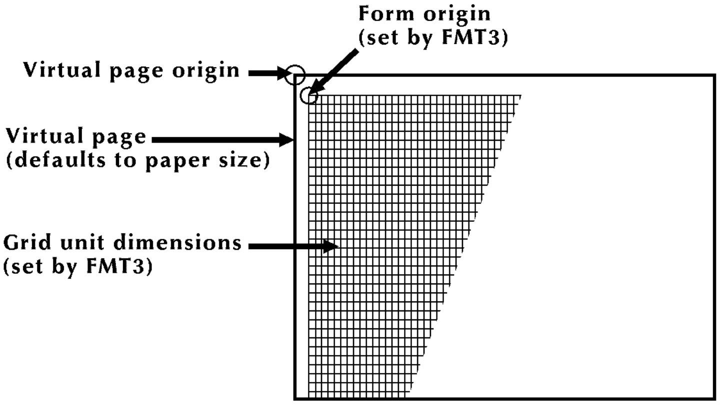
The following examples illustrate how virtual page and form origin are determined. (Also refer to the "Grids" section in the "Basic concepts" chapter.)

Example 1

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

Figure 3-1 shows a form with the grid specified, but no page size or origin.

Figure 3-1. **Form with grid specified, but no page size or origin**

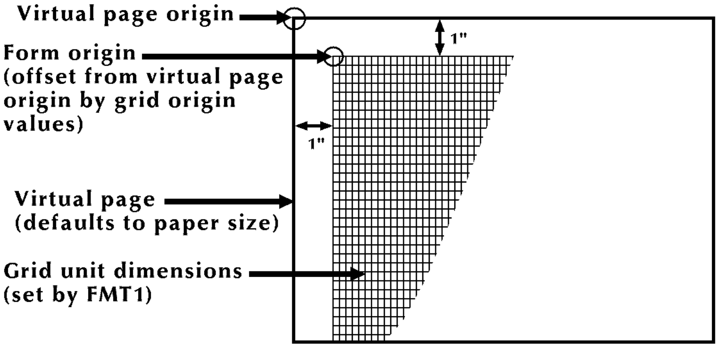


In example 1, no page size is specified, so the virtual page defaults to paper size. FMT3 in the GRID command provides the grid size and form origin (which is offset from the virtual page origin).

Example 2 LANDSCAPE;
GRID [UNIT] [IS] FMT1 ORIGIN 1 INCH 1 INCH;

Figure 3-2 shows a form with the origin offset one inch from the virtual page origin.

Figure 3-2. **Form with origin offset one inch from virtual page origin**

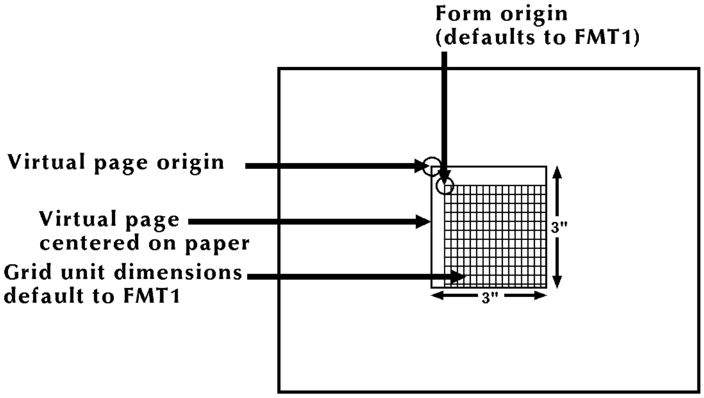


In example 2, the ORIGIN parameter in the GRID command specifies a form origin that is offset from the virtual page origin by one inch vertically and one inch horizontally. Grid unit dimensions are set by FMT1.

Example 3 LANDSCAPE PAGE SIZE IS 3 INCH 3 INCH;

Figure 3-3 shows a form with the page size specified, but not the origin or grid.

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

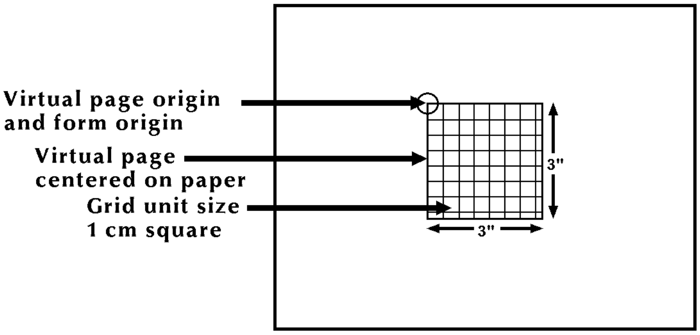


In example 3, the landscape-oriented virtual page is centered on the paper in accordance with the parameters in the LANDSCAPE PAGE SIZE command. Grid size and form origin default to FMT1.

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

Figure 3-4 shows a form with the grid specified, but not the origin or format.

Figure 3-4. **Form with grid specified, but no origin or format**

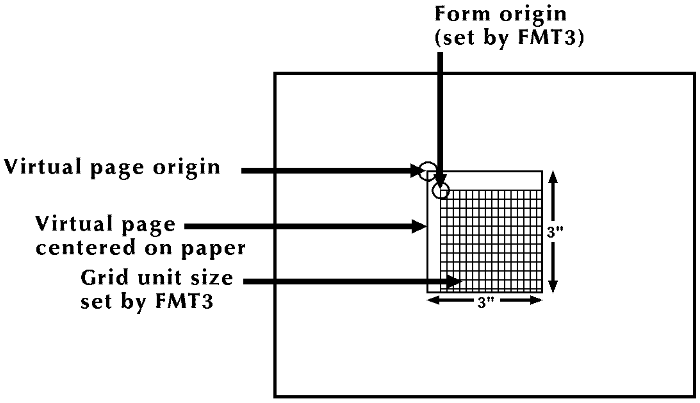

Virtual page origin and form origin
Virtual page centered on paper
Grid unit size 1 cm square
3"
3"

In example 4, 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 be set to coincide with virtual page origin.

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

Figure 3-5 shows a form with the grid and page size specified.

Figure 3-5. **Form with grid and page size specified**


Form origin (set by FMT3)
Virtual page origin
Virtual page centered on paper
Grid unit size set by FMT3
3"
3"

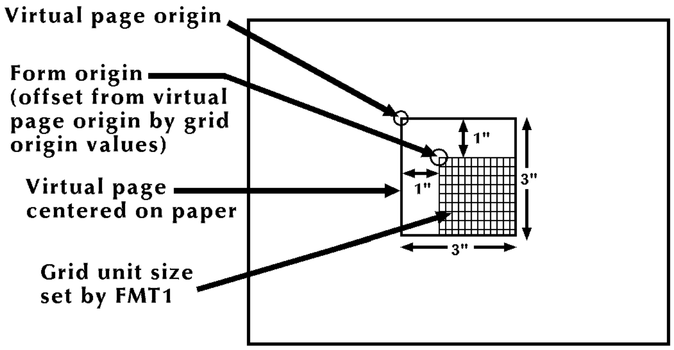
In example 5, FMT3 provides both the grid unit dimensions and form origin.

Example 6

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

Figure 3-6 shows a form with the grid, origin, and page size specified.

Figure 3-6. **Form with grid, origin, and page size specified**


Virtual page origin
Form origin (offset from virtual page origin by grid origin values)
Virtual page centered on paper
Grid unit size set by FMT1
1"
1"
3"
3"

In example 6, 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.

FONT command

Specifying fonts

The FONT command identifies the character sets to use when creating and printing forms data and variable data. Fonts must be selected using the FONT command before text can be specified. FONT can be used only once. The command has the following format:

FONT [S] id[. . . id];

id

Identifier of the standard or custom font you want to use. 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.

Note: Multiple ids are separated by either a blank or comma.

Example:

```
FONTS UN106A,UN104C,UN114A;
```

Description commands

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

The commands used for entering descriptive form data are:

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

These commands may be entered in any sequence. (For a discussion of problems you may encounter when entering these commands, refer to the “Forms layout considerations” chapter.)

Location coordinates

The locations are specified in terms of the y and x axis coordinates, measured from the form origin specified in the GRID command. Generally the form origin is 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.

Both x and y coordinates may be given, 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

Five symbols are used in the description commands to symbolize different coordinates, as follows:

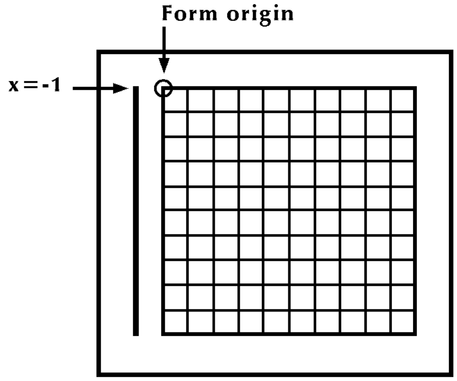
$\mathbf{c_o}$	Origin coordinate
$\mathbf{c_s}$	Start coordinate
$\mathbf{c_e}$	End coordinate
$\mathbf{c_a}$	Absolute coordinate
$\mathbf{c_i}$	Incremental coordinate

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 also may 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 3-7. When you use negative numbers, be sure to stay within the boundaries of the system page.

Figure 3-7. **Use of a negative coordinate**



LINE command

Specifying lines

The LINE command 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 (the AT location)
- Direction of the line (HORIZONTAL or VERTICAL)
- Length of the line (FROM location TO location)
- Type of line (SOLID, BROKEN, DOTTED)
- Thickness of the line (HAIRLINE, 0, 1, or 2)
- Number of times the same line is to be drawn, either from different origins or at specified intervals from the initial origin.

Use the following command format to specify lines:

$$\text{AT } c_o \text{ [}\textit{unit}\text{] [DRAW][}\textit{n}\text{]} \left[\begin{array}{l} \underline{\text{HORIZONTAL}} \\ \text{VERTICAL} \end{array} \right] \left\{ \begin{array}{l} \underline{\text{LINE}} \\ \text{LINES} \end{array} \right\} \text{[IN } \textit{unit}\text{] [FROM] } c_s$$

$$\text{[}\textit{unit}\text{] TO } c_e \text{ [}\textit{unit}\text{] [USING]} \left[\begin{array}{l} \underline{\text{SOLID}} \\ \text{BROKEN} \\ \text{DOTTED} \end{array} \right] \left[\begin{array}{c} \text{HAIRLINE} \\ 0 \\ \underline{1} \\ 2 \end{array} \right]$$

$$\left[\text{[AND] [REPEAT]} \left[\begin{array}{l} \text{HORIZONTALLY} \\ \text{VERTICALLY} \end{array} \right] \left\{ \begin{array}{l} \text{AT } c_a \text{ [}\textit{unit}\text{][} c_a \text{ [}\textit{unit}\text{] . . .]} \\ \text{EVERY } c_i \ \ \textit{unit} \end{array} \right\} \right] ;$$

c_o 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 (Default is 1)

unit Unit of linear measurement, expressed as inches (IN), centimeters (CM), DOTS, or XDOTS. If a linear unit is specified following IN, the co 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.

c_s Coordinate of the start of the line, measured on the x or y axis, depending on the direction of the line.

c_e Coordinate of the end of the line, measured on the x or y axis, depending on the direction of the line.

c_a Absolute x or y coordinate at which to start repetitive lines in a horizontal or vertical direction. Multiple ca parameters can be specified. Whether ca 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.

Example:

```
AT 3 DRAW LINE FROM 4 TO 10;
```

Types of lines

The following types of lines may be drawn:

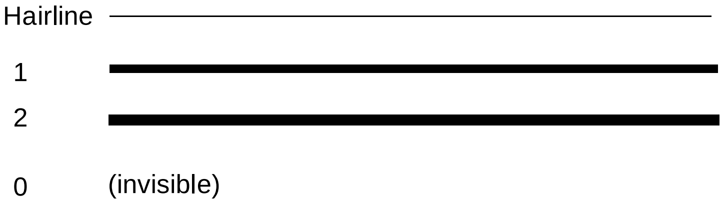
- Solid An unbroken, straight line
- Broken Line is divided into many equal sections, separated by small amounts of space

  _

- Dotted Line consists of dots of equal size and spaced equally apart.

  . . . .

Lines may be of the following weights:



LINE command defaults

The system defaults for direction and type of line are HORIZONTAL and SOLID 1 and are adopted automatically if no other option is specified. The default option of REPEAT is used to repeat a horizontal line vertically and a vertical line horizontally to produce parallel lines.

(The point of origin of a vertical line is at the top of the line at the midpoint of the line thickness. A horizontal line point of origin is at the left end of the line at the midpoint of the line thickness.)

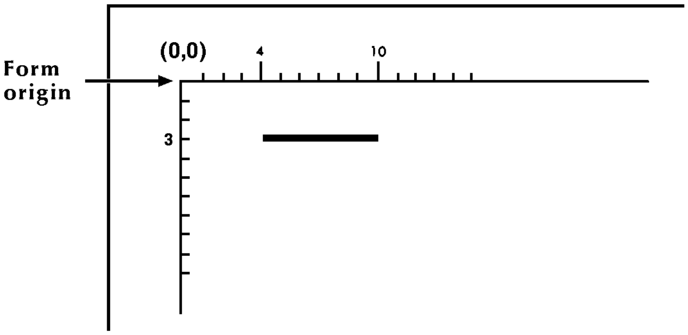
Example 1

AT 3 DRAW LINE FROM 4 TO 10;

AT 3	Keyword AT and the location down the page at which the line is placed
DRAW	Keyword DRAW
LINE	Keyword LINE or LINES (When the number of lines is omitted, one SOLID 1 line —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, as shown in figure 3-8.

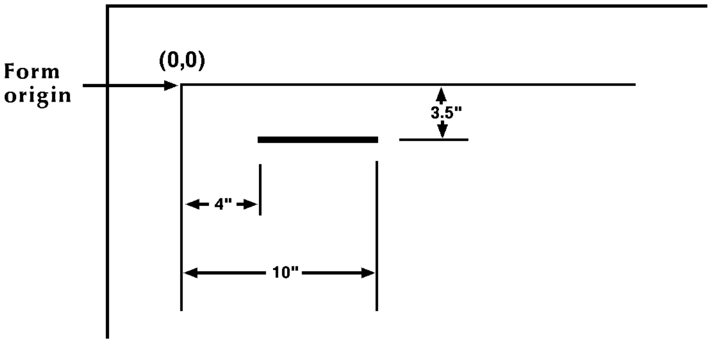
Figure 3-8. **Drawing a horizontal line (rows and columns)**



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, as shown in figure 3-9.

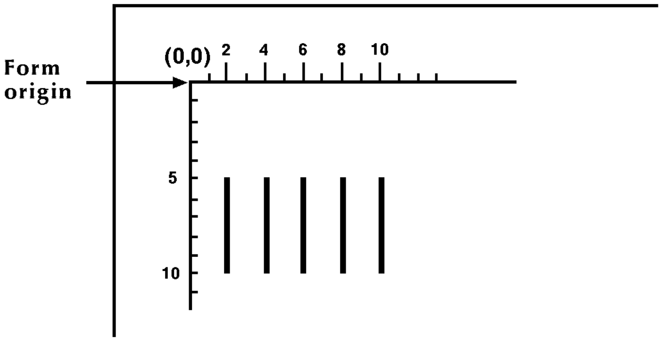
Figure 3-9. **Drawing a horizontal line (inches)**



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, as shown in figure 3-10.

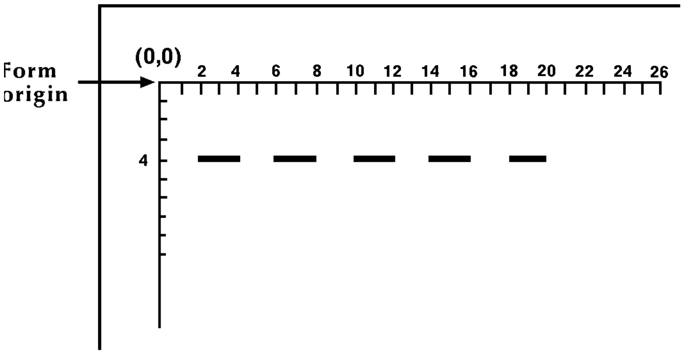
Figure 3-10. **Drawing parallel vertical lines**



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, as shown in figure 3-11.

Figure 3-11. **Drawing repeated horizontal lines**



BOX command

Specifying boxes The BOX command is similar to the LINE command. It describes the size and shape of a square or rectangular box. 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 format of the BOX command is as follows:

```
AT y [unit] x [unit] [DRAW] [n] BOX[ES]

[IN unit] p [unit][WIDE][BY] q [unit][HIGH][USING]

[ [SOLID  ] [HAIRLINE ]            [LIGHT  ] ]
[ [BROKEN ] [0        ] [SHADING]  [MEDIUM ] ]
[ [DOTTED ] [1        ]            [HEAVY  ] ]
[           [2        ]                      ]

[ [AND] [REPEAT] [ HORIZONTALLY ] { AT c_a [unit] [c_a [unit]] . . . } ] ;
[                [ VERTICALLY   ] { EVERY c_i [unit]                 } ]
```

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. Default is grid units.

n Number of boxes to be drawn. Default is 1.

p Width of the box.

q Height of the box.

SOLID,BROKEN,DOTTED Line style making up the border of the box.

HAIRLINE,0,1,2 Thickness of the border of the box.

SHADING Filling the box with a gray shading.

LIGHT,MEDIUM,HEAVY Relative intensity of the shading.

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

c_i Incremental number representing the grid units or linear units between repeated lines.

Example:

```
AT 4,6 BOX 24 BY 4 USI SHA HEA;
```

This example creates a shaded box:

BOX command defaults The default for LINES is SOLID 1. The default for REPEAT is HORIZONTALLY.

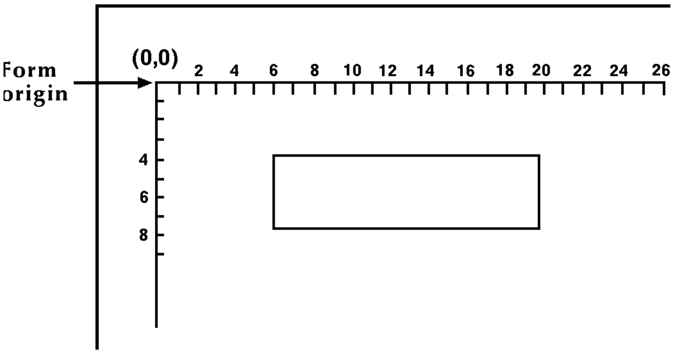
0 lines Specifying a line thickness of 0 is useful for positioning text in an invisible box. When using this technique, however, remember that 0 lines, although they are not printed, appear as lines internally.

Note: 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 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, as shown in figure 3-12.

Figure 3-12. **Drawing a box**

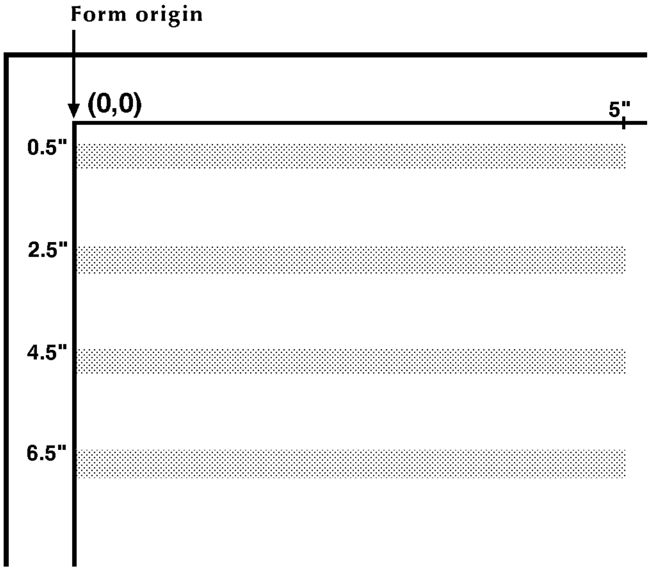


Example 2

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, 0.5-inch high bars placed with the top edges at 0.5 inches, 2.5 inches, 4.5 inches, and 6.5 inches as shown in figure 3-13.

Figure 3-13. **Drawing boxes**



Converting a 4850 color box to a DocuPrint 180 black box

When the DocuPrint 180 prints a 4850 or 4890 form specifying a color box, it converts the color box fill to a black box fill. In printing the box, the DocuPrint 180 converts any shades of a color to a shade of black or "grayscale." Be aware, however, that solid-color boxes are not converted to solid-black boxes. These solid-colors are also printed in grayscale.

Using the SHIFT command with SHADING on a DocuPrint 180

The SHIFT and XSHIFT parameter is a PDL feature that enables the Programmer to adjust the data on a form to allow for three-hole drilling or binding. Sometimes a negative SHIFT value can cause the data to be shifted past the margin and off the page. This can easily occur when shading is used near the leading edge of the paper. Adjusting the SHIFT, ORIGIN and ALIGNMENT values can prevent the shading image from shifting off the page at the leading edge. The following example illustrates this point:

Example:

```
GRID [UNIT] [IS] 1 DOT, ORIGIN [IS] 0,0;
```

The system displays the following message:

```
Data origin off page. Check output
```

TEXT commands

Font requirement

At least one font must be specified before any text can be specified. The FONT setup 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, not by their identification name but 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 substitute.

Two methods are available for specifying the text that is to be put on forms. One places the text at a specified location anywhere on the form. The other places text inside a box.

Using space options in text placement

FDL provides you with 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 line length for text applications.

Example:

```
TEXT SPACED 150 DOTS FONT 2;
```

TEXT AT

The following option allows you to print text in specific locations.

```
[ HORIZONTAL ]  TEXT  [  [SPACED] d  [ DOTS      ]  [PER LINE]  ]
[ VERTICAL   ]        [              [ XDOTS     ]              ]
                      [              [ PTS       ]              ]
                      [              [ IN        ]              ]
                      [              [ CM        ]              ]
                      [              [ LPI       ]              ]

[  [ALIGNED]  { LEFT    }  ]   [[USING] FONT n]
[             { RIGHT   }  ]
[             { CENTER  }  ]
[             { TOP     }  ]
[             { BOTTOM  }  ]
```

AT y [unit] x [unit] ‘text‘ [‘text‘] . . . ;

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.”

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 to be 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.

Example:

```
TEXT AT 5, 1 ’FIRST’ ’NATIONAL’ ’TRUST’;
```

TEXT command defaults If orientation and alignment are not specified, the defaults are HORIZONTAL and CENTER.

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.

Some keywords in the command are explained below.

Keywords		**Explanations**
HORIZONTAL VERTICAL		Specifies the direction in which text is to be printed relative to page orientation (LANDSCAPE or PORTRAIT). HORIZONTAL is the default.
TEXT		Command keyword
[SPACED]d	DOTS [PER LINE] XDOTS POINTS PTS INCH[ES] CM CENTIMETER LPI	Overrides the line spacing value of the font being used for this TEXT command (if specified and not zero). POINTS and PTS have a unit value of 1/72 inch.
[ALIGNED]	LEFT RIGHT CENTER TOP BOTTOM	Specifies how multiple strings of text are to be aligned. Multiple horizontal strings may be centered underneath each other, or they may be right-justified or left-justified. Multiple vertical strings may be centered beside each other, or they may be aligned at the top or bottom. The default is to center the strings.

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 use of toggles to change from uppercase to 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 9790/8790, 4050, 4650, 4090, 4850/4890, 4135, 4635 or DocuPrint 180 LPS.

Aligning text

Text in forms may be left-aligned, right-aligned, or centered, as illustrated in the examples that follow.

Left-aligned

To produce text that is left-aligned, enter:

```
TEXT ALIGNED LEFT AT 5,1

‘FIRST’ ‘NATIONAL’ ‘TRUST’ ‘CO’;
```

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:

```
FIRST
NATIONAL
TRUST
CO
```

Right-aligned

To produce text that is right-aligned, enter:

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

This command produces the following:

```
   FIRST
NATIONAL
   TRUST
      CO
```

Center-aligned

To produce text that is center-aligned, enter:

```
TEXT AT 5,1
‘FIRST’ ‘NATIONAL‘ ‘TRUST’ ‘CO’;
```

To center the stacked words (the default option), an alignment need not be specified.

This command produces the following:

```
  FIRST
NATIONAL
  TRUST
   CO
```

Horizontal printing is the default condition, which is automatically selected without being specified. If vertical printing is desired, it must be specified, for example:

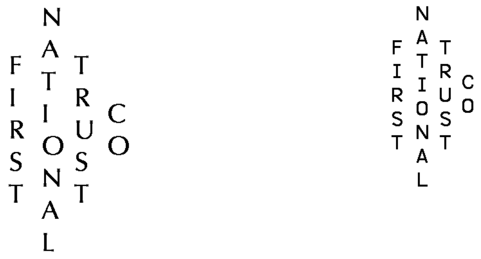
Aligning vertically

To produce text that is aligned vertically, enter:

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

This command produces the following:

Using a proportional font   Using a fixed font



Again, centering is automatic. Notice how the fixed font gives a more uniform appearance.

Aligning at the top

To produce text that is aligned at the top, enter:

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

This command produces this output:

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

Aligning at the bottom

To produce text that is aligned at the bottom, enter:

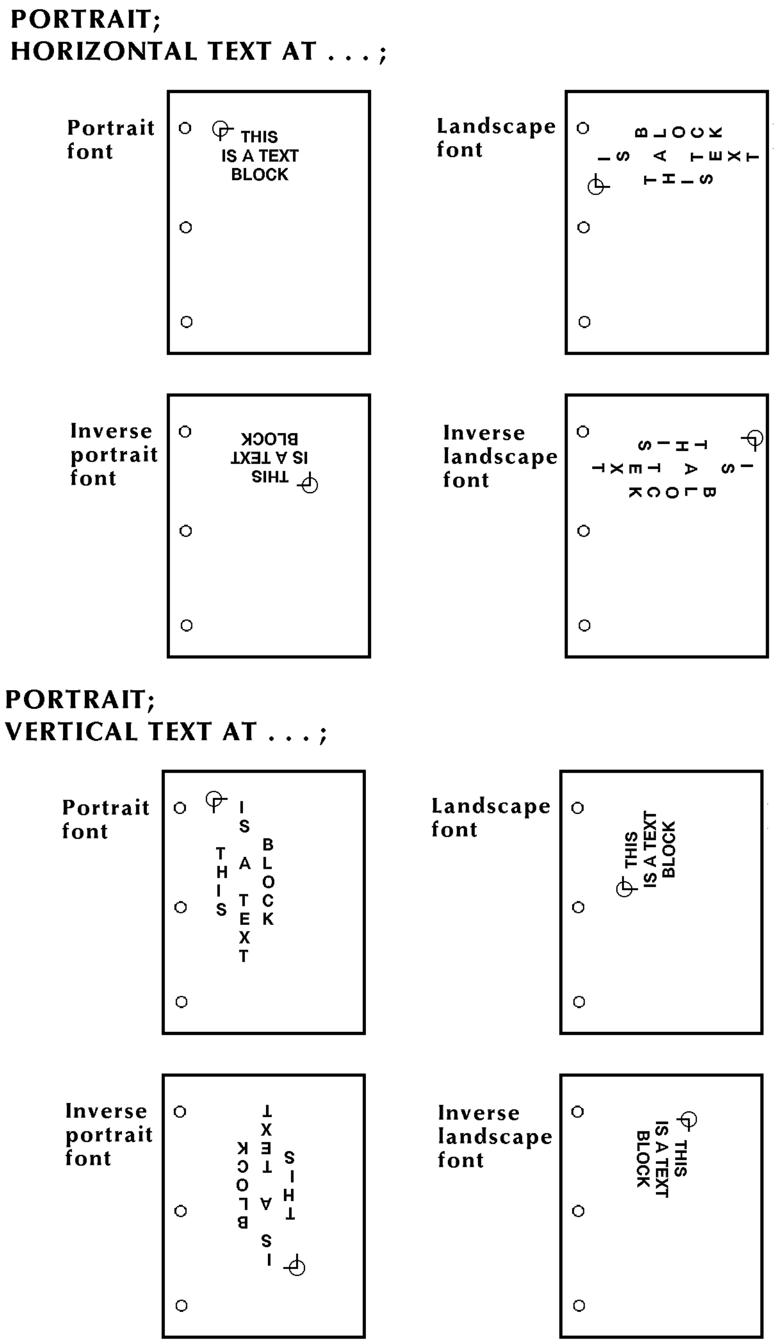
```
VERTICAL TEXT ALIGNED BOTTOM AT 5,1
'FIRST' 'NATIONAL' 'TRUST' 'CO';
```

This command results in the following:

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

Other character-block orientations are shown in figures 3-14 and 3-15 on the following two pages.

Figure 3-14. **Character block orientations for a portrait page**

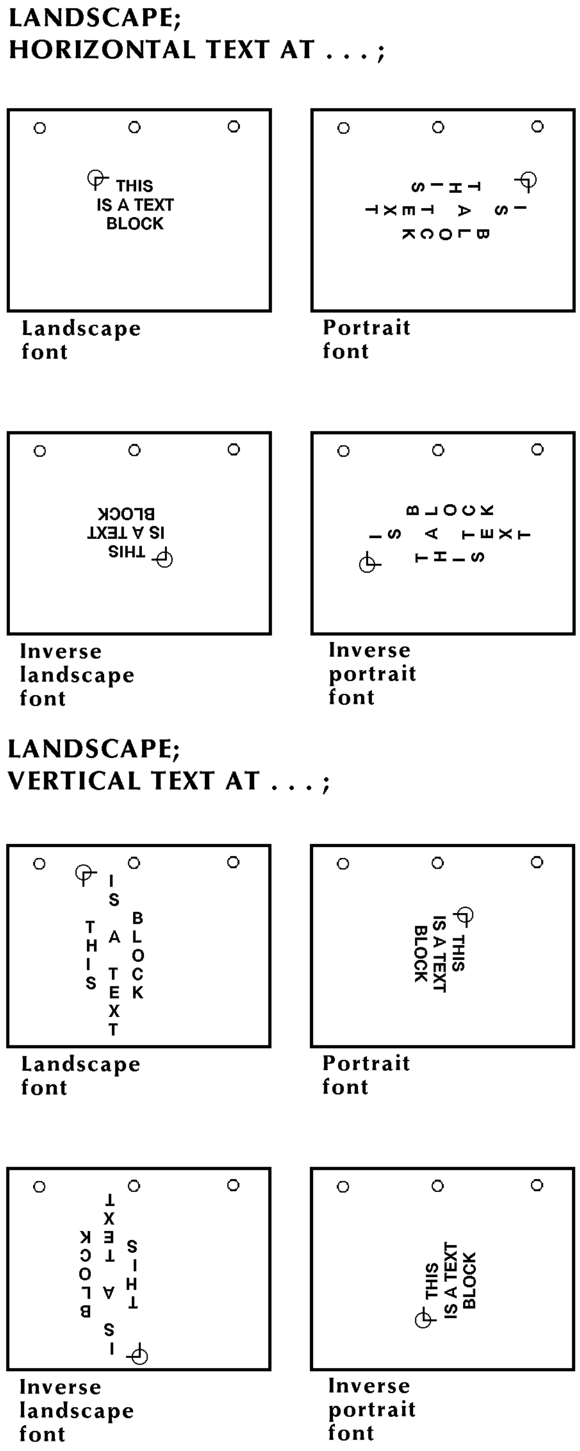


⌖ denotes the positioning origin of the text block.

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* and *Xerox 4850 Highlight Color* and *4135 Laser Printing Systems Font User Guide*.

Figure 3-15. **Character block orientations for a landscape page**



⌖ denotes the positioning origin of the text block.

TEXT IN BOX

Specifying text in a box TEXT IN BOX allows you to place text within a box. Use the following command format to place text in a box:

```
                                      ┌            ┌ DOTS  ┐              ┐
┌ HORIZONTAL ┐                        │            │ XDOTS │              │
│ VERTICAL   │ TEXT                   │ [SPACED] d │ PTS   │ [PER LINE]   │
└            ┘                        │            │ IN    │              │
                                      │            │ CM    │              │
                                      └            └ LPI   ┘              ┘

┌          ┌ LEFT   ┐ ┐
│          │ RIGHT  │ │
│[ALIGNED] { CENTER } │ [ [USING] FONT n ]
│          │ TOP    │ │
└          └ BOTTOM ┘ ┘

     ┌ ┌ ┌ TOP    ┐ ┌ LEFT   ┐ ┐ ┐
     │ │ { CENTER } { CENTER } │ │
     │ └ └ BOTTOM ┘ └ RIGHT  ┘ ┘ │
IN   │                           │ BOX y [unit] x [unit] 'text' ['text' ] . . .
     │ ┌ ┌ LEFT   ┐ ┌ TOP    ┐ ┐ │
     │ │ { CENTER } { CENTER } │ │
     └ └ └ RIGHT  ┘ └ BOTTOM ┘ ┘ ┘

[ [IN] [NEXT] ┌ HORIZONTAL ┐ BOX 'text' ['text' ] . . .] ;
              └ 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.”

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 box origin is located.

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

Example:

TEXT IN BOX 4 3 ‘FIRST’ ‘NATIONAL’ ‘TRUST’;

This example prints the following text within the designated box:

FIRST
NATIONAL
TRUST

text Text characters that are to be printed at the specified location. Multiple text strings (a string is a series of characters) can be specified by enclosing each text string in single quotation marks. Separate each text string with one or more spaces. 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.

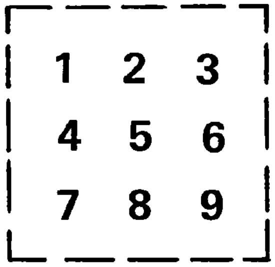
TEXT IN BOX command defaults

The defaults for the optional keywords in the TEXT IN BOX command are HORIZONTAL, DOTS, CENTER, and HORIZONTAL.

A box with matching coordinate values must be defined before 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, as shown in the following list and in figure 3-16.

1. TOP LEFT or LEFT TOP
2. TOP CENTER or CENTER TOP
3. TOP RIGHT or RIGHT TOP
4. LEFT CENTER or CENTER LEFT
5. CENTER CENTER (default) or CENTER
6. RIGHT CENTER or CENTER RIGHT
7. BOTTOM LEFT or LEFT BOTTOM
8. BOTTOM CENTER or CENTER BOTTOM
9. BOTTOM RIGHT or RIGHT BOTTOM.

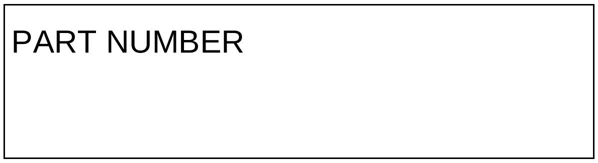
Figure 3-16. **Possible text positions in box**



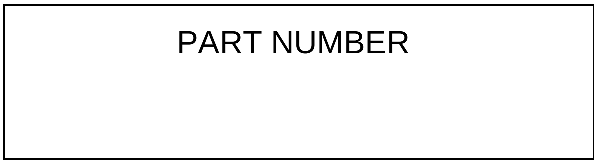
Note that except for CENTER, two keywords are required. If no location is specified, the default is to place text in the center of the box. If the font selected causes the text to overflow the box or overflow the page, the system prints the form as specified and generates a message indicating the maximum size font, in points, that will fit in the allotted space.

The following examples demonstrate these nine positions.

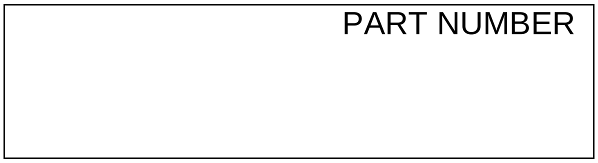
TOP LEFT TEXT ALIGNED LEFT FONT 1 IN TOP LEFT BOX 10,20 ’PART NUMBER’;



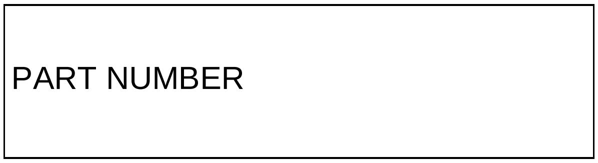
TOP CENTER TEXT ALIGNED CENTER FONT 2 IN TOP CENTER BOX 10,10 ’PART NUMBER’;



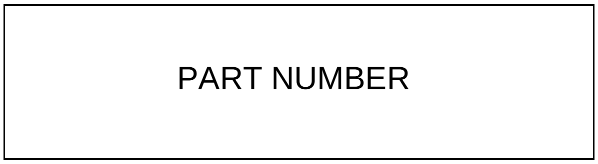
TOP RIGHT TEXT ALIGNED RIGHT FONT 3 IN TOP RIGHT BOX 5,5 ’PART NUMBER’;



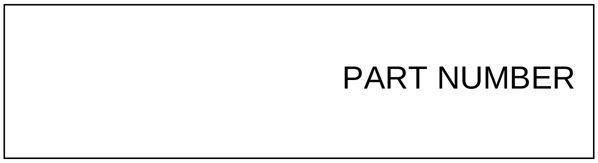
LEFT CENTER TEXT ALIGNED LEFT FONT 3 IN LEFT CENTER BOX 35,5 ’PART NUMBER’;



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

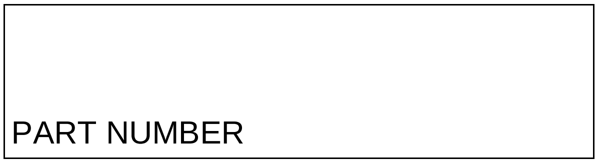


RIGHT CENTER TEXT ALIGNED RIGHT FONT 1 IN RIGHT CENTER BOX 32,3 ’PART NUMBER’;



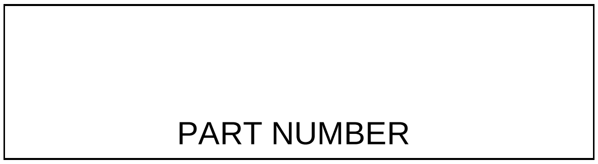
BOTTOM LEFT

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



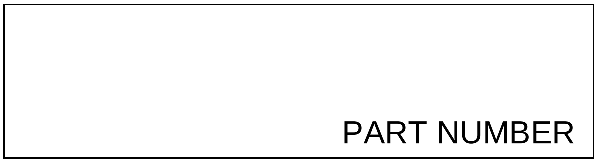
BOTTOM CENTER

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



BOTTOM RIGHT

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



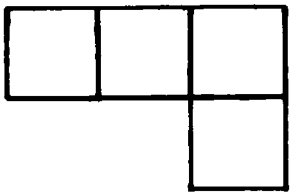
Adjacent boxes

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, having the following form:

[[IN] [NEXT] HORIZONTAL | VERTICAL BOX ‘text‘ [‘text‘ . . .]] . . .] ;

To be considered adjacent, the 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 3-17. The default is HORIZONTAL.

Figure 3-17. **Adjacent boxes**

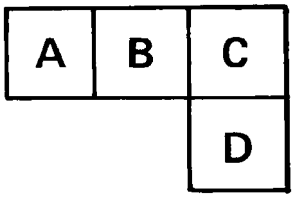


Assuming that the upper left corner of the first box above is located two grid units down from the form origin and one grid unit to the right of the form origin, you would use the following statements:

```
TEXT IN BOX 2,1'A'              or     TEXT IN BOX 2,1'A'
IN NEXT BOX 'B'                        BOX 'B'
IN NEXT BOX 'C'                        BOX 'C'
IN NEXT VERTICAL BOX 'D'               VERTICAL BOX 'D'
```

The results of either statement are shown in figure 3-18.

Figure 3-18. **Placing text in adjacent boxes**



LOGO command

Placing logos

A complex figure called a logo, up to two square inches in size, can be digitized to order by the Xerox Font Center or Xerox Limited. This logo is a special font of one or more characters, which carries with it the relative position of the characters to 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.

Note: 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.

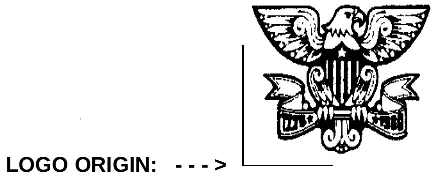
Placement is accomplished with the following command:

LOGO id AT y [unit] x [unit];

The logo identifier (1 to 6 characters) is **id**.

Example:

LOGO EAGLE AT 10, 12;



LOGO Keyword LOGO

EAGLE The name of the logo, which is a one to six alphanumeric character label, is assigned to the logo when it is digitized by the Xerox Font Center or Xerox Limited.

AT 10, 12 The keyword AT and the coordinates (y,x) indicate where the top left corner of the logo is to be placed.

Sample FSL

The LOGO command is typically inserted towards the end of the FSL as illustrated in figure 3-19.

Figure 3-19. **Placing a logo**

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

GRAPHIC command

Using graphics

A form may consist solely of graphics (images). Up to 16 images per page are permitted. Interpress and graphics capability (Advanced Imaging Subsystem—AIS), enable the printing of more than 16 images per page as well as vector graphics. Refer to your *DocuPrint 180 LPS Operations Reference* for additional information on AIS. Each graphic to be associated with a form must be specified in the FSL file by a statement with the following syntax:

GRAPHIC name AT vpos [unit] ,hpos [unit] [SCALE [IS] n[/d]];

Sample FSL

Similar to the LOGO command, the GRAPHIC command is also typically placed near the end of the FSL, as shown in figure 3-19.

name Name of graphic (IMG) file, found on the system disks.

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 fractional digits (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 form 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, thereby allowing 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 1 to 8. That integer becomes the effective scale factor with which the graphic is imaged.

Example:

```
GRAPHIC AFJ AT 10, 12;
```

Figure 3-20. **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’;
```

SECTION commands

Defining a 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. This is done with the following command:

[**BEGIN] SECTION id;**

The id is an identifier (1 to 6 characters) that is invoked when a section is to be defined.

The command 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 following command before another section can be defined:

END SECTION;

Invoking a section

To invoke a section that has been defined, the section identifier is invoked with the following command:

DO SECTION id AT y [unit] x [unit];

A section must be defined before it can be invoked.

Sample FSL

Figure 3-21 illustrates how the SECTION commands are invoked.

Figure 3-21. **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;
```

SECTION command syntax

```
BEGIN SECTION PHONE;
```

BEGIN SECTION Keywords

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

```
END  SECTION;
```

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 have been previously defined by 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 command

Recording comments

It is frequently helpful to include comments in the source statements to describe 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 at a later time. When you use comments, they appear on the source statement only. They are not printed on your form nor do they affect the execution of your program.

Enter the word COMMENT, then the text that describes the command or procedure, followed by a semicolon.

Important: The 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. All comments up to the first semicolon encountered are ignored by the FDL compiler.

The format of the comment command is:

COMMENT text;

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

Example:

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

Sample FSL

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

```
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.

Example:

```
/* 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.

END command

Terminating an FSL

The description of a form is terminated with an END command. The command syntax is as follows:

END;

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;

4. Compiling and printing forms

Once the file of forms source library (FSL) commands has been created, the file can be stored on the DocuPrint 180 LPS system disk. The next step is to compile the file and print a copy of the form.

Form printing processing

To print an electronic form on your laser printing system:

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 chapter 3, "Forms description language," of this guide.)

Creating an FSL form

You create an FSL file containing FDL commands such as coordinates for placing lines, boxes, text, and so forth. You can create the FSL file directly at the LPS PC User Interface, at a host computer input device, or through remote communications.

Communicate the FSL file to the LPS system disk

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

Step 1. Create the source file at the host computer and store it on a magnetic tape.

Step 2. Mount the tape on the LPS tape drive and transmit the files electronically to the system disk.

The source code can be entered directly to the LPS at the PC User Interface keyboard 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 to be stored on the LPS system disk. Your *DocuPrint 180 LPS Operations Reference* explains the Hostcopy commands in detail.

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 causes the source file (FSL) to be compiled into an object file (FRM).

Invoking the forms compiler

To invoke the forms compiler, enter the following command at the LPS keyboard:

```
FDL [parameters]
```

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

Note: The entire command must fit on one line.

```
FDL [filename][,NOPRINT][,TRAY][,DEBUG][,XPAN][,NOSOURCE][,PROOF][,SIMPLEX]RES={300 | 600}]
FDL[filename][,NOPRINT][,TRAY][,DEBUG][,XPAN][,NOSOURCE][,PROOF][,SIMPLEX]RES={300 | 600}][,TDn]
```

filename Specifies the name of an FDL source file in the FSL directory on the system disk that is to be used for source input to the FDL compiler. The file extension, .FSL, may be included; no other extension is allowed. The file name may not 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 the forms compiler.

NOPRINT Specifies that no listing of the FDL source statements, no form summary, and no sample form are to be printed. However, if an error occurs during the processing of the form, the listing and the summary are printed.

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

DEBUG Specifies that no attempt to print the sample form is to 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 expansion.

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 is to be compiled and the source statement and or summary sheet is to be printed. No FRM file is generated.

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

RES=300
or
RES=600 Specifies the resolution at which the form should be compiled.

TD*n* The tape drive containing the FSL if you are compiling from tape. All DocuPrint 180 tape devices can be referenced using TD0, TD1, and TD2. Refer to your *DocuPrint 180 LPS Operations Referenc*e for detailed information.

Note: 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 on a DocuPrint 180 printer even though it may be unable to print the form. It is important, however, that all 600 spi system fonts, logos, and image files are loaded on that system prior to compilation.

Compiling 4850/4890 color forms and logos

Color forms created on a 4850 or 4890 LPS cannot be compiled on the DocuPrint 180 LPS. However, a form or logo that was created and compiled on a 4850/4890 can be printed (in monochrome black) on your DocuPrint 180 LPS.

There are no restrictions with a color form referencing a monochrome image file or with a monochrome color form referencing a color image file.

Summary sheet

If the compilation is successful, a summary sheet of statistics is printed, containing 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.

Simplex and duplex

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

```
FDL TRYIT,SIMPLEX
```

Pagination

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

Error checking

If the compilation fails, a list of error messages is printed.

As the FSL file is processed, it is automatically checked to see that the following errors have not occurred:

- Unknown commands, keywords, or parameters
- Illegal or conflicting commands, keywords, or parameters
- 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
- Illegal syntax.

Errors are flagged in the source statement with messages specifying the type of error. Refer to appendix B, “FDL-generated messages” for a description of error messages that may appear while forms are being compiled.

PROOF option

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. To invoke the PROOF option, enter the following:

FDL TRYIT,PROOF

If the form is compiled with no errors, the FRM file and the source statement and or summary sheet is printed. Since the PROOF option causes it to be deleted, no form file then resides on the disk.

Note: When you use the PROOF option, the form file that is created is given a pseudo-name that differs from the one specified in the FSL. Therefore, when TRYIT.FSL, for example, is compiled, 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

Caution: If you attempt to overwrite a secured file while compiling a form, a security violation message appears and the compilation process is aborted.

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

Example:	TRYIT1.FSL is a secured file:
You enter:	FDL TRYIT1,TRAY
FSL contains:	FORM TRYIT1;
	GRID IS 1 INCH;
	END;END;

In this case, a security violation message would appear and compilation would abort.

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

Example:	TRYIT1.FSL is a secured file:
You enter:	FDL TRYIT,TRAY
FSL contains:	FORM TRYIT1;
	GRID IS 1 INCH;
	END;END;

In this case, a security violation message would still appear and the compilation would abort, but a single page would be printed containing the page heading and the FSL line “FORM TRYIT1;”

Example 1

FDL TRYIT,TRAY

This command causes the system to compile the FSL named “TRYIT” (provided it does not contain errors), generate the source statement, print a copy of the statement and the form, and deliver 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 does not print.

Debugging and modifying the file

Whenever you first create a file, it rarely produces the form exactly as you imagined it to look.

- You may have syntax errors which prevent the form from printing.
- You may have successfully followed all the FDL rules and produced a form, but you inadvertently placed some text or graphic on the form in the wrong place or misspelled a word.
- Everything comes out the way you planned it, but the printed form just doesn’t look right (that is, it would look better if that box were a little larger).

It is easy to identify the specific cause of the problem (debugging) and correct it (modifying). Your *DocuPrint 180 Operations Reference* provides a complete explanation on how to modify your FSL file.

Storing form files

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 may not, however, 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. Information stored in the file includes the identifier, the encoded form, and the list of fonts and logos specified. The original source statements that created the forms description are stored separately under the same identifier.

A list of all forms stored in the directory, a sample of each, and the source statement lists can all be obtained by operator commands. (Refer to your *DocuPrint 180 LPS Operator Guide*.)

Printing a compiled form

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

SAM[PLE] filename.FRM

Example SAM[PLE]TRYIT.FRM

To produce five copies of the form, enter the following:

SAM[PLE]TRYIT.FRM,5

When an FRM is compiled, 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.

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 that are dispersed over 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 unnecessary font files and use the COMPRESS utility to reorganize your files on the disk. Your *DocuPrint 180 LPS Operations Reference* explains how to compress files and delete files that are no longer needed. These recommendations will shorten the font lookup time and make the most efficient use of the disk space.

5. Forms layout considerations

Physical printer constraints and forms compiler methods are factors that can affect form design. This chapter explores the implications of these factors relative to the following:

- Image complexity
- Boxes
- Shading
- Sections
- Rounding measurements
- Coding techniques

Image complexity

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 providing 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 at a later time.

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. For dotted or broken lines, FDL replaces them with an invisible line of the same length.

Line table limits The FDL line tables can store 2,000 vertical and 2,000 horizontal lines in memory. Whenever the line tables become too full and exceed either of these limits, a warning-level error message is displayed:

`TOO MANY HORIZONTAL LINES` or `TOO MANY VERTICAL LINES`

This message warns you that the new user-specified line cannot be retained in the table. The error 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 a serious error message results.

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 that are aligned vertically (for example, tick marks) or horizontal lines that are aligned horizontally (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 two criteria before entering a new line in the line table:

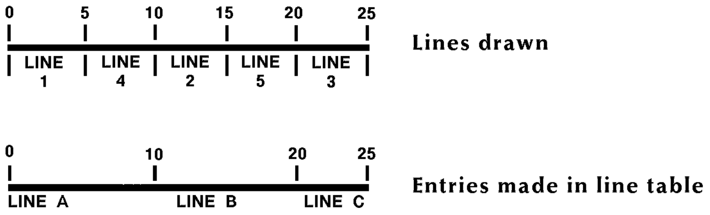
- Is the new line contained within the boundaries of an existing line?
- Is the new line an extension of one of the existing lines?

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

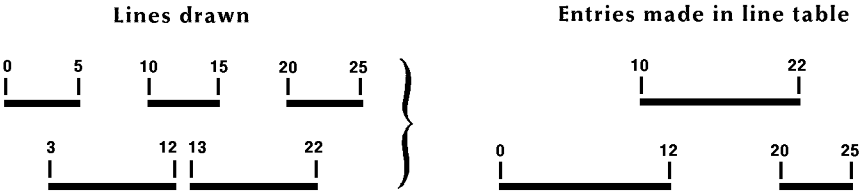
The procedure of line extension results in an interesting irregularity if lines are not specified in an orderly manner. For example, draw five line segments that are each five units in length. If the lines are drawn in an unreasonable or irregular manner, as shown below, the result is more entries in 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 extension of only the first line segment with common coordinates to the new line. In the case described, the three line entries in the line table would be 0 to 10, 10 to 20, and 20 to 25. Figure 5-1 shows examples of extraneous lines drawn.

Figure 5-1. **Example of extraneous lines drawn**



In addition, it is 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 5-2 shows lines entered in unintended locations.

Figure 5-2. **Lines entered in unintended locations**



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

Suggested techniques for entering lines

The suggested technique for entering lines is to 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 instance, the previously cited example of five line segments of five units each might have consisted of alternating solid and dotted lines. In that case, the most reasonable method of specifying the total line would be as follows:

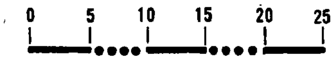
AT 0 LINE 0 TO 25 USING SOLID 0;

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 5-3 shows the line that would be drawn.

Figure 5-3. **Line made up of different types of lines**



Scan line density

"Scan line" density is dependent upon printer speed 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 a line density error message:

```
OS6950 LINE DENSITY EXCEEDED
```

There is a hardware limitation of 320 dispatchable items per 300-spi scan line (640 for 600 spi), which 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 thus 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 will have twice as many dots.

- Each 32 dots (or fraction thereof) of a line drawn on the long axis of the paper is 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 (320 minus the two required for overhead) dispatchable items 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.

As discussed below, line density restrictions differ as a function of the mode (landscape or portrait) of the form.

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 dots for 600 spi. A vertical line is a single dispatchable item. A horizontal line is treated as a series of lines that are 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, resulting in 320 dispatchable items) on a scan line. When using a 6-point font, it is possible to have, for example, 132 characters, a line across the page under the text, as well as 80 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 a landscape direction. Therefore, if a page is formatted as a portrait page, the hardware must take the time to reorganize the data into landscape prior to imaging.

Thus, for a 300-spi portrait page, this drops the dispatchable-item count below the 320-character level when a 12-point font is used. That is, with a 12-point font, a form may have not 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 permitted is approximately 200 per scan line. This limit falls off gradually 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.

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 be successfully 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 the amount of variable data can be reduced, or the form simplified. By reviewing the broken page, you can determine the approximate location of the failure and try to reduce the number of characters and lines in that area. It is important to recognize that 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 basically means that there was not enough time to image a page. The lack of time could be caused by an excessively large amount of data and/or form 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 small text very closely spaced.

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

Troubleshooting

If a form you have 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 so, you may reduce the density of this area by spreading out the material or by deleting parts of the form in the area where you suspect a problem.

Items to look for in determining the possible cause of a page setup error related to local density are the following:

- Large amounts of closely spaced text in a small font, that is, long lines of solid text with minimum spacing. This is especially suspect 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.

Summary

In general, you can optimize form generation in the following manner:

- Use lines and boxes rather than characters of the form element font, whenever possible.
- Avoid placing too many small characters in one area of the page.
- Avoid overlapping (superimposing) lines or boxes.
- Avoid overlapping characters to achieve bolding or other effects. Use the correct font whenever possible.
- Avoid using too many dotted/broken lines because they create too much overhead in the printing process. You will receive a displayed message during compilation each time a broken/ dotted line has been defined.
- Avoid too many font switches on the same text line. This creates overhead in the printing process.
- Avoid drawing unneeded lines across the longest side of the physical page.

FDL statistics

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

- 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

Using boxes

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

Note: Using the BOX command can have a negative aspect when a single 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.

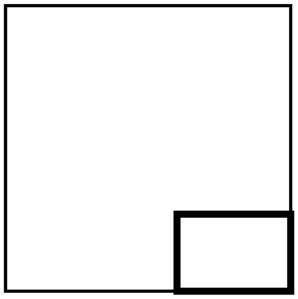
When to use the BOX command

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

- When the box is fully isolated from any other lines
- When 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 5-4).

A SOLID 2 box sharing a small portion of a SOLID 1 edge is shown in figure 5-4.

Figure 5-4. **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 both the horizontal and vertical directions of the box. If an error is detected in either 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

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 only 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 given. This is because the FDL system of reckoning does not take into account the leading used within the font or provided by line spacing specifications.

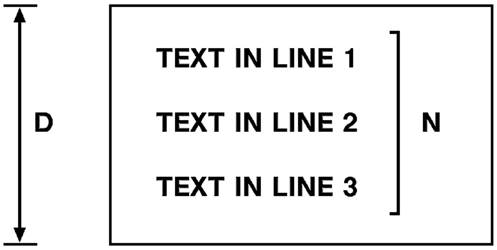
The formula used by the error-handling routine to compute text size when the box is too small in a vertical direction is:

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 the top and bottom of the box
N	number of lines that are involved

Figure 5-5 shows measurements used in computing vertical box errors.

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



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 visually fits, 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. So, 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 in conjunction 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 particular 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 could be used in conjunction 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, this can be achieved through the use of blank lines. A small line spacing along with blank lines allows you to get positioning control and force visual centering of text within a box.

The statements below provide an example of how this technique is used (a lower case b with an overstrike over it 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

It is sometimes desirable 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 or xdots. Because of hardware design, this character can be repeated in a landscape direction up to 32 times for dots and 64 times for xdots. 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 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, resulting in an increase in the space used.

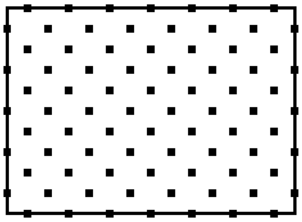
Portrait shading

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 and character units. Thus, the shading is 0.2 to 0.4 units smaller than the surrounding box and is centered in that box. (The units referred to are lpi and cpi units.) The result is that shading is set back from the borders by 3 to 5 dots.

Avoiding boundary line density problems

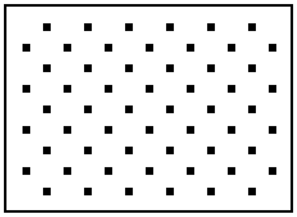
Terminating the shading before reaching the boundary line helps to avoid line density problems, conserves space in the form file and in the form image buffer, and enhances the appearance of the form.

Figure 5-6. **Normal shading-using the same coordinates**



The early termination of the shading is shown in figure 5-7.

Figure 5-7. **Early termination-using smaller box for the shading**



Sections

To duplicate identical information on a page, create sections. However, form image buffer limitations and potential line density problems should be taken into account whenever this feature is used.

A form comprised 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 numerous 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 form creation technique than 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 there is 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 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.)

The efficient approach to saving form image buffer space is to draw a continuous dotted line and to overlay a series of short, solid line segments. However, while this technique makes best use of the form image buffer space, it does not reduce the load on the imaging section of the system. (Refer to the “Scan line density” section in this chapter.) 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 measurements

Laser printing systems use only dot units in the actual performance of forms compilation. 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 may position in decimal-valued 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 values defined (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 example statements below illustrate 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, this is not the case. The boxes can be found by using the IN NEXT BOX parameter of the TEXT IN BOX command. However, the coordinates of the boxes are not exactly those expected.

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 is great enough to make 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 this 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;
```

Note: 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. When this happens, it may be the result of the effects of rounding on the line spacing.

For example, you can 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 off 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.

Please note the difference. 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 instance, the line drawn at 43 is assigned to scan line 1433 using the formula below:

(43 * 300) / 9 = 12900 / 9 = 1433.3333 or 1433

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

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

Thus, we have an error that increases as calculation proceeds down the page.

Furthermore, if, in the example form, 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.

How to avoid 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, not a software problem.

Suggested coding techniques

Converting preprinted forms

To convert preprinted forms:

Step 1. Print data, using an appropriate format, on the laser printing system.

Step 2. Draw horizontal and vertical lines on system output.

Step 3. Use the forms design ruler to measure line and character spacings. Refer to appendix F.

Step 4. Code the form.

Designing new forms

To design new forms:

Step 1. Determine the appropriate format.

Step 2. Use the forms design ruler to measure line and character spacings. Refer to the "Forms design ruler" appendix F.

Step 3. Draw horizontal and vertical lines on a layout sheet.

Step 4. Define the y,x coordinate

Step 5. Code the form.

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, sequence is not significant to the compiler. However, it is worthwhile to develop a sequence while debugging or making changes to a form. It is best to use a method of sequencing commands similar to the following:

1. Horizontal and vertical lines
2. Boxes (if needed)
3. Text
4. Logo placement
5. Shading

Table 5-1 shows tips, tricks, and pitfalls.

Table 5-1. **Tips, tricks, and pitfalls**

Keywords	**Explanation**
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 collinear segments, whether they are touching or not.
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 at a later time.
Use of shading	Use 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.
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 at best an approximation. Use the TEXT SPACED AT command to force exact placement of text.
Coding sections	Use a COMMENT command. Use coordinates based at 0,0 when defining a section. Then place the section at the desired locations.
Source copy	If filename (.FSL) and the form name (name that follows the FORM keyword) do not agree, an FSL file is created that has the same name as the form name. Therefore, you copy X.FSL to Y.FSL and compiles 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, it is necessary that you 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.

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 one of 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.

In general, try not to write confusing FSL statements or use ambiguous abbreviations.

6. Coding a complex form

This chapter reviews the commands discussed earlier in this guide and it also illustrates a sample form along with the entire forms source library (FSL) that created it. Enter the commands as shown in the sample FSL to produce the form.

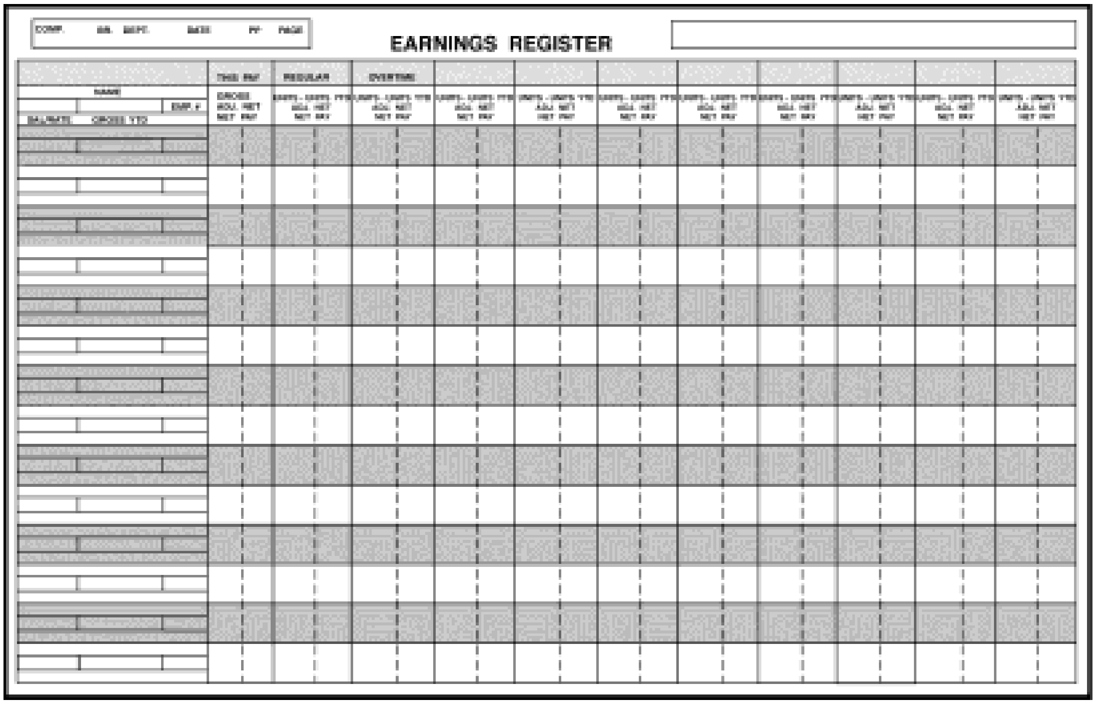
Getting started

In this section you can practice entering the forms description language (FDL) commands that instruct the LPS to accurately produce a sample form. Refer to command definitions discussed earlier in this guide as needed.

Note: You must be familiar with the DocuPrint 180 LPS editor utility or the editor at your host.

The sample form that you will create is shown in figure 6-1. The illustration of the sample form is reduced in size; your form will be actual size.

Figure 6-1. **Earnings Register**



COMP. DIV. DEPT. DATE PP PAGE

EARNINGS REGISTER

	THIS PAY	REGULAR	OVERTIME
NAME EMP. # SAL/RATE GROSS YTD	GROSS ADJ. NET NET PAY		

Writing the setup commands

The setup commands precede the form description commands for lines, boxes, and text. In general, the setup commands specify the parameters which describes the form.

Invoke the editor utility and enter the commands shown in figure 6-2.

Figure 6-2. **Setup commands FORM 1STFRM;**

```
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 in your source statement, messages or reminders 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 at a later date.

Remember: 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 6-3, which indicates that horizontal lines are coded next.

Figure 6-3. **COMMENT command**

```
FORM   1STFRM;
GRID   FMT1;
FONTS   UN114A,UN106A,UN104C;
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 6-4. Remember that you have the option of abbreviating the commands to the first three characters.

Figure 6-4. **HORIZONTAL LINE command**

```
FORM 1STFRM
GRID FMT1;
FONTS UN114A,UN106A,UN104C;
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 6-5.

Figure 6-5. **VERTICAL LINE command**

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

The BOX command enables you to construct individual, stand-alone boxes or boxes that share common sides. You can also create a shaded area or construct an invisible box to conveniently place “floating” text such as titles.

Enter the COMMENT and BOX command shown in figure 6-6.

Figure 6-6. **BOX command**

```
FORM 1STFRM
GRID FMT1;
FONTS UN114A,UN106A,UN104C;
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;
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;
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 SHA MED
       AND REPEAT VER EVE 6;
```

Placing text at a location

The TEXT AT command enables you to place text at an exact location.

Enter the COMMENT and TEXT AT command as shown in figure 6-7.

Figure 6-7. **TEXT AT command**

```
FORM 1STFRM
GRID FMT1;
FONTS UN114A,UN106A,UN104C;
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;
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;
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 SHA MED
AND REPEAT VER EVE 6;
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 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 command as shown in figure 6-8.

Figure 6-8. **TEXT IN BOX command**

```
FORM 1STFRM;
GRID FMT1
FONTS UN114A,UN106A,UN104C;
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;
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;
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 SHA MED
AND REPEAT VER EVE 6;
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 AT 3,47 ’EARNINGS REGISTER’;
TEXT USING FONT 2 AT 61,0 ’7860-143-1’;
VER TEXT USING FONT 3 AT 66,-5 ’F8662’;
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’;
```

END command

The END command is shown in figure 6-9. Enter END; to complete the task

Figure 6-9. **END command**

```
FORM 1STFRM;
GRID FMT1
FONTS UN114A,UN106A,UN104C;
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;
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;
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 SHA MED
AND REPEAT VER EVE 6;
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 AT 3,47 ’EARNINGS REGISTER’;
TEXT USING FONT 2 AT 61,0 ’7860-143-1’;
VER TEXT USING FONT 3 AT 66,-5 ’F8662’;
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’;
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 whether or not there are errors.

After you have entered the END command, then SAVE, CLEAR, and END the editing session. (Refer to your *DocuPrint 180 LPS Operations Reference* for additional information.)

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

Note: 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, proceed as follows:

At the `OS1000 READY FOR COMMANDS` message on the DocuPrint 180 PC User Interface, enter:

EDIT 1STFRM.FSL

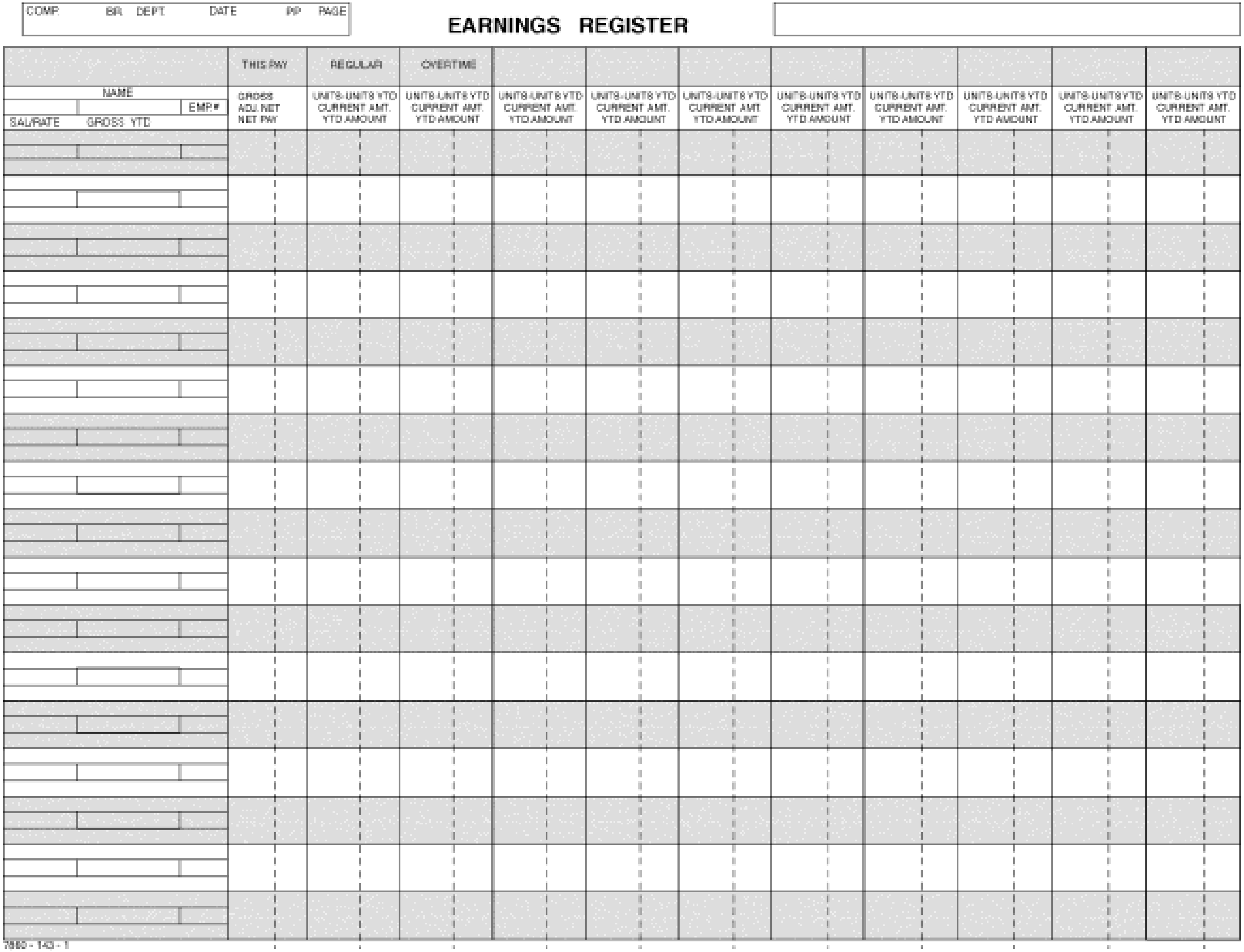
The FSL file is displayed. When you identify where the error occurred, modify that record, then SAVE, CLEAR and END the editing session. Since this FSL already exists, use the abbreviated method to SAVE, CLEAR and END (SCE). For example:

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

When the form compiles error-free, your form prints successfully. Figure 6-10 shows the complete FSL and the form it produces.

Figure 6-10. **Source statement (1STFRM.FSL)**

```
FDL VERSION B03  14:11 30-APR-XX  PAGE      1
DISK-ID:  ARIEL VX.7 R9.7 REL #6 XX/XX/XX
   1  FORM 1STFRM;                                                           000010
   2  GRID FMT1;                                                             000020
   3  FONTS UN114A,UN106A,UN104C;                                            000030
   4  COMMENT *** DRAW HORIZONTAL LINES ***;                                 000040
   5  AT 7 DRAW 18 LINES FROM 0 TO 132 USING HAI AND REPEAT EVE 3;           000050
   6  AT 8 DRAW 18 LINES FROM 0 TO 24 USING HAI AND REPEAT EVE 3;            000600
   7  AT 9 DRAW 18 LINES FROM 0 TO 24 USING HAI AND REPEAT                   000070
   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 SHA MED                000200
  22     AND REPEAT VER EVE 6;                                               000220
  23  COMMENT *** TEXT AT COMMAND ***;                                       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 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
```



COMP. BR. DEPT. DATE PP PAGE

EARNINGS REGISTER

	THIS PAY	REGULAR	OVERTIME								
NAME EMP# SAL/RATE GROSS YTD	GROSS ADJ. NET NET PAY	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT	UNITS-UNITS YTD CURRENT AMT. YTD AMOUNT

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A. FDL command summary

This appendix contains an alphabetized summary of the forms description language (FDL) commands described in this manual. The conventions and definitions used in describing FDL commands are as follows:

KEYWORD	The required word(s) in the command appear in uppercase and may be abbreviated to the first three characters (except for FMTn).
id	Identifier consists of 1 to 6 alphanumeric characters (0 through 9, A through Z, “-”).
stacked words	Parameters arranged one above another to denote a choice.
...	Multiple occurrence of the preceding bracketed parameter is permitted.
lowercase	The word, character, or phrase in lowercase is to be replaced by a value.
[ ]	Optional. If omitted, system will substitute its default.
{ }	Required choice of one of the parameters the braces enclose.
unit	DOTS, XDOTS, IN, INCH, INCHES, CM, or CENTIMETERS. If omitted, default to grid size.

FDL command syntax

Table A-1 lists in alphabetical order the FDL commands and their syntax.

Table A-1. **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]** $\left[\begin{bmatrix}\underline{\textbf{SOLID}}\\ \textbf{BROKEN}\\ \textbf{DOTTED}\end{bmatrix} \begin{bmatrix}\textbf{HAIRLINE}\\ \textbf{0}\\ \underline{\textbf{1}}\\ \textbf{2}\end{bmatrix} \textbf{[SHADING]} \begin{bmatrix}\textbf{LIGHT}\\ \underline{\textbf{MEDIUM}}\\ \textbf{HEAVY}\end{bmatrix} \right]$ $\left[\textbf{[AND] [REPEAT]} \begin{bmatrix}\underline{\textbf{HORIZONTALLY}}\\ \textbf{VERTICALLY}\end{bmatrix} \left\{\begin{matrix}\textbf{AT } c_a \textbf{ [}unit\textbf{] [}c_a\textbf{ [}unit\textbf{]] . . .}\\ \textbf{EVERY } c_i \textbf{ [}unit\textbf{]}\end{matrix}\right\} \right] \textbf{;}$
COMMENT	**COMMENT** ***text***
END	**END;**
FONT	**FONT[S]** ***id{…id}***;
FORM	**FORM** ***id***;
GRAPHIC	**GRAPHIC** ***name AT vpos [unit]*** **[SCALE [IS]** ***n[/d]*****];**
GRID	$\textbf{GRID [UNIT] [IS]} \left\{\begin{matrix}\textit{format-id}\\ n\textbf{ inch[es]}\\ n\textbf{ CM}\\ n\textbf{ CENTIMETERS}\\ n\textbf{ CPI n LPI}\\ \textbf{[}n\textbf{] DOTS[[}n\textbf{] DOTS]}\\ \textbf{[}n\textbf{] XDOTS[[}n\textbf{] XDOTS]}\end{matrix}\right\} \left[\textbf{ORIGIN } y \begin{bmatrix}\textbf{INCHES[ES]}\\ \textbf{CM}\\ \textbf{CENTIMETERS}\\ \textbf{DOTS}\\ \textbf{XDOTS}\end{bmatrix} x \begin{bmatrix}\textbf{INCHES[ES]}\\ \textbf{CM}\\ \textbf{CENTIMETERS}\\ \textbf{DOTS}\\ \textbf{XDOTS}\end{bmatrix} \right] ;$

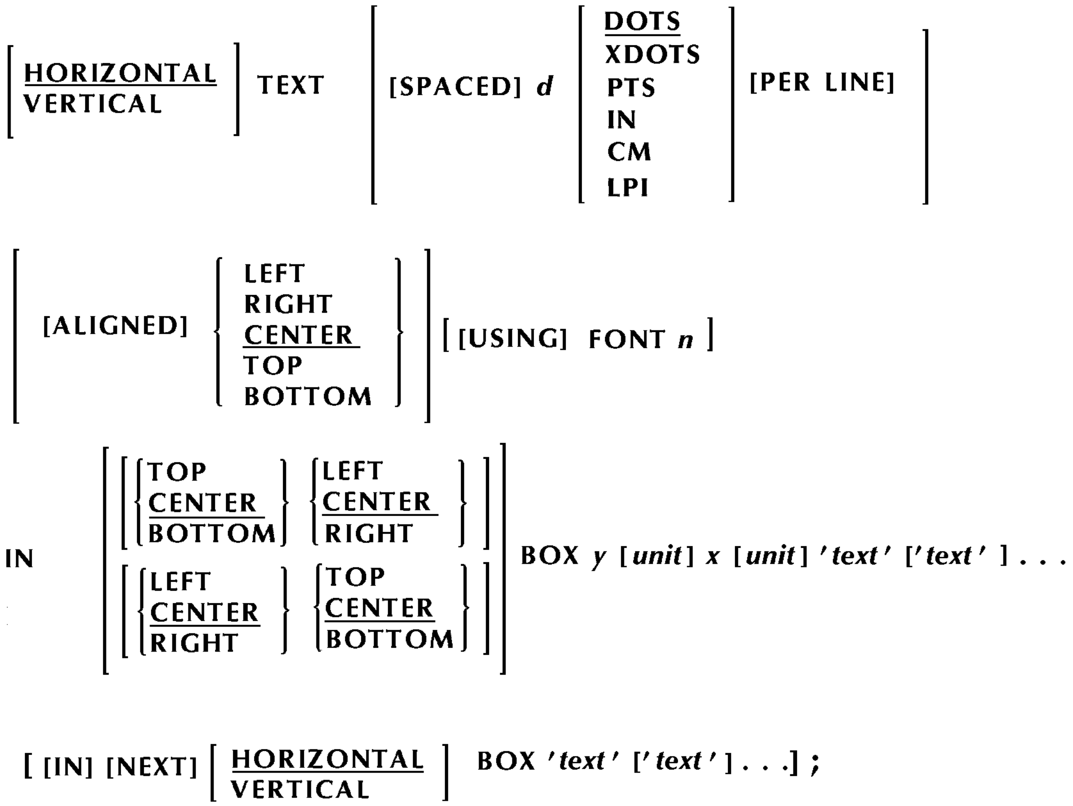
Table A-1. **FDL command syntax** (continued)

Command	Syntax
LANDSCAPE/ PORTRAIT	$\left\{\begin{array}{l}\underline{\textbf{LANDSCAPE}}\\ \textbf{PORTRAIT}\end{array}\right\} \left[\textbf{PAPER [SIZE] [IS] } \boldsymbol{n} \left[\begin{array}{l}\textbf{DOTS}\\ \textbf{XDOTS}\\ \textbf{INCH[ES]}\\ \textbf{CM}\\ \textbf{CENTIMETERS}\end{array}\right]\right.$ $\left.\textbf{[WIDE] [BY] } \boldsymbol{m} \left[\begin{array}{l}\textbf{DOTS}\\ \textbf{XDOTS}\\ \textbf{INCH[ES]}\\ \textbf{CM}\\ \textbf{CENTIMETERS}\end{array}\right] \text{[HIGH]}\right] \quad ;$ ***n*** virtual page width ***m*** virtual page height
LINE	$\text{AT } c_o \text{ [}\textit{unit}\text{] [DRAW][}\textit{n}\text{]} \left[\begin{array}{l}\underline{\text{HORIZONTAL}}\\ \text{VERTICAL}\end{array}\right] \left\{\begin{array}{l}\underline{\text{LINE}}\\ \text{LINES}\end{array}\right\} \text{[IN } \textit{unit}\text{] [FROM] } c_s$ $\text{[}\textit{unit}\text{] TO } c_e \text{ [}\textit{unit}\text{] [USING]} \left[\begin{array}{l}\underline{\text{SOLID}}\\ \text{BROKEN}\\ \text{DOTTED}\end{array}\right] \left[\begin{array}{c}\text{HAIRLINE}\\ 0\\ \frac{1}{2}\end{array}\right]$ $\left[\text{[AND] [REPEAT]} \left[\begin{array}{l}\text{HORIZONTALLY}\\ \text{VERTICALLY}\end{array}\right] \left\{\begin{array}{l}\text{AT } c_a \text{ [}\textit{unit}\text{][} c_a \text{ [}\textit{unit}\text{] . . .]}\\ \text{EVERY } c_i \quad \textit{unit}\end{array}\right\}\right] ;$

Table A-1. **FDL command syntax** (continued)

Command	**Syntax**
LOGO	**LOGO** ***id*** **AT** ***y [unit] x [unit]***
PAPER	For standard paper sizes: $\textbf{PAPER[SIZE][IS]}\begin{bmatrix}\textbf{USLETTER}\\ \textbf{A4}\\ \textbf{USLEGAL}\end{bmatrix}\textbf{;}$ For nonstandard paper sizes: $\textbf{PAPER [SIZE] [IS]}\left\{\textbf{x}\begin{bmatrix}\textbf{INCHES[ES]}\\ \textbf{CM}\\ \textbf{CENTIMETERS}\\ \textbf{DOTS}\\ \textbf{XDOTS}\end{bmatrix}\textbf{[BY] y}\begin{bmatrix}\textbf{INCHES[ES]}\\ \textbf{CM}\\ \textbf{CENTIMETERS}\\ \textbf{DOTS}\\ \textbf{XDOTS}\end{bmatrix}\right\}\textbf{;}$
SECTION	**[BEGIN] SECTION** ***id*****;** **END SECTION;** **DO SECTION** ***id*** **AT** ***y [unit] x [unit]*****;**
TEXT AT	$\begin{bmatrix}\underline{\textbf{HORIZONTAL}}\\ \textbf{VERTICAL}\end{bmatrix}\textbf{TEXT}\left[\textbf{[SPACED] d}\begin{bmatrix}\underline{\textbf{DOTS}}\\ \textbf{XDOTS}\\ \textbf{PTS}\\ \textbf{IN}\\ \textbf{CM}\\ \textbf{LPI}\end{bmatrix}\textbf{[PER LINE]}\right]$ $\left[\textbf{ALIGNED}\begin{Bmatrix}\textbf{LEFT}\\ \textbf{RIGHT}\\ \underline{\textbf{CENTER}}\\ \textbf{TOP}\\ \textbf{BOTTOM}\end{Bmatrix}\right]\textbf{[[USING] FONT n]}$ **AT** ***y [unit] x [unit] ‘text’ [‘text] . . . ;***
LPS task invoking command	**FDL[filename][,NOPRINT][,TRAY][,DEBUG][,XPAN][,NOSOURCE][,PROOF][,SIMPLEX][RES=300 | 600]** **FDL [filename][,NOPRINT][,TRAY][,DEBUG][,XPAN][,NOSOURCE][,PROOF][,SIMPLEX] [RES=300 | 600] [TDn]**

Table A-1. **FDL command syntax** (continued)

Command	Syntax
TEXT IN BOX	 [HORIZONTAL | VERTICAL] TEXT [[SPACED] *d* [DOTS | XDOTS | PTS | IN | CM | LPI] [PER LINE]] [[ALIGNED] { LEFT | RIGHT | CENTER | TOP | BOTTOM }] [[USING] FONT *n*] IN [[{ TOP | CENTER | BOTTOM } { LEFT | CENTER | RIGHT }] | [{ LEFT | CENTER | RIGHT } { TOP | CENTER | BOTTOM }]] BOX *y* [*unit*] *x* [*unit*] '*text*' ['*text*'] . . . [[IN] [NEXT] [HORIZONTAL | VERTICAL] BOX '*text*' ['*text*'] . . .] ;

B. FDL-generated messages

These messages may appear while forms are being compiled using the forms description language (FDL) compiler.

FD0900 OPERATOR-REQUESTED ABORT

ABORT command was entered. Compiling is stopped.

FD1000 ALL FORMS COMPILED. FORMS COMPILER EXITING.

FDL file name command was entered. Forms have been successfully compiled, and FDL compiling session is terminated.

FD1050 FORMS COMPILER RESUMING

System is beginning to compile another form after having completed one previously sent.

FD1800 FORMS COMPILER ABORTING.

FDL task is being cancelled. ABO[RT] command was entered, disk error has occurred, or a specified file was not found. Message appears with all fatal error messages.

FD2700 UNRECOGNIZED KEY-IN, KEY-IN IGNORED. MAY BE RE-ENTERED.

A command was entered incorrectly or placed incorrectly in a line. System is ignoring entry. Reenter command correctly.

FD2710 INVALID CHARACTER, RE-ENTER.

Symbol or word entered was incorrect for location in command line. Reenter line correctly.

FD2720 KEY-IN TOO LONG. RE-ENTER.

Name or word entered exceeds permitted number of characters. Enter different word within permitted range.

FD2730 PARAMETER TOO LONG. RE-ENTER.

Command parameter entered contained more characters than permitted. Reenter command correctly.

FD2740 `FSL NOT FOUND OR INVALID OPTION. CHECK AND RETRY.`

The specified forms source library (FSL) file does not exist on the system disk or the option is invalid. Compiler aborts.

1. Check for correct file name.
2. Create FSL file on disk if necessary. (Refer to the “Editor” chapter in your *DocuPrint 180 LPS Operations Reference.*
3. Retry FDL task.

FD2915 `SECURITY VIOLATION.`

Requested file has been protected by ABNORMAL SECURITY = YES command. Attempt was made to access it at wrong logon level. To access file, obtain correct password and log on at Level 5. (Refer to your *DocuPrint 180 LPS Operations Reference.)*

FD4500 `ERROR IN READING MAGNETIC TAPE.`

System is unable to read input tape containing FDL. Compiler aborts.

1. Clean tape drive. (Refer to the “Maintenance” chapter in your *DocuPrint 180 LPS Operator Guide*.)
2. If problem recurs, remake FDL tape.

FD8500 `STACK UNDERFLOW.`

Forms compiler software error has occurred. Compiler will abort

1. Retry compiling
2. If message reappears, call your system support representative.

FD9400-FD9540 `Disk/file error messages`

System is unable to access (read, write, open, or close) indicated file due to problem with disk. Forms compiler will abort.

1. Retry entry. Message should not reappear if failure was intermittent memory error.
2. If problem persists, call your system support representative.

FD9400	**ERROR IN CLOSING THE SOURCE-INPUT FILE**
FD9410	**ERROR IN CLOSING THE SOURCE-OUTPUT FILE**
FD9420	**ERROR IN CLOSING THE LISTING/SUMMARY FILE**
FD9430	**ERROR IN OPENING THE SOURCE/OUTPUT FILE**
FD9440	**ERROR IN OPENING THE LISTING/SUMMARY FILE**
FD9450	**ERROR IN READING THE SOURCE-INPUT FILE**
FD9460	**ERROR IN READING THE SOURCE-OUTPUT FILE**
FD9470	**ERROR IN READING THE SOURCE-OUTPUT FILE**
FD9475	**ERROR IN BACK-SPACING THE SOURCE-OUTPUT FILE**
FD9480	**ERROR IN WRITING THE LISTING/SUMMARY FILE**

FD9485 ERROR IN READING THE LISTING/SUMMARY FILE

FD9490 ERROR IN BACK-SPACING THE LISTING/SUMMARY FILE

FD9510 ERROR IN CLOSING CONTEXT FILE

FD9520 ERROR IN OPENING CONTEXT FILE

FD9530 ERROR IN READING CONTEXT FILE

FD9540 ERROR IN WRITING CONTEXT FILE

TDn DEVICE DOES NOT EXIST. THE INPUT TAPE DEVICE SPECIFIED IN TDn DOES NOT EXIST.

C. 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 following grid and origin substitutions are made when printing on 8.5 by 11-inch 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 following grid and origin substitutions are made when printing on 8.5 by 14-inch 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 following grid and origin substitutions are made when printing on A4 (8.27 by 11.69-inch) 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, 117 CM (0.91, 0.46 INCH)
FMT7A	PORTRAIT; GRID UNIT IS 12 CPI, 6 LPI, ORIGIN 2.16, 100 CM (0.85, 0.39 INCH)
FMT8A	PORTRAIT; GRID UNIT IS 10 CPI, 6 LPI, ORIGIN 2.16, 100 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, 100 CM (0.57, 0.39 INCH
FMT11A	PORTRAIT; GRID UNIT IS 20 CPI, 12.5 LPI, ORIGIN 1.44, 100 CM (0.57, 0.39 INCH)

The following substitutions are made 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
PAGE SIZE not specified	Virtual page size set to sysgen-specified paper size
Explicit GRID UNIT measurement is specified, and ORIGIN is not specified	Form origin set to virtual page origin
GRID format-id is specified, and ORIGIN is not specified	Form origin set to specified format-id's BEGIN values
No GRID UNIT or format-id is specified, and ORIGIN is specified	Grid unit dimensions set by FMT1 (landscape) or FMT6 (portrait)
No GRID command is specified	Grid unit dimensions and form origin set by FMT1 (landscape) or FMT6 (portrait)
Unit not specified in ORIGIN parameter of the GRID command or 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 TEXT command	Current font in use
Unit not specified in SPACED parameter of the TEXT command	Dots
No units specified in LOGO command	Grid unit

D. GRID and TEXT command examples

This appendix shows the grid unit scaling specifications when the grid parameters are omitted or specified.

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 1500 DOTS;`

E. FDL capacity limits

The available memory space imposes the following maximums for use:

Text

Buffer capacity:	512 bytes
Lines per TEXT statement:	64

Space allocation

TEXT AT command:	16 bytes + S1 + S2 . . . Sn
TEXT IN BOX command:	18 bytes + S1 + S2 . . . Sn (1st box)
	6 bytes + S1 + S2 . . . Sn (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: 8 per form

Invocation: No limit

Lines

Horizontal: 2000

Vertical: 2000

Fonts and logos

60

This number may vary, depending on memory capacity and use; however, 60 fonts and logos cannot be exceeded.

F. Support tools and measurements

There are two separate functions of forms 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 reference, However, for the forms designer's convenience, a forms design ruler is provided.

Forms design ruler

The forms design ruler is used for measuring character and line spacings The ruler has eight scales, shown in table F-1.

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

Side 1	
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.

Table F-2. **Standard formats and spacings side 2**

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

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. (Refer to table 2-1 for a complete list of standard formats and spacings.

Glossary

A3 Paper size measuring 297 by 420 mm.

A4 Paper size measuring 210 by 297 mm.

abort To terminate the printing of a job or execution of a program before it completes.

algorithm Computational procedure that can be repeated any number of times.

alignment Positioning of an image on a page for printing.

alphanumeric Set of characters including the letters A through Z, numerals 0 through 9, and all printable special symbols.

AIM Ancillary IOT message processor. System task that initializes the client layer between the printer and the system controller. It also displays the Fault, Hint, and information messages.

ASCII American Standard Code for Information Interchange. Standard 7-bit code that represents alphanumeric information. Each alphanumeric character and several nonprinting characters are assigned a binary number, covering 128 possible characters. It is used for information interchange among data processing systems, data communication systems, and associated equipment.

application Use to which a computer program or system is put, for example, sorting employee records.

applications software Host- or LPS-resident software that directs the computer to perform specific tasks or functions as opposed to the software used to operate the computer. Common business applications include payroll, accounting, and inventory.

ascender Portion of alphabetic character that rises above the body of the character (its x-height portion). See also descender; x height.

asynchronous Transmission in data communications controlled by start and stop elements at the beginning and end of each character. Thus, time intervals between transmitted characters may be unequal in length.

audit log Captures the sheet delivery information for every page in an audited report, certain details about each sheet, the planned and actual report control totals, and waste management.

auxiliary menu Menu that contains options not displayed in a window. The symbol for an auxiliary menu is a box containing three horizontal lines.

B4 Paper size measuring 250 by 353 mm.

background job Low-priority job, usually batched, that is executed automatically as system resources become available.

backup file File copied to a storage medium for safekeeping in case the original is damaged or lost.

band Rectangular area in printer memory into which an image sent to the printer from a computer is divided.

batch processing Allows for repetitive operations to be performed sequentially on batched data without much involvement of the computer operator.

baud Measurement of data rate in bits per second. This term is used to describe information flow between two devices. Unit of data transmitting and receiving speed is roughly equal to a single bit per second. Common baud rates are 110, 300, 1200, 2400, 4800, and 9600.

binary Numbering system based on 2 that uses only the symbols 0 and 1. Binary is used in computers and related devices since information can be represented with electric pulses (0=off, 1=on). Most computer calculations are binary.

binary digit (bit) In the binary numbering system, either of the characters 0 or 1. The “bit” is the base unit of information used by computers. It can take the form of a magnetized spot, an electric pulse, or a positive or negative charge. A sequentially stored set of bits represents a character on a computer.

Multipliers are:

1 or 0 byte = 8,192 bits

kilobyte (KB) or 1,024 bytes = 8,388,608 bits.

Computer space equivalents are:

1.5 KB = about 1 single-spaced typed page

30 KB = about 20 typed pages

150 KB = about 100 typed pages

binary synchronous transmission Data transmission in which synchronization of characters is controlled by timing signals generated at the sending and receiving stations.

bit Abbreviation for binary digit, the smallest unit of information recognized by a computer. See also binary digit.

bit map Visual representation of graphic images in which a bit defines a picture element (pixel); for example, if a bit is 1, the corresponding pixel is printed.

bit mapped Display image generated bit by bit for each point or dot. A software-driven scanner is used to create characters or graphics.

blocking Process of combining two or more records into a single block of data which can then be moved, operated upon, or stored, 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.

boot To load the initial instructions of a program into computer memory; these instructions then direct the loading of the rest of the program. Booting may require entry of a few commands at the keyboard or the flip of a switch to begin the process.

bps bits per second. In serial communication, the instantaneous bit speed with which a device or channel transmits a character.

BSC binary synchronous communication. 1. Communication using binary synchronous line discipline. 2. Uniform procedure using a standardized set of control characters and control character sequences for synchronous transmission of binary-coded data between stations.

buffer Compartment of memory in which this data is stored during transfer from one device to another. This is useful for accumulating data into blocks before storage or processing and for adjusting differences of speed between devices, or between a device and a communicating facility.

Bypass Transport Optional module that moves paper from the last stacker bin to a finishing device.

byte Fixed number of bits (in data processing, usually 8) operated upon as a unit. A byte may represent a character, a machine instruction, or some other logical unit of information.

carriage return Control character that causes the printing system to start printing at the left margin of the current line unless set to be interpreted as a line end.

channel 1. In data communications, a path or line that enables two or more devices to communicate (sometimes called a circuit, facility, or link). 2. In computers, a path for communication between the central processing unit (CPU) and input/output units, or between the CPU and peripheral devices.

character Single printable letter (A-Z), numeral (0-9), symbol (& % #), or punctuation mark (, . ! ?) used to represent data. Characters can also be nonprinting, such as space, tab, or carriage return.

character cell Digitized space containing a single character within a font set.

character code Code representing alphanumeric information, for example, ASCII.

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 Number of different characters used by a particular device, including alphabetic, numeric, and special characters such as symbols.

client layer The software interface used by the AIM task and the Output task to communicate with the printer, allowing printing commands and fault and status information to be exchanged.

clocking A method of synchronizing the sending and receiving of data communications devices. Clocking allows synchronous transmission at high speeds.

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

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

code 1. Set of symbols representing data or instructions to a computer. 2. To write a list of instructions (software) to cause the product/system to perform specified operations.

code conversion Translation of one type of character or symbol code to another.

collate To arrange or assemble into ordered sets.

column Vertical arrangement of characters.

command User instruction to a computer, using the system controller keyboard or the PC UI. Commands are words, mnemonics, or characters that cause a computer to perform predefined operations. Coded instruction to a computer or computer-based system.

command language Set of commands that can be used for a system, such as how the system can be instructed to perform a task.

comment Explanations written with program instructions. They are ignored by the computer.

communication line Telecommunication line connecting devices at one location with devices at other locations in order to transmit and receive information.

communication link Physical means, such as data link, connecting one location to another to transmit and receive information.

communications Ability of two devices to transmit information to each other.

compatibility Characteristic of computer equipment permitting one device to use the same information or programs as another device without conversion or code modification.

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

computer Functional unit capable of performing substantial computations, including numerous arithmetic or logic operations without human intervention during a run.

computer language Computer-oriented language consisting solely of computer instructions. See also machine language.

computer system Central processing unit (CPU) with main storage, input/output channels and devices, control units, and external storage devices connected to it.

concatenate To connect or link in a series, as when files are grouped together for faster processing. See also job concatenation mode.

console Functional unit containing devices used by an operator to communicate with an operating system. It may consist of a display, keyboard, and certain switches or other controls.

consumable supplies Supplies such as paper and dry ink that are depleted (used up) during the course of normal printer operation.

continuous printing Refers to Interpress job integrity under any of the following conditions: excessive graphics, forms, or font use problems.

control program Program that supports the operating system by monitoring the flow of jobs, tasks, processing, and so on, within the system; for example, a data communication program.

coordinate Point on the x and y axis that determines a grid position.

copy To duplicate data in a new location or on an additional storage medium, for example, to copy files from disk to tape.

copy-sensitive Term used to indicate jobs in which multiple copies of a report will contain different data, as with paychecks and banking statements.

cpi characters per inch. Designates the number of characters per inch for a particular typeface. See also pitch.

CPU central processing unit. Interprets and executes instructions, performs all operations and calculations, and controls input and output units and auxiliary attachments.

data 1. In general, facts, numbers, letters, symbols, and so on, which can be processed or produced by a computer. 2. In data processing, the source data or raw data entered for processing, as opposed to the results obtained by processing.

database Information to meet specific processing and retrieval needs. Generally applies to integrated file of data, arranged for access by many subsystems.

data communications Transmission and reception of encoded information over telecommunication lines.

data file Collection of related data records organized in a specific manner so that each record is similarly structured, for example, a payroll file set up with one record for each employee, last name first, indicating the rate of pay and all deductions.

data processing Operations carried out on data by means of algorithms and programs to produce information or a specific result. The rearrangement of data into a suitable form for further use.

data rate In data communications, the rate at which a channel carries data, measured in bits per second (bps).

data storage Preservation of data on various media, for example, tape, disks, magnetic bubble memory, and so on.

data transmission Transmission of coded data over telephone or other telecommunication lines.

debug To detect and correct errors in a program.

decompose To break down into component parts, such as when Interpress breaks down a Font Interchange Standard (FIS) master to compile font information.

default Value assigned to a field by the system. Default fields may be used for such items as document formats, menu selections, input fields, font selection, and paper or image size. The default value of a field may be changed.

descender	Portion of alphabetic character that extends below the baseline. See also ascender, x height.
desktop	Basic display screen of the PC UI.
device	Any piece of hardware other than the central processing unit (CPU).
digitize	To express or represent data in digital (binary) form so that it can be processed electronically.
disk drive	Device that can read or write magnetic media.
display	Viewing device (monitor) that visually communicates system warnings, status, and error messages and reflects operator interaction with the system on a display.
DJDE	Dynamic Job Descriptor Entry. Command within an input data stream used to modify the printing environment dynamically.
DMR	Command parameter that designates a Digital Equipment Corporation host system.
document	1. Data medium and the data recorded on it, usually permanent, which can be read by you or a computer. 2. Collection of information pertaining to a specific subject or related subjects.
dot	Unit of measurement representing a fraction of an inch, for example, 300 dots per inch (dpi). It may also be referred to as a picture element (pixel) or spot.
download	To copy files using communication lines from the host onto LPS system disks.
dry ink	Minute dry particles of resin and carbon black used to create images. Dry ink can accept an electrical charge.
duplex printing	Printing on both sides (front and back) of a page. See also simplex printing.
EBCDIC	Extended Binary Coded Decimal Interchange Code. Coded character set consisting of 8-bit coded characters. It can accommodate 256 characters.
edgemarking	Use of graphic objects, usually lines or boxes, that bleed off the edge of the physical page. See also physical page.
electronic publishing	Integrated production of documents on demand, using digitally stored documents, computerized composition, and electronic printing systems.

elite Smallest size standard typewriter type: 12 characters per horizontal inch. See also pica.

embedded blanks Blank spaces within a command line.

Ethernet Xerox local area network (LAN) that allows data to be transmitted by cable from one device to another, enabling it to share the network.

extended metrics Measurements used in Interpress to alter the size of fonts, allowing more precision with character escapement. Used for rendered characters.

FCB forms control buffer. Buffer for controlling the vertical format of printed output.

FDL forms description language. LPS-resident source language used for designing electronic forms. See also FSL; form.

field 1. Part of a record that serves a similar function in all records of that group, such as name and address field. 2. Area or setting of practical activity or application.

file Set of records or text that can be stored and retrieved. An organized, named collection of records treated as a unit. For offline, it is the data between the two tape marks. For online, it is the data between banner pages.

file protection To prevent the contents on a disk or tape from being erased or written over by disabling the write head of a unit.

firmware Permanent programs stored in read-only memory (ROM).

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

fixed font Font containing characters with fixed spacing. See also proportional font.

fixed pitch Font set in which every character cell has the same width. In reference to character sets, this term describes typefaces in which all character cells are of equal width. Monospaced as opposed to proportional spaced.

fixed spacing Arrangement of characters on a line so that all characters occupy the same amount of horizontal space.

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

font Set of images, usually characters and symbols, having common characteristics such as style, width, height, and weight.

form 1. Compiled forms source library (.FSL) file. 2. Printed or typed document with blank spaces for inserting information. Specific arrangement of lines, text, and graphics stored in a computer under an identifying name. Page of data that, when preceded by proper commands, is stored on the system disk as a permanent file. It may be merged with variable data by a form start command. See also FDL; FSL.

format 1. Layout of a document, including margins, page length, line spacing, typeface, and so on. 2. In data storage, the way the surface of a disk is organized to store data. 3. To prepare the surface of a disk for acceptance of data.

form feed Keyboard or printer control character that causes the printer to skip the top of the next page.

FSL forms source library. Uncompiled collection of user-created files containing FDL commands. Refer to FDL; form.

function keys Keyboard keys that produce no character but initiate a particular machine function, such as delete.

fuse To affix dry ink to paper by heat or pressure or a combination of both.

GCR group code recording mode. Refers to the specific density of data (such as 6250 bpi) as it is recorded on tape, which is measured in bits per inch (bpi).

graphics Use of lines and figures to display data, as opposed to using text.

grid Imaginary pattern of evenly spaced horizontal and vertical lines on a page.

grid unit Smallest rectangle enclosed by horizontal and vertical lines on a grid. The size of a grid unit is expressed as the length of one side of a rectangle.

halftone screen A tool used in offset printing, typesetting, and laser printing to convert a continuous tone (such as photographic) image to dots, which allows the image to be rendered accurately in these printing processes.

hardcopy Machine output in permanent form, such as printed reports, listings, and so on. Output in a permanent form (usually on paper or paper tape) rather than in temporary form, as on a display. Contains readable printed copy of machine (for example, computer) output.

hard values Nonoptimal adjustment of particular FIS fonts in terms of point size and orientation.

hardware Physical components, such as mechanical, magnetic, and electronic elements of a system, as opposed to programs, procedures, rules, and associated documentation. Hardware is operated by software and firmware.

HCF high-capacity feeder. Feeder tray capable of holding 2500 sheets of 20 pound/75 gsm paper. The high-capacity feeder trays are the primary paper supply for the DP180 LPS. They are located in the bottom half of the feeder/stacker modules.

HCS high-capacity stacker. Stacker bin capable of holding 2500 sheets of 20 pound/75 gsm paper. In the LPS, the high-capacity stacker bins are located in the top half of the feeder/stacker modules.

hexadecimal Numbering system with a base of 16. In this system, 10 through 15 are represented by A through F, respectively.

hierarchy Relative priority assigned to arithmetic or logical operations that must be performed.

high-level language Language consisting of words and symbols that are close to normal English and, therefore, readily understandable by the user. High-level languages are oriented to problems or commercial procedures and are the source languages for most programs.

host Computer accessed by users which serves as a source of high-speed data processing for workstations with less computer power. See also mainframe.

host interface Connection between network and host computer.

icon Symbol appearing on the PC UI or printer control console that can be opened to display a window or screen options.

id identifier. Character used to identify or name data and possibly to indicate certain properties of that data.

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

information processing Generic term encompassing both word and data processing, used to describe the entire scope of operations performed by a computer.

initialize 1. To prepare the magnetic surface of a blank diskette so that it can accept data. 2. To set all information in a computer system to its starting values (usually the first step is accomplished when a program is booted).

input Data or text introduced into a computer-based system.

input/output General term encompassing the flow of data into and out of a system.

input processing Formatting control for the pages of a report.

insert To add text or graphics to a document.

interface Device by which two systems connect and communicate with each other.

interpolation Series of logical rules implemented in the printer to convert a 300 spi input video stream to a 600 spi output video stream. Interpolation is functionally analogous to bit doubling (2x scaling), except the logical rules result in superior output.

Interpress Xerox standard that defines digital representation of lines for printing. Interpress documents can be printed on any sufficiently powerful printer equipped with Interpress print software.

Interpress font utility (IFU) program Program used to convert FIS fonts to LPS fonts.

Interpress master File written according to the Interpress standard.

IPL initial program load. For the optional open-reel tape drive, the internal initialization sequence whereby certain functions are loaded into random access memory (RAM).

JDE job descriptor entry. Collection of job descriptions. See also job; JSL.

JDL job descriptor library. Collection of compiled job descriptions. See also JSL.

job 1. Set of instructions (JDEs) defining a unit of work for the system. 2. In setting a separation boundary through the Bin Full Criteria task, job refers to everything printed as the result of a single start command. See also JDE.

job concatenation mode In HIP, a mode in which multiple print jobs are processed as reports in one print job. See also concatenate.

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

job management Collective functions of job scheduling and command processing.

JSL job source library. Collection of uncompiled job descriptions. See also job; JDE; and JDL.

keyboard Group of alphabetic, numeric, and/or function keys used to enter information into a system.

keyword Required part of a command. See also operator command.

label 1. In data storage, a reference to a file saved on tape or disk, a record indicating the file name or date created, or other control information. 2. In programming, a name assigned to a particular instruction or portion of a program as a locational reference (the computer translates the label into an address).

landscape page orientation Orientation of print lines or top of an illustration parallel to the long edge of the paper if the sheet is within the standard size range. (Sheets larger than standard have the reverse print orientation.)

language Defined set of characters and symbols combined together by specific rules. See also high-level language; low-level language.

laser printing Technology that uses a laser to transfer character forms to a page by direct or indirect means.

latent image Static charge present on the photoconductor before contact with dry ink particles.

leading 1. Vertical distance between lines (also called line space), measured from a baseline of one line to the baseline of the next. 2. Extra spacing between lines of type. 3. In typography, spacing between lines and paragraphs.

LED light emitting diode. Solid substance that glows when a current is passed through it. Often used for indicator lights on disk drives or modems, as well as for displays on other electronic equipment.

LEF long-edge feed. The movement of paper through the printer in the direction of the paper length (the longer side of a sheet of paper).

legal size Sheet the standard size of legal briefs, 8.5 by 14 inches.

letter size Paper sized 8.5 by 11 inches/216 by 279 mm.

library In data storage, a collection of related files or programs.

line One horizontal flow of characters.

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.

line tables Internal data structures providing a record in memory of lines to be drawn on a page.

listing Printout or display of the statements in a program, usually used as a convenience in examining or editing programs.

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

load To enter data into storage or working registers.

location Place in which data can be stored.

log Collection of messages or message segments placed on an auxiliary storage device for accounting or data collection purposes.

logical page In the Xerox printing systems environment, 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.

logo Small illustration or design, usually simple, typically used to identify a company.

log off Procedure by which a user ends a session.

log on Procedure by which a user begins a session between an application program and a logical unit.

magnetic media Term for all storage devices, such as disks, diskettes, and tape, on which data is stored in the form of magnetized spots on surface of the media.

magnetic storage Use of magnetic media to store data, programs, and so on.

magnetic tape Flexible plastic tape, with one side offering a magnetic surface suitable for storing computer data in the form of magnetized spots. Magnetic tape is often used for long-term storage since it can accommodate large volumes of information.

mainframe Central processing unit (CPU) and memory of a large computer. More often used to denote any large computer of the type that might be used to control a group of smaller computers, terminals, or other devices. See also host.

margins White space on each side of printed text.

mask 1. Selection of bits from a storage unit by using an instruction that eliminates the other bits in the unit. 2. In accessing files, a file name mask is used to reference one or more files with similar file-id (identifier) syntax. 3. In Interpress, a mask serves as a template, indicating the shape and position of an object on a page.

MB megabyte. Unit of one million bytes.

media Vehicles or devices by which information is stored or transmitted. Classifications include source, input, and output.

medium Object or material on which data is stored, for example, magnetic tape or floppy disk.

memory Space in a device where information is kept, or the ability of a device to keep information until needed.

menu List of available functions, commands, and options.

message Unit of information transmitted by one facility to another in a form that the receiving facility can understand and act upon. The standard message format consists of a header (containing identifying and control information), followed by the actual message content, followed by a trailer (indicating that the message is completed).

metacode Same as “native mode.” The method of speaking to and controlling the image generator. These controls are used by the character dispatcher 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.

MHz megahertz. 1. Unit of cycling speed (one million cycles per second) for an electromagnetic wave (in particular, a radio wave). 2. Sending and receiving stations of a radio wave transmission must be tuned in to the same unit of megahertz.

mode Manner in which an activity or process is carried out.

modem Device that converts digital information into an analog signal suitable for sending over analog telecommunication lines. Also converts an analog signal from telecommunication lines into digital information.

module Cohesive unit within a program. It is consistent in its level and identifiable in terms of loading or with other units.

mouse Electronic device used with the PC UI to select options and enter data.

mouse pad Base that provides friction and direction information to the electronic mouse.

mouse tray Optional extension module attached to the system controller to accommodate the mouse pad and provide ample working space.

network 1. System of geographically separate computers, linked to one another over transmission lines. 2. Communication lines connecting a computer to its remote terminals.

nonimpact printer Printer that forms characters without any strikes of a key or element against the paper.

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

offline Devices not under the active control of a central processing unit. For example, a computer makes output to a magnetic tape. The tape is then used by an offline printing system to produce printed data. Offline operations are much slower than online operations. See also online.

offset To place pages currently being printed in slightly different positions from previous pages.

offset printing Widely-used method of commercial and corporate printing, where ink is picked up by a metal or paper plate, passed to an offset drum, and then passed to the paper.

online Devices under the direct control of a central processing unit, for example a printing system in interactive communication with a mainframe. See also offline.

operating system Basic host- or LPS-resident controlling program that governs the operations of a computer, such as job entry, input/output, and data management. The operating system is always running when the computer is active. Unlike other types of programs, it does not run to an end point and stop. The operating system of a Xerox LPS is referred to as the operating system software (OSS).

operation Well-defined action that, when applied to any permissible combination of known entities, produces a new entity.

operator area The 24-inch exclusive clearance that must be available directly in front of each component of an LPS for operator activities.

operator command Statement to control a program, issued through a console device, PC UI, or terminal, causing a control program to provide requested information, alter normal operations, initiate new operations, or terminate existing operations.

orientation 1. In reference to image area, orientation describes whether the printed lines are parallel to the long edge of the paper or the short edge of the paper. 2. Choice of printing portrait (vertically) or landscape (horizontally).

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

output 1. Material produced by a peripheral device of a computer, such as a printout or a magnetic tape. 2. Result of completed operations.

overprinting Printing more than one character at the same position.

overprint lines Print lines whose carriage control specifies printing with no line spacing after the last printed line.

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

override To take precedence or priority over, to overrule.

overstrike To print characters over each other.

page 1. In computer programming, a block of instruction, data, or both that can be located in main or auxiliary storage. 2. In word processing, a defined section of a document.

page orientation Direction in which data is printed on a report. See also landscape page orientation; portrait page orientation.

parameter Part of a command, other than the keyword. See also keyword; operator command.

pass-through job On systems with XPAF, a job that is sent directly from a host to a Xerox printer using XPAF, without undergoing XPAF processing.

password Unique word or set of characters that an operator or user must supply to log on to a system.

patch In programming, to modify a portion of the program at the machine language level, as opposed to modifying at the source program level.

PC UI PC user interface. The PC hardware and Xerox-supplied software which allows the operator to control the LPS by means of a mouse, windows, and icons. See also object mode; TEM.

PDL print description language. Language used to describe printing jobs to an LPS. PDL describes the input (type, format, characteristics), performs the processing functions (logical processing), and describes the output (type, format, font selection, accounting options).

physical page Sheet of paper on which printing is done. See also edgemarking.

pitch 1. Horizontal character spacing; 10-pitch (10 characters per inch) spacing is called pica, and 12-pitch (12 characters per inch) spacing is called elite. 2. The number of page images placed on the xerographic belt during one revolution. The DocuPrint 180 LPS supports two pitch modes: 7 pitch when paper 9 inches/229 mm long or less is used to print a job, and 3 pitch when paper 9 to 17 inches/229 to 432 mm long is used to print a job.

pixel Acronym for picture element. Smallest addressable point of a bit-mapped screen that can be independently assigned color and intensity. Pixels are definable locations on a display used to form images. For graphic displays, more pixels generally provide higher resolution. Spots, dots, and pixels are used interchangeably.

point 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 every inch. See also pica.

point size Height of character set from the top of its ascenders to the bottom of its descenders in units (points). Point size does not always include leading.

portrait page orientation Orientation of print lines or the top of an illustration parallel to the short edge of the paper if the sheet is within the standard size range. Sheets larger than standard have the reverse print orientation.

printer Output device that produces hardcopy printouts. Also referred to as the IOT.

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

printout Informal expression referring to almost anything printed by a computer peripheral device.

process 1. To perform a systematic sequence of operations, such as add, edit, delete. 2. To produce a specific result by manipulating data.

program Complete set of instructions in language compatible with the device to be used. A program directs a system to perform each operation at the right time in the proper sequence.

programmer Person involved in designing, writing, and testing computer programs.

prompt Message or symbol displayed on a system console requiring the operator to take action.

proportional font Font containing characters that vary in width. See also fixed font.

proportional spacing Text in which each alphanumeric character is given a weighted amount of space. Such output has print-like appearance. Proportional spacing allows more space for wide characters and less space for narrow characters

proportional type Characters that vary in width.

protocol Formal set of conventions governing the format of data and the control of information exchange between two communication devices.

purge To delete data from a system.

queue List of documents waiting to be processed.

RAM random access memory. Storage that allows data, such as documents, to be stored and retrieved directly by address location without reading through any other data.

raster data Binary data, usually consisting of dots arranged in scan lines, according to the print order.

rasterization Creation of a page's bit map image for printing.

read/write head Input/output device that reads and writes data in the form of magnetic dots on the surface of an external storage medium, such as a magnetic disk.

record Collection of data or words treated as a unit.

recovery Act of overcoming a problem or error during processing. Typically, a specialized software recovery routine gains control and attempts to resolve the error without crashing the system.

remote access Access to a central computer by terminals or devices geographically separated from that computer.

replace Process of exchanging one portion of text for another. This process encompasses two functions: deleting old text and inserting new.

report In setting a separation boundary through the Bin Full Criteria task, report refers to a subset of a job (a job may consist of one or more reports).

resolution Number of dots per unit. The LPS imaging system converts a character from digitized data into a printed image composed of these tiny dots. The greater the number of dots per inch, that is, the resolution, the clearer the image that is produced.

ROM read-only memory. Solid-state memory for programs. It cannot be rewritten.

save To store programs, data, or text for retrieval at a later time.

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

scroll Manipulation of a display to bring upper or lower portions of a document page into view when no space is available for the entire document at once.

scroll bar Part of a window that allows you to view information extending beyond the window display.

SCSI small computer system interface. Accepted standard for connecting peripheral devices to computers.

secondary storage Form of storage external to a system, such as magnetic tapes or floppy disks.

security 1. Procedure for limiting access to the system resources, programs, or files, to authorized personnel. 2. Protecting programs and files from unintentional or undesired modification.

SEF short-edge feed. The movement of paper through the printer in the direction of the paper width (the shorter side of a sheet of paper). For the DocuPrint 180 LPS, short-edge feed allows larger sizes of paper (up to 11 by 17 inches/279 by 432 mm) to be printed.

sequential In numeric sequence, usually in ascending order. As applied to a file organization, describes files in which records are written one after another and cannot be randomly accessed. For example, the first 99 records in a sequential file-access file have to be read before the 100th record is accessible.

set In setting a separation boundary through the Bin Full Criteria task, set refers to multiple copies of the same report.

simplex printing Printing on one side of the page. See also duplex printing.

software Programs, including operating systems, procedures, utilities, and applications programs, written for a system. Software can be supplied by the hardware manufacturer or other firms but does not include programs written by the user.

sort To rearrange data records according to a particular item (field) which they all contain, using a predetermined ordering scheme.

source Terminal node at which data enters a network. For example, a computer transmitting data through telecommunication lines to several other computers or receiving terminals.

source file File containing source language statements or commands.

source language Language, high-level or low-level, used by a programmer. A source language must be converted by a compiler to machine language for the instructions to be executed.

source program Program written in source language

space Blank area between words, recognized as a character by word and data processing systems.

special processing Commands allowing the user to process special reports, such as printing certain records, or printing on special paper.

spooling Process of releasing data from main memory and storing it temporarily until a peripheral device is ready to accept it, for example storing text before sending it to a printer.

spot Unit of measurement representing a fraction of an inch, for example, 300 spots per inch (spi). May also be referred to as a picture element (pixel) or dot.

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

static data Information usually found on preprinted forms or overlays.

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

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

storage Retention of information. Primary storage refers to internal storage where data and program instructions pertinent to current operations/ jobs are held. Auxiliary storage refers to external media, such as disks or tapes, for use at a later time.

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

symbol Character used in a computer language to specify a particular function.

synchronous Efficient encoding of data suitable for high-speed, block-oriented data transmission by using equal time elements.

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

syntax error System response to a mistake in a command entry.

system 1. In data processing, a collection of parts and procedures organized to accomplish a set of specific functions. 2. Assembly of components united by some form of regulated interaction to form an organized whole. 3. Operations or procedures through which a business activity is accomplished.

system controller Part of the LPS that provides interfacing capability, data handling, formatting, buffering, and operator control for the system. Also referred to as the “ESS”.

system disk Magnetic disk storage medium, usually of large capacity, that is not removable as opposed to floppy disk or disk packs.

system file Master software program that keeps all components working together.

system generation Process whereby the system is made ready to operate. Typically involves selecting the operative parameters and activating the relevant software.

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

system software Software programs that support and/or control system functions by governing hardware operation and input/output processes, interpreting source programs and breaking them down into machine language, distributing tasks among various processors, and so on.

tab To move the cursor on a display or printer to a prespecified column on the display or paper, most often by using the <TAB> key on a keyboard.

tape Recording media for data or computer programs. Tape can be in permanent form, such as perforated paper tape. Generally, tape is used as a mass storage medium in magnetic form and has a far higher storage capacity than disk storage, but it takes longer to write or recover data from tape than from disk.

tape density The number of characters that can be stored on magnetic media, such as how close together data can be recorded. The Xerox LPS may use either 1600 bpi or 6250 bpi density magnetic media.

tape drive Input/output device that controls the movement of magnetic storage tape past the read/write head while data is accessed or stored.

task 1. Any major job performed by a computer. 2. One of several programs being executed by a system.

telecommunications Voice or data communications transmitted and received through telephone lines.

teleprocessing Sending and receiving data through telecommunication lines for processing among various remote terminals and the central processing unit (CPU).

TEM terminal emulation mode. The processing method of the PC UI which features a character display and the operator’s use of the keyboard. The mouse, windows, and icons are inactive in this mode. The PC UI operates in either the TEM mode or in the object mode. See also object mode.

terminal Device equipped with a keyboard and connected to a computer or a network

testing 1. Process of running a program for the express purpose of discovering any errors it may contain. 2. For computer-oriented systems, the process of verifying a system's ability to meet performance objectives in a simulated environment or validating its actual performance in a live environment.

text In communications, the content portion of a transmitted message.

text string Consecutive series of characters to be printed exactly as specified in a command.

throughput In data processing systems, the amount of data that can be processed, transmitted, printed, and so on, per a specified unit of time.

toggle To switch (alternate) from one tray to another. The system switches from an active feeder or stacker tray to an inactive one to allow continuous printing when the proper commands are invoked.

trailer In data communications, the last portion of a message that signals the end.

transaction processing Method of data processing in which files are updated and results are generated immediately after data entry.

translation 1. In data communications, the conversion of one code to another on a character-by-character basis. 2. In programming, the function of a language processor which converts a source program from one programming language to another.

transmission speed In data communications, the rate at which data is passed through communication lines, usually measured in bits per inch (bpi).

transmit To send data from one place to another.

truncated Cut off before completion, as when data transfer from a host to a printer is cut off before all data has been transmitted.

two-up Application that prints two logical pages on one side of a physical page.

typeface 1. All type of a single design. 2. Set of characters with design features that make them similar to one another.

type size Height of a typeface, measured from the bottom of its descenders to the top of its ascenders, expressed in points.

type style Italic, condensed, bold, and other variations of typeface that form a type family.

UCS Universal Character Set. Printer feature that permits the use of a variety of character

upload To copy files from a remote peripheral device to a host. LPS files are not copied to the host because one of the LPS functions is to store files for the host.

utility program General-purpose program that performs activities, such as initializing a disk or sorting, which are not specific to any application.

validation Process of testing a system’s ability to meet performance objectives by measuring and monitoring its performance in a live environment.

variable Information of a changeable nature which is merged with a standard or a repetitive document to create specialized or personalized versions of that document.

variable data Variable data is not a part of a form design. It varies from page to page.

variable text Text of changing nature, such as various names and addresses combined with a form letter to make a complete document.

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

warning message System-issued message indicating that an error has been encountered even though the program has not failed.

weight Characteristic of type determined by how light or dark it appears.

wildcard Part of a command (* symbol, / symbol, ? symbol) that represents a category for which the possible options are requested.

wildcarding In a command, calling out a general category rather than a specific item within that category. The purpose of wildcarding is to generate the options within the given category.

window In the PC UI, the graphic display object that allows you to select options and enter information.

write To record data in memory or an external storage medium.

write protection Data protection feature implemented on magnetic media (for example floppy disk, 9-track tape) to prevent stored data from being modified, written over, or erased.

x axis	Horizontal axis on a forms grid.
xdot	Unit of measurement representing a fraction of an inch. It may also be referred to as a picture element (pixel) or spot, for example, 1/600 spots per inch (spi).
xerographic engine	Component of a printer that develops an image, transfers it to paper, and fuses it for output as hardcopy.
x height	Height of lowercase letters without their ascenders or descenders (height of letter “x”). See also ascender; descender.
y axis	Vertical axis on a forms grid
ACT	Advanced Customer Training
AFP	Advanced Function Printing
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
BCD	binary coded decimal
BOF	bottom of form
BOT	beginning of tape
bpi	bits per inch
bps	bits per second
BSC	binary synchronous communications
CD	character dispatcher
CDC	control data communications
CD/IG	character dispatcher/image generator
CM	control module
CME	copy modification entry
cpi	characters per inch

CPU	central processing unit
CR	carriage return
DCE	data communications equipment
DDCMP	Digital Data Communication Message Protocol
DEC	Digital Equipment Corporation
DFA	Document Feeding and Finishing Architecture
DJDE	dynamic job descriptor entry
DMR	data mode ready (DEC interface for LPS)
DOS	disk operating system
dpi	dots per inch
DSDD	double sided double density
DSU	digital signal unit
DSR	disk save and restore
DSSD	double sided single density
DTE	data terminal equipment
EBCDIC	Extended Binary Coded Decimal Interchange Code
ENET	Ethernet network
EOT	end of tape
EP	electronic publishing
ESS	electronic subsystem, also referred to as the system controller
FCB	forms control buffer
FCG	finishing configuration utility
FCP	file control parameter

FDL	forms description language
FDR	file directory
FFM	font file management
FIS	Font Interchange Standard
FMS	file management subsystem
FPS	formatting print service
FSL	forms source library
FST	font specification table
GCR	group code recording
gsm	grams per square meter
HCF	high-capacity feeder
HCS	high-capacity stacker
HFDL	host forms description language
HIP	Host Interface Processor
hpos	horizontal positioning
IBM	International Business Machines Corporation
IFU	Interpress font utility
IG	image generator
IGM	image generator module
I/O	input/output
IOM	image output module
IOT	input output terminal, also referred to as “printer”
IPD	Interpress decomposer

IPFONTS	Interpress fonts
IPL	initial program load
IPM	Interpress mapping
ips	inches per second
JCB	job control block
JCL	job control language
JDE	job descriptor entry
JDL	job descriptor library
JID	job identifier
JSL	job source library
LAN	local area network
laser	light amplification by stimulated emission of radiation
LED	light-emitting diode
LEF	long-edge feed
LF	long-edge feed
lpi	lines per inch
LPS	Laser Printing System
MTU	magnetic tape unit (refers to the 9-track magnetic tape drive; also referred to as “magnetic tape drive”)
OCR	optical character recognition
OCS	operator communications subsystem
OLI	online interface
OS	operating system

OSDS	operating system diagnostic software
OSEXEC	operating system executive
OSS	operating system software
PC	personal computer
PCC	printer carriage control
PC UI	personal computer user interface
PDL	print description language
PE	phase encoded
ppm	pages per minute
PQA	print quality adjustment
PROM	programmable read-only memory
PSC	printer subsystem controller
pt	point
PWBA	printed wiring board assembly
QIC	1/4 inch cartridge
RAM	random access memory
ROS	raster output scanner
SAFES	stand-alone field engineering software
SAN	software analysis number
sci	START command index
SCSI	small computer system interface
SDLC	synchronous data link control
SEF	short-edge feed

SFS	status file services
SIF	sequence insert file
SNA	system network architecture
spi	spots per inch
SST	system software tape
sysgen	system generation
TL/DL	text line/display list
TOF	top of form
tpi	tracks per inch
TPJ	test pattern job
TXC	total xerographic convergence
UCS	Universal Character Set
UCSB	Universal Character Set Buffer
UI	user interface
VM	virtual memory
vpos	vertical positioning
VS	virtual storage
WAN	wide area network
XCSC	Xerox Customer Support Center
XDGI	Xerox DCF and GDDM Interface
XDSS	Xerox Documentation and Software Services
XICS	Xerox Integrated Composition System
XJCF	Xerox Job Control Facility

XMP	xerographic mode persistence
XMS	xerographic mode switching
XPAF, XPF	Xerox Printer Access Facility
XPMF-VMS	Xerox Print Management Facility - VMS Version
XPPI	Xerox Pen Plotter Interface
XPS	Xerox Publishing System

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