Guide to Advanced Function Presentation

G544-3876-00

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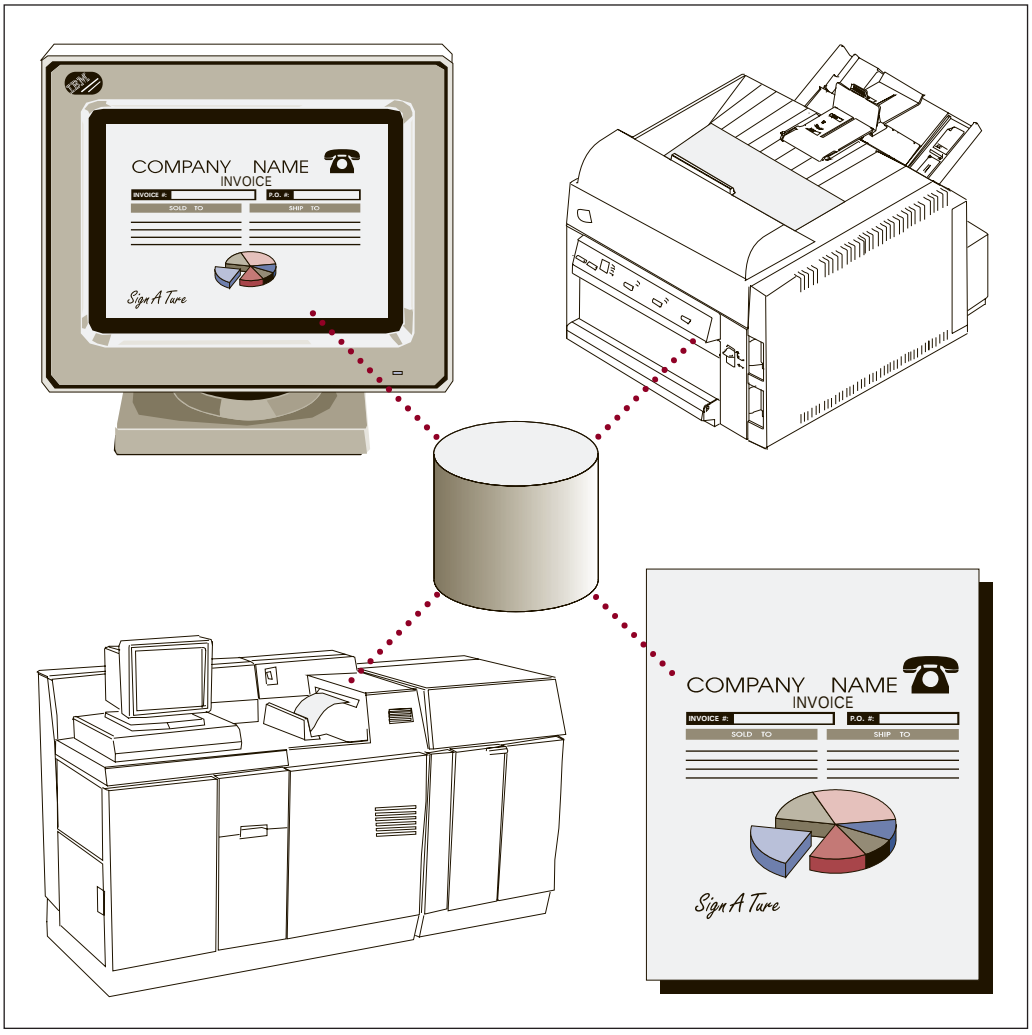

Note!

Before using this information and the product it supports, be sure to read the general information in “Notices” on page iii.

First Edition (June 1993)

This first edition of *Guide to Advanced Function Presentation* replaces *A Guide to IBM's Advanced Function Printing*, G544-3095, which provided detailed, industry-specific examples of AFP applications, and *Advanced Function Printing: Software General Information*, G544-3415, which described AFP software products. Be sure to use the correct edition of this publication for the level of the products you are using.

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INFORMATION DEVELOPMENT
PENNANT SYSTEMS
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- IPDS
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Tell me about this publication

This publication describes how Pennant Systems' Advanced Function Presentation (AFP) products work together to *present* your company's information: creating, indexing, viewing, distributing, and printing. Pennant's partnerships with other hardware and software companies extend the capabilities of Pennant's product line.

Who is the audience?

The audience for this publication consists of executives, end users, system administrators, and implementers. The information is written for several purposes: to serve as an executive overview, to introduce end users to the richness of AFP function, to give system administrators a preview of AFP's capabilities, and to point implementers to the variety of AFP products to accomplish their information-presentation tasks.

How is this publication organized?

In this publication, the words *information*, *data*, and *document* are used somewhat interchangeably. Also, when the text refers to System/390 (S/390) products, it includes System/370 (S/370) products.

- Chapter 1, “How can AFP help my business?” asks questions to help you understand how AFP can help your business and meet your information-handling needs. The chapter ends with a list of AFP benefits for your business.
- Chapter 2, “What are the basics of AFP?” describes the AFP architecture and provides simple descriptions of how you create, use, and manage information. The chapter briefly describes AFP resources.

  Chapters 1 and 2 serve as an executive overview.
- Chapter 3, “Can you provide more details about AFP?” describes printing with AFP and how it is superior to line printing. The chapter then describes the AFP resources in more detail.
- Chapter 4, “What are some of the AFP products?” provides details about the AFP products and lists the program numbers of the licensed programs. The chapter also includes a list of Pennant's cooperative business partners and lists their products that work with AFP.
- Chapter 5, “What are some AFP applications?” describes industry-specific applications of AFP.
- The appendix lists additional publications containing detailed information about AFP products. If you need additional information, see your Pennant marketing representative.

This publication does not contain detailed information about printers supported by AFP; for a summary of these printers, refer to *Advanced Function Presentation: Printer Summary*. For information about programming considerations for specific printers, refer to *Advanced Function Presentation: Printer Information*. For product information about a supported printer, refer to the publications for that printer.

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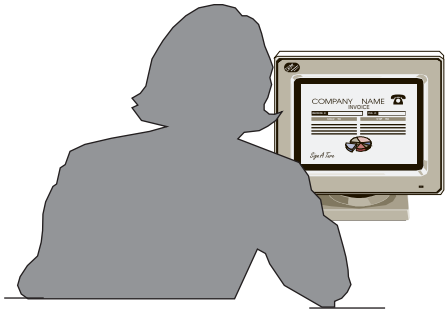
Chapter 1. How can AFP help my business?

This publication describes how Advanced Function Presentation (AFP) products work together to “present” your company's information. This first chapter shows how AFP can benefit your business by improving the way you handle your information.

Do you want to:

View your formatted output on a computer display *before* printing it or *instead* of printing it?

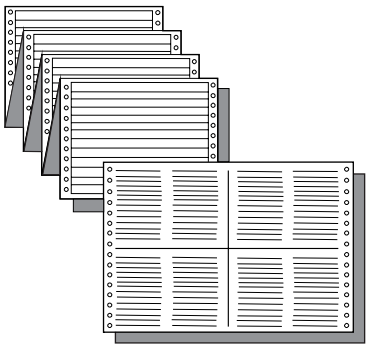
Benefit: You'll save time, paper, and unnecessary printing expenses.



Do you want to:

Print system output using smaller fonts and printing more than one page of data on a single sheet?

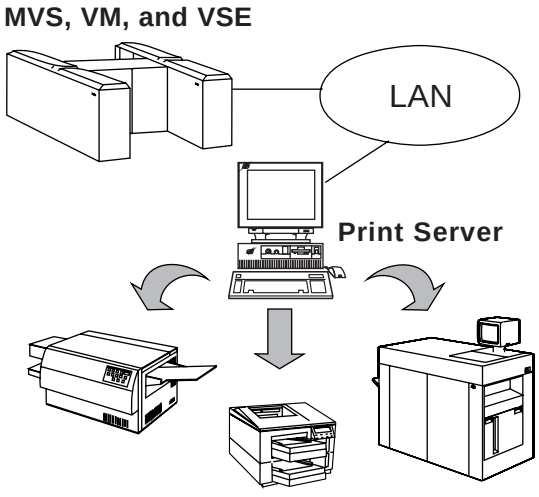
Benefit: You'll save paper and storage space.



Do you want to:

Send a document stored on your headquarters' S/390 computer to a PS/2, AS/400, or RISC System/6000 for printing?

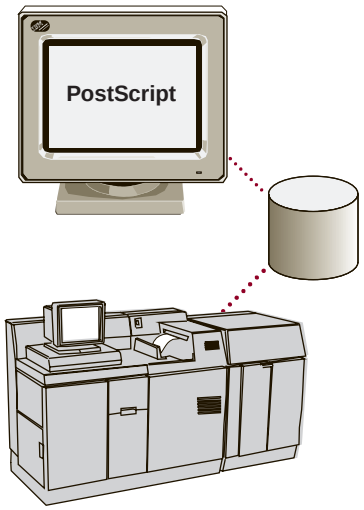
Benefit: You'll save the time and expense of copying and mailing the document.



Do you want to:

Print a PostScript Level 1 document on a printer capable of printing up to 229 impressions per minute?

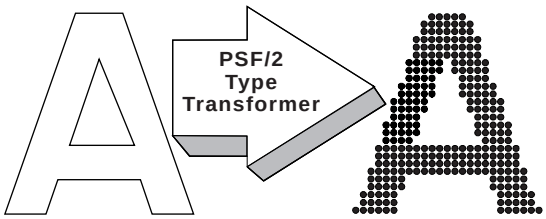
Benefit: You'll protect your investment in PostScript applications by using AFP, which supports many data formats.



Do you want to:

Convert any Adobe Type 1 fonts into fonts that can be used on AFP printers?

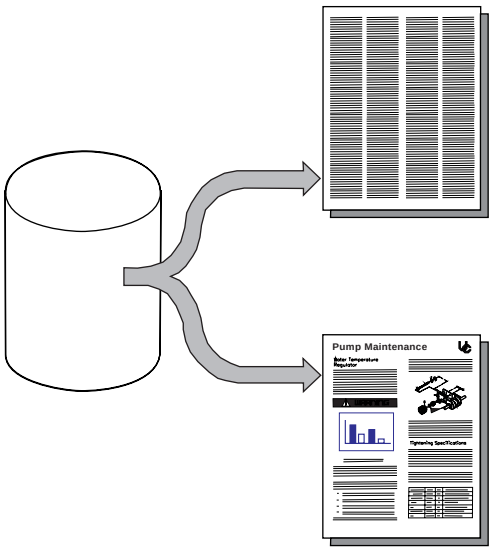
Benefit: You can choose any fonts you need from over 10 000 styles available in Adobe Type 1 format and use them with your AFP printers.



Do you want to:

Extract data from your AS/400 data base and print it in a different format? For example, you can create price lists, inventory status reports, or parts catalogs from the same source.

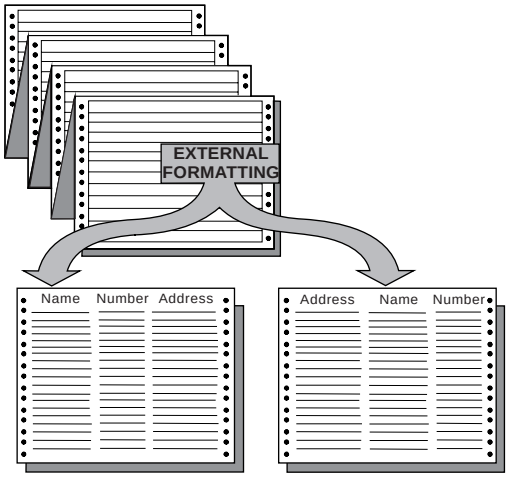
Benefit: You'll save money and improve accuracy by using a single data source for multiple purposes, without having to retype the data in a different format.



Do you want to:

Change the format of printed output from your application programs without changing the application program itself?

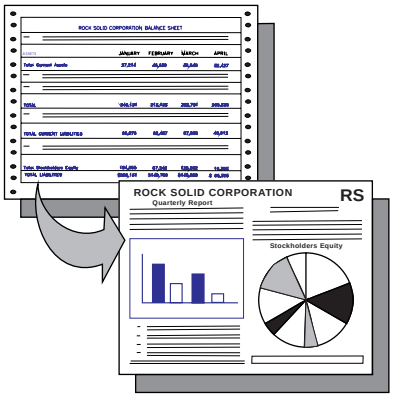
Benefit: You'll improve your programmers' productivity and use a single source of information for different purposes.



Do you want to:

Print line data on page printers but incorporate complex images and graphics such as graphs, charts, logos, and bar codes?

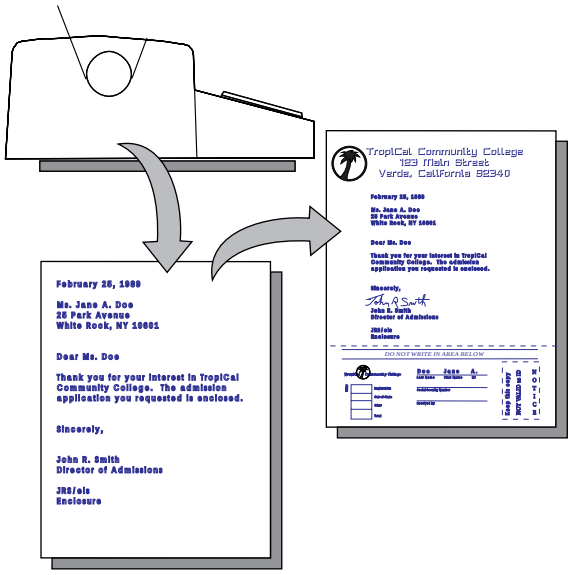
Benefit: You'll protect your investment in line data and will improve the quality and readability of your print output.



Do you want to:

Print your office documents, letters, reports, and presentations but add different fonts, letterheads, logos, signatures, and graphics?

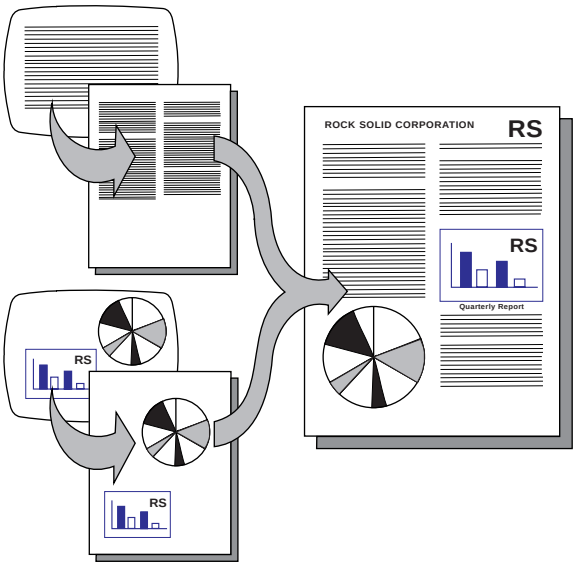
Benefit: You'll improve the quality and appearance of your office documents.



Do you want to:

Proof your output in-house, with the graphics and text merged?

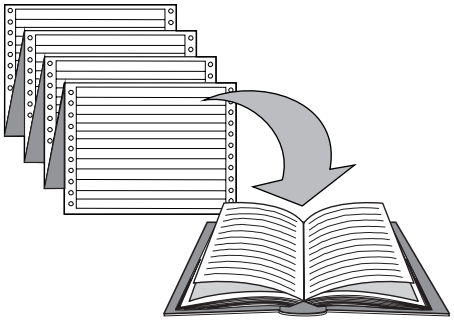
Benefit: You'll save the expense of hiring an outside typesetter to merge text and graphics for you.



Do you want to:

Create procedures guides, handbooks, and training manuals?

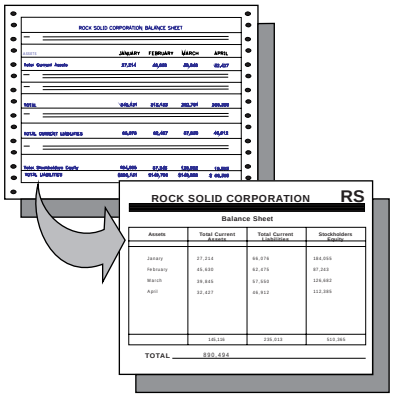
Benefit: You'll save time and money by creating these documents in-house, rather than by hiring outside vendors to do them for you.



Do you want to:

Create your own forms in-house?

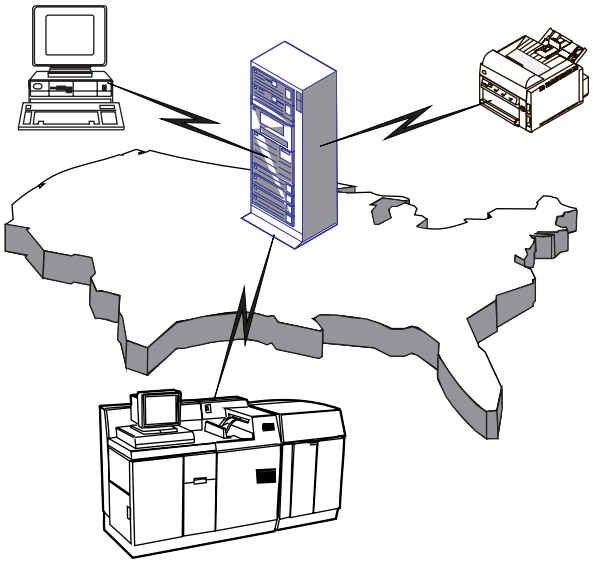
Benefit: You'll improve the flexibility and quality of your forms, avoid the expense of having someone create them for you, and avoid the inventory problems associated with preprinted forms (forms obsolescence, storage, handling).



Do you want to:

Access a System/390 or AS/400 application from your personal workstation, then print the output on a printer attached to a print server on a LAN?

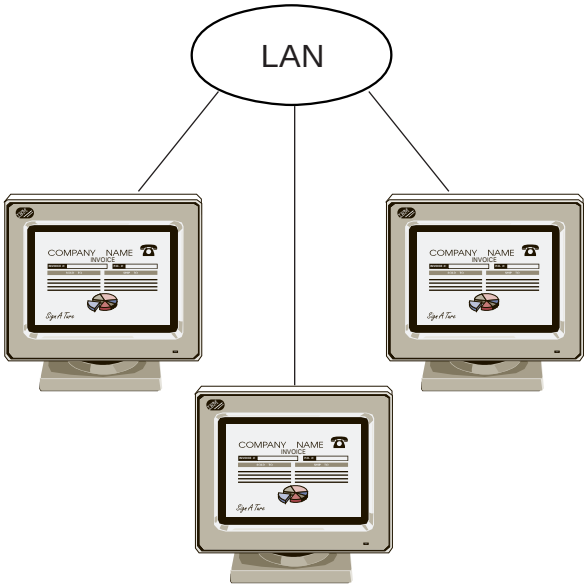
Benefit: You'll protect your investment in various computer platforms while using each platform to best advantage.



Do you want to:

Create a document on your personal workstation, view it, and distribute it electronically on a LAN?

Benefit: You'll avoid the expense and delay of using paper and the mail service.



Do you want to:

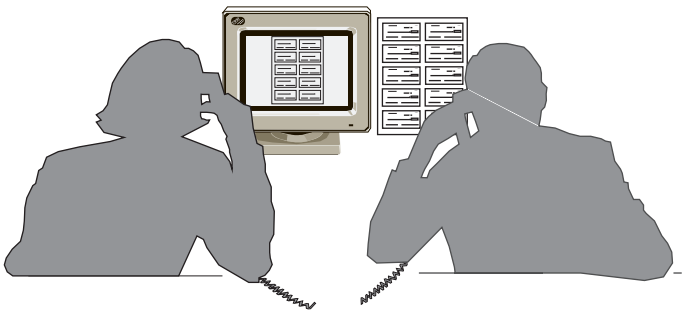
Print postal permits and bar codes on your documents to convert them into mailers?

Benefit: You'll save the time and expense of stuffing envelopes and affixing stamps and perhaps can qualify for cheaper postage rates.

Do you want to:

Prepare and index customer statements and documents for archiving, along with print resources such as images and overlays, so that you can later view or print a specific statement, exactly as your customer received it?

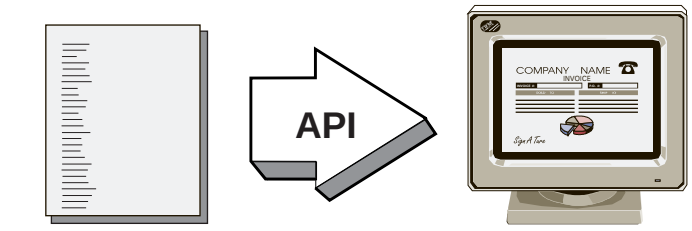
Benefit: You'll save paper storage space by eliminating printed output, save time and expense by eliminating microfiche, and improve customer service by providing immediate access to an exact replica of the statement about which your customer is calling.



Do you want to:

Use a program that produces AFP data from a high-level programming language such as COBOL or PL/1?

Benefit: You'll enable your programmers to produce high-quality, tailored output, without the expense of extensive retraining.

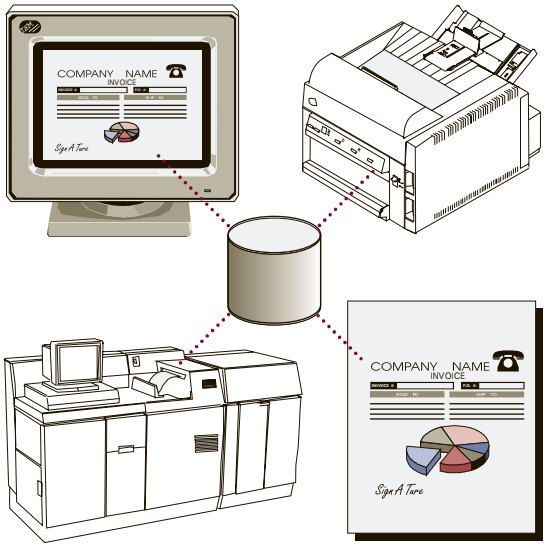


COBOL or PL/1 **AFP data**

Do you want to:

Find a single solution for all your printing needs on all your operating system platforms, from high-capacity production printing on the System/390 to distributed printing on desktop printers attached to personal workstations?

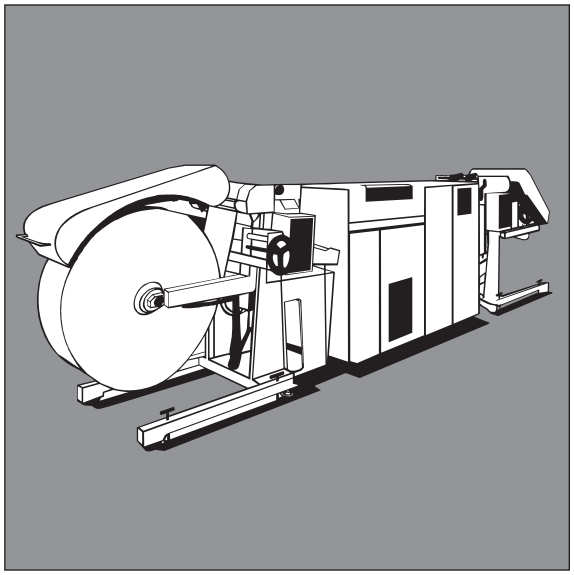
Benefit: You'll save money by not purchasing different printers for each computer platform.



Do you want to:

Find a printing solution that enables you to operate essentially a “lights out” environment, accomplishing your high-volume production printing after the usual business hours?

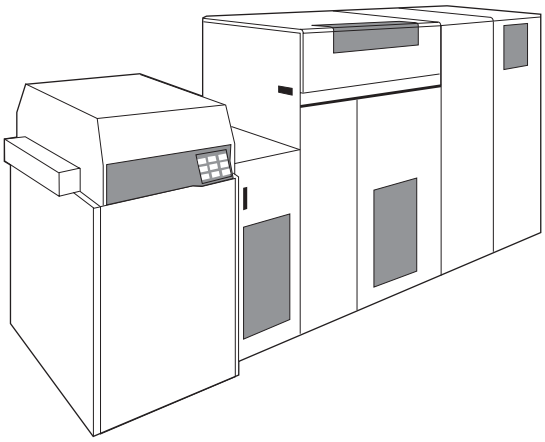
Benefit: You'll save money by reducing the number of printer operators needed for off-shift operations.



Do you want to:

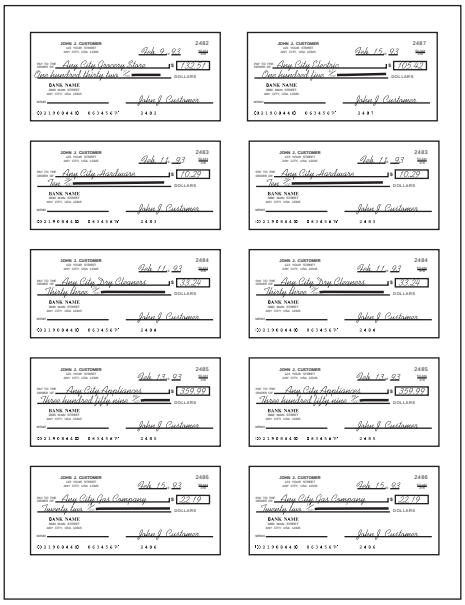
Use a postprocessing device attached to your printer to print documents with MICR characters, such as checks?

Benefit: You'll save time and money by printing MICR documents in-house, with your own equipment.



Do you want to:

Include scanned images of transaction items such as cancelled checks, delivery receipts, credit slips, and work orders in the statements you send to your customers?



Benefit: You'll improve customer satisfaction, reduce billing inquiries, and shorten your billing cycle by providing your customers with verification of their transactions. You'll also save time, expense, and postage by providing the information electronically instead of manually.

If your answer to any of these questions is yes, AFP is the solution.

What are the benefits of AFP?

AFP provides the following benefits:

- System-managed printing in all IBM operating environments: MVS, VM, VSE, OS/400, OS/2, and AIX/6000
- Incorporation of industry standards:
  - Application data streams: MO:DCA-P, ASCII, PostScript Level 1, OS/2 graphics in metafile format, ditroff, IPDS, SCS, and line data
  - Network protocols: Novell NetWare, TCP/IP, and IBM LAN Server
  - Platforms: System/390, PS/2, RISC System/6000, AS/400, and other platforms that generate accepted data streams
  - Image compression algorithms such as CCITT Group 3 and Group 4
- Automatic error recovery with detailed error messages
- Automatic accounting information
- Resource management
- A family of supported printers with a variety of capabilities and features

With AFP you can:

- Create an AFP data stream from programs written in the COBOL and PL/1 high-level programming languages
- Index documents for efficient archival, retrieval, viewing, and printing
- View the merged information before printing it or instead of printing it
- Transmit data among various platforms and print information on printers attached to these platforms and to LANs
- Print information using AFP's powerful print capabilities
- Print with typographic (proportionally spaced) and uniformly spaced (monospaced) fonts of varying styles and sizes
- Print more information in less space (condensed printing)
- Use electronic overlays rather than preprinted forms
- Merge and print text, graphics, and images (line art, pie charts, business graphics, logos, signatures, and scanned output such as photographs)
- Print bar codes
- Use formatting controls external to the data itself
- Create varied page layouts from the same source information
- Print the same information on central or remote host printers (outside the computer room) or on printers attached to LANs or personal workstations

Chapter 2. What are the basics of AFP?

In today's business environment, you must increasingly rely on computers to manage information, one of your most valuable assets. You must perform activities such as creating, indexing, archiving, retrieving, viewing, distributing, and printing information. You must link computer platforms from mainframe to midrange to micro and must be able to transmit information from one platform to another, display it on your workstation, and print it on a variety of printers attached to these platforms.

All of these activities require a common set of rules or architecture. IBM's AFP architecture, upon which Pennant Systems' AFP software and hardware are based, provides such a set of rules.

Why is architecture so important?

AFP begins with the architecture, the set of rules and conventions governing creation and control of data types (text, font, image, graphics, bar code, fax, color, audio, and multimedia, among others). The specific interchange architecture, which is called MO:DCA-P (Mixed Object Document Content Architecture-Presentation), makes information interchange possible among different platforms using different protocols. Without such an architecture, interchange of information is difficult and unpredictable.

The AFP architecture allows data interchange among platforms ranging from System/390 (MVS, VSE, and VM), to AS/400, to RISC System/6000, and to PS/2. The architecture supports such networks as Novell NetWare 3.1.1 LAN, IBM LAN Server, and TCP/IP and supports numerous input and output data streams.

As shown in Figure 1, AFP supports a variety of platforms and protocols.

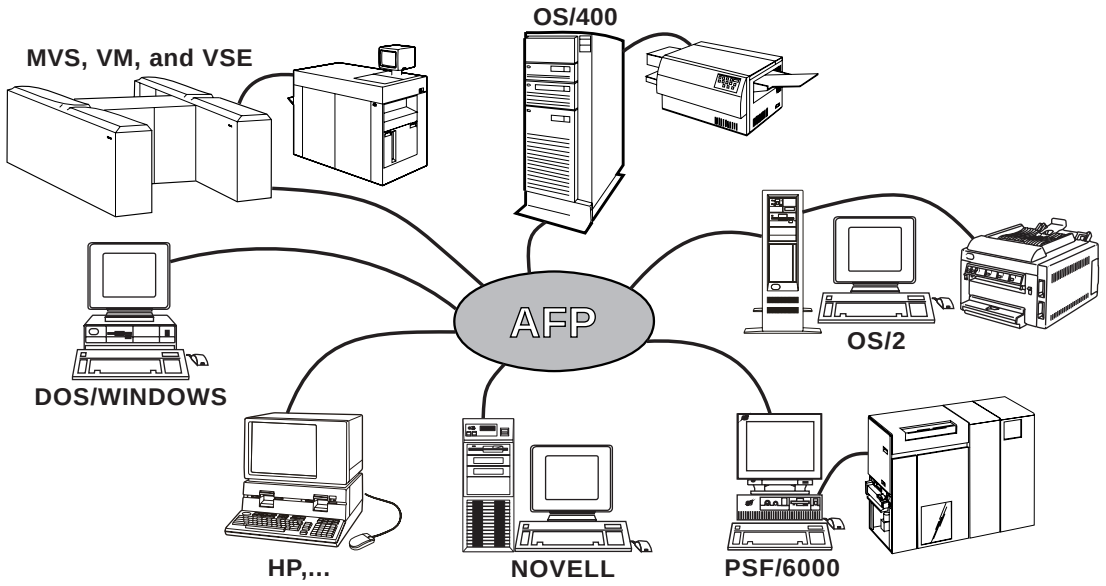


Figure 1. AFP: supporting your environment

Because of this architecture, you can print information on Pennant Systems' printers at speeds ranging from 5 to 229 impressions per minute, in addition to printing on printers supplied by Hewlett-Packard, Lexmark, and other manufacturers. Because of this architecture, you can also view exact replicas of the archived information on a workstation display. The Advanced Function Presentation architecture is the glue that binds all the AFP products together. Most important, the glue is flexible enough to continue growing, expanding, and encompassing new data types, products, and applications.

What are the phases through which information progresses?

Imagine that information progresses through phases, as shown in Figure 2:

- **Creation**

  Information to be printed or viewed almost always contains text. To display or print text, you need fonts. You may also want to include graphics, and you will need formatting resources to format the information.

- **Use**

  To use the information, you need programs to index, archive, retrieve, distribute, view, and print it.

- **Management**

  To manage your information, you can store it either unformatted or formatted, including all the necessary resources.

Figure 2. Creating, using, and managing information

To take the information through these phases, you must use various programs and products, which are described in the rest of the chapter.

How can I create documents?

You can create the text portion of your documents by using a variety of products. You can use some of the products to produce the text directly, while you can use other products to produce information indirectly, by converting existing data to MO:DCA-P format. Depending on the platform on which you create the documents, you can use different products. You can also use non-IBM products, which are described later in this publication.

What IBM products can I use on a System/390 system?

You can create complex printed documents by using **Document Composition Facility (DCF)**, which is a powerful text-processing program that uses control words and tags to format text, automatically generate indexes and tables of contents, and include graphics and various fonts. DCF enables you to control page and line breaks and make formatting decisions. DCF can produce many types of output data streams and supports Generalized Markup Language (GML) applications in which the content of the document is independent from its appearance. With DCF 1.4.0 and APAR PN36437, you can include navigation information in your documents to use with viewing, archiving, and retrieving applications. You can use other AFP software to view and print the documents you create using DCF.

You can also use **BookMaster** to create complex printed documents. BookMaster, a powerful text-processing program, uses DCF's GML tags and the SCRIPT/VS text formatter and adds additional tags, attributes, and predesigned style files to help you create your documents.

You can use **DisplayWrite/370 (DW/370)**, which is a word-processing program, to create smaller, less complex documents than those created using DCF or BookMaster. DW/370 is ideal for creating documents such as letters, memos, and reports.

Using the **AFP Application Programming Interface (AFP API)**, you can create an AFP data stream by using the COBOL and PL/1 high-level programming languages. Instead of producing line data from your COBOL and PL/1 programs, you can use the procedure calls in AFP API to create an AFP data stream in MO:DCA-P format.

Using **AFP Conversion and Indexing Facility (ACIF)**, you can create a MO:DCA-P document from line data or from a mixture of line data and AFP data.

What IBM products can I use on an AS/400 system?

You can create office documents in AS/400 using **OfficeVision/400** or **WordPerfect/400** and then print the documents on AFP printers. In addition, you can use products offered by IBM Business Partners and independent software vendors, whose programs support the creation of sophisticated printed output on the AS/400.

What IBM products can I use on a workstation?

Using the **IBM AFPDS Windows Driver** program, you can create documents from any Microsoft Windows application. The IBM AFPDS Windows Driver is installed as a Windows printer driver, with its output directed to a file. When you select the print function from any Windows application, you can select the IBM AFPDS Windows Driver as the "printer," and the driver will convert the application data into AFP document format and write it to a file. The IBM AFPDS Windows Driver is shipped with two IBM products: **Print Services Facility/2** (PSF/2) and **AFP Workbench for Windows**.

Using transform programs provided with **Print Services Facility/6000** (PSF/6000), you can convert data in print formats common to the AIX environment to AFP document format. These transform programs can be invoked without printing the file, so that you can generate an AFP document for viewing or interchange with another system, not just as a step towards printing it on a PSF/6000 printer.

Using **MARKUP** on a workstation, you can enter text and Generalized Markup Language (GML) tags to create a document, which you can then format using DCF on a System/390 computer. You can use MARKUP in either Text Mode, in which you type text and use the keyboard to enter tags or commands, or in Menu Mode, in which you enter tags by selecting items on menus.

In addition to text, what else can I use?

After creating the text for your document, you may want to use graphics and images such as charts, graphs, logos, boxes, lines, or shading, to make your document more readable and interesting. After you have created these graphics and images, you can store them as resources in a system library, where they are available for use by other jobs. In addition to resources stored in system libraries, some resources can be contained in the print files themselves, which allows you to have a private resource (such as a signature) that only you can use.

The five types of AFP resources are:

- **Fonts** are families or assortments of characters of a given size and style. Fonts are available in different horizontal spacings:
  - Uniformly spaced, such as typewriter fonts or fonts generally printed by line printers
  - Mixed-pitch, or fonts that have characters of several different horizontal widths
  - Typographic, or fonts with characters of varying horizontal widths, such as fonts used in typesetting.

  In addition to fonts containing characters of varying widths, fonts are available in multiple vertical sizes.

  Some AFP products supply fonts, and you can purchase other fonts as separate IBM licensed programs. You can also use non-IBM products to supply, create, and convert fonts.
- **Overlays** are collections of coded information describing where to put boxes, lines, shading, text, logos, and graphics on forms. When printed with variable data from applications, overlays can replace the need for preprinted forms.

  You can use AFP or non-IBM products to create overlays for special application requirements.

- **Page segments** are collections of data that can be printed anywhere on a page or at the same place in every page of a print job. Examples of items that can be page segments include logos, signatures, bar charts, and engineering drawings.

  You can use AFP or non-IBM products to create page segments or to convert scanned images or vector graphics into page segments.

- **Form definitions** are control resources that contain information about how a page of data is presented on the printing medium (sheet of paper). Form definitions specify such things as the paper source, the number of copies, which overlay to use, and whether the data should be printed on one or on both sides of the sheet.

  Form definitions are supplied with some AFP products, and you can use other AFP and non-IBM products to create form definitions for special applications.

- **Page definitions** are control resources that contain information about the placement of line data on a page. Page definitions specify such things as line positioning and page length, the fonts used for printing, and whether output should be rotated.

  Page definitions are supplied with some AFP products, and you can use AFP and non-IBM products to create page definitions for special applications.

Although Pennant supplies resources suitable for common uses, Pennant also offers products you can use to create customized resources for your specific applications. You can also use products provided by Pennant's cooperative software business partners.

How can I use documents?

You use documents every day to store information, to inform and persuade others, and to confirm business agreements. To perform these tasks, you can use programs to index, archive, retrieve, distribute, view, and print the documents.

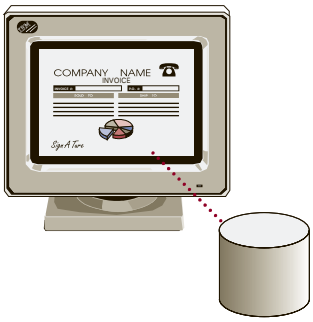
How can I index documents for archival and retrieval?

Indexing allows a large print file to be logically segmented into uniquely-identifiable pages or page groups. Bank-statement applications, for example, can create large print files, with each print file containing thousands of individual statements. Each of these statements can be thought of as a page or page group and can be uniquely identified by an attribute such as an account number. Other attributes, such as a date and type of account, can further identify a specific customer's statement.

Documents designed for viewing on a workstation can contain indexing information to facilitate navigating through the document. Archival and retrieval applications can then use the indexing information to identify separate parts of a large print file for saving or restoring.

Using **ACIF**, **AFP API**, or **DCF**, you can index uniquely identifiable segments of MO:DCA-P documents for archival and subsequent retrieval. For example, you can index bank statements and then retrieve a single customer's account or a single entry in an account and view it with the **Viewer** application of **AFP Workbench for Windows**. If a customer has a question about his or her account, the customer can call the bank and discuss the account with a bank employee, who can view the account statement on a workstation display. Any type of business can index documents for later archiving, searching, and retrieving.

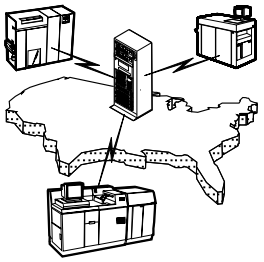
How can I view documents?



Using the Viewer application of AFP Workbench for Windows, you can display your formatted AFP documents, page segments, overlays, and ASCII files, using a workstation running Windows 3.0 or above or WIN-OS/2. You can clip a portion of a displayed page and enlarge it for easier reading, and you can view the document in multiple-up format (more than one page of data on a single display screen).

Using the Viewer application, you can print one or more document pages on a PSF/2- or Windows-attached printer. You can convert a page or page segment into an AFP overlay, select a different form definition to display an AFP file, convert an AFP overlay or page segment to a page, and navigate through or search documents using page numbers, page identifiers, keyword strings, or indexing tags.

How can I distribute documents?



You may need to obtain documents from or send documents to remote sites, where users can view or print them on small printers located in individual offices or on large printers located in computer rooms. You can distribute AFP data throughout your enterprise with any of the available communications protocols, such as IBM LAN Server, TCP/IP, or Novell NetWare. In addition, using the **Distributed Print Function of PSF/2**, you can route AFP data from a host printer driver on MVS, VSE, VM, or OS/400 to a print spool on OS/2. You can print the data from the print spool by using the PSF/2 printer driver on OS/2.

Using ACIF, you can collect and package all the AFP resources (fonts, overlays, page segments, and the form definition) needed to print or view a document. You can send the entire package to another site or to another platform, where users can view it in formatted form and perhaps archive or print it, days, weeks, or even years after its creation.

Using AFP to view or print documents at a remote location saves the time, effort, and expense of mailing the printed document to the remote location or of using couriers to carry it. Sometimes printing documents is not necessary; the recipient can accomplish necessary tasks by merely viewing the documents using an AFP program.

How can I print documents?

One important way to use information is to print it. Figure 3 shows some of the AFP printers on which you can print your data. The AFP printer driver on each operating system combines the data and resources and drives the printer, printing your document.

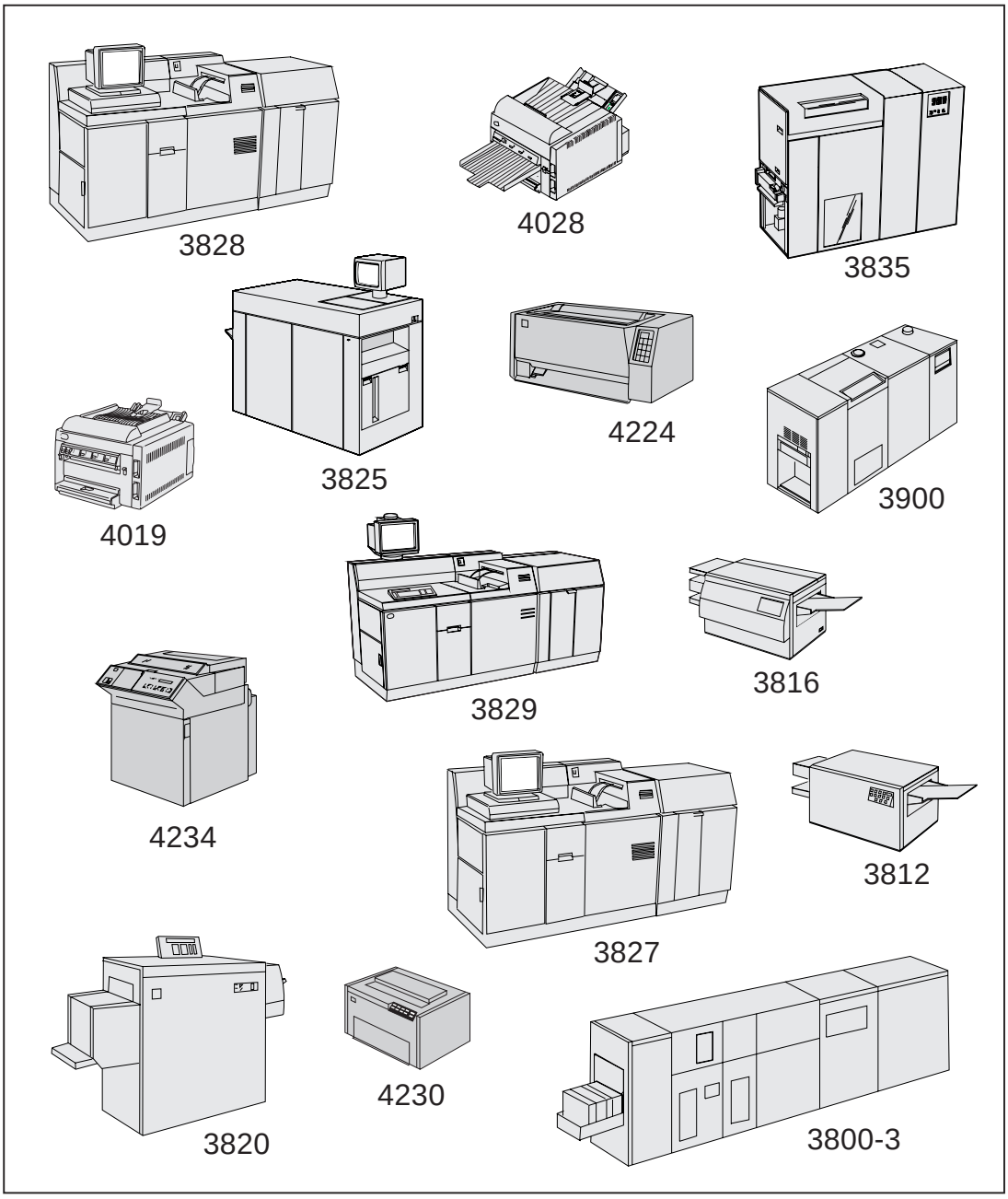


Figure 3. AFP printers

How can I manage documents?

To manage documents, you can, among other things, delete them or store them in unformatted format, using the program you used to create them. Or, you can use **ACIF** to prepare them for archiving in formatted form, so that you can later retrieve, view, or print them. When you archive a document formatted using ACIF, you can be confident that it will appear exactly as it did when archived, perhaps years ago, because ACIF can be used to include the original resources (fonts, page segments, overlays, and the form definition) inline with the document.

What's AFP in a nutshell?

In a nutshell, **AFP** is:

- An architecture that defines the interchange of data
- A collection of products to manage your information
  - Products for creating, indexing, viewing, distributing, and printing information
  - A way to distribute information directly to the people who need it, who then use the information in whatever format is best
  - A way to immediately enhance your line-printing applications and improve the print quality of your text and graphics applications
- The solution for your information-presentation needs

Chapter 3. Can you provide more details about AFP?

This chapter provides details about AFP printing and why it is superior to line printing. The chapter then describes the AFP resources used in printing and viewing data.

Tell me about AFP printing

Figure 4 shows the basic components of AFP printing. The right side of the figure shows the data streams processed by AFP, while the left side shows the five types of resources. The data streams and resources are processed by the printer driver, which in turn drives the AFP printer.

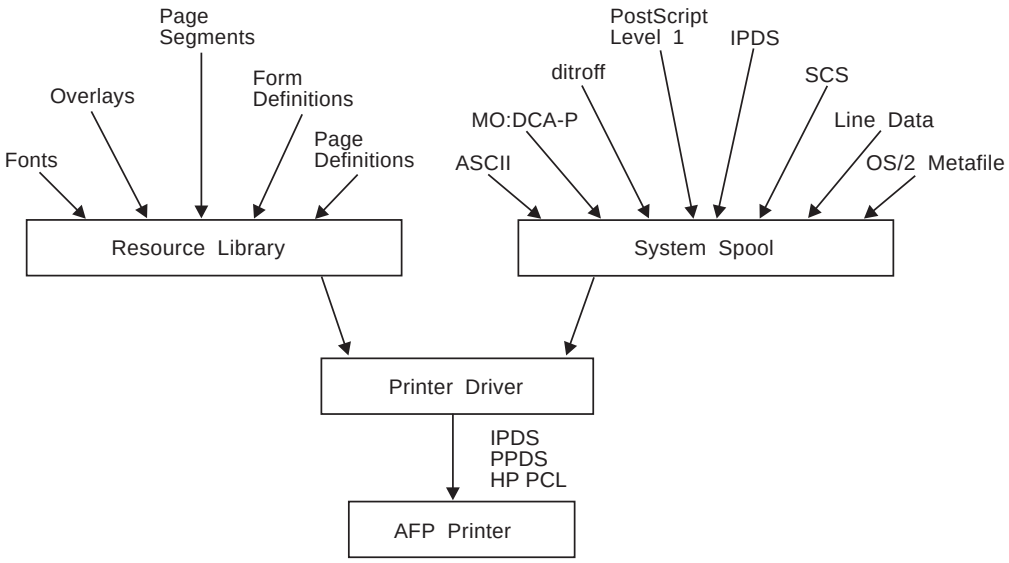


Figure 4. Overview of AFP

The figure uses the following names of data streams, which might be new to you:

- *ASCII* data is application data prepared for printing on a workstation printer.
- *ditroff* data is device-independent data produced for phototypesetters, usually on AIX systems.
- *IPDS* data is data that PSF produces to send to printers and that contains both data and the controls defining how the data is to be presented.
- *Line data* is application data prepared on a System/390 for printing on a line printer such as a 6262 or 3211.
- *MO:DCA-P* data is data that is already composed into pages. Included in MO:DCA-P data are the structured fields (formatting information) that organize data on each page. MO:DCA-P, which stands for Mixed Object Document Content Architecture-Presentation, is sometimes referred to as AFPDS.
- *OS/2 metafile format* data is graphics data produced by Presentation Manager applications.
- *PostScript Level 1* data is data that uses a specialized *page descriptor language* with graphics capabilities.
- *SCS* data (SNA Character Set) is data that is processed by the OS/400 operating system. SCS is a simple control-byte structure in which most commands are related to a hexadecimal byte and are row and column oriented for placement of text.

The figure also uses the following terms:

- *Printer driver* is a program that passes commands and resources with a data stream from the system spool to tell the printer how to print the data. The Print Services Facility licensed programs are one type of printer driver.
- *System spool* is a special storage area that allows users to queue jobs to a device, such as a printer.

On the right side of Figure 4, different types of data are placed on the system spool, which transfers the data to the printer driver. The AFP printer drivers on the various operating systems can handle the data streams shown in Table 1.

Table 1. AFP printers drivers and supported input (I) and output (O) data streams

	PSF/6000	**PSF/2**	**OS/400 ***	**PSF/MVS PSF/VM PSF/VSE**
ASCII	I	I		
ditroff	I			
IPDS	O	O	I/O	O
MO:DCA-P	I	I	I	I
Line data			I	I
OS/2 metafile		I		
PostScript Level 1	I	I		
SCS			I	
HP PCL4/5	O	O		
PPDS	O	O		

Note: * The PSF functions are part of the OS/400 operating system.

What is a printer driver?

The *printer driver* is the software that takes the data from the system spool, combines it with the resources needed to print that data, and sends the result to the printer.

The printer driver also performs two special functions: resource management and error recovery. The printer driver collects the resources (fonts, page segments, overlays, form definitions, and page definitions), so that the necessary resources are available when they are needed. Because resources are collected and managed by the printer driver, the printer operator does not have to ensure that the resources are available in the printer.

The printer driver also provides error recovery. For example, if the printer has a paper jam, the printer driver can reprint the pages involved in the jam after the operator has cleared the jam.

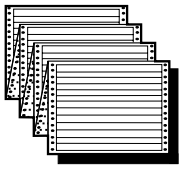
What is an APA printer?

An *APA printer* places data not just at line and character positions but *at any addressable point (pel* or *picture element) on the paper*, a capability called all-points addressability (APA). All AFP printers are APA printers.

Why is AFP printing superior to line printing?

To appreciate AFP printing, you should first be aware of the limitations of line printing.

What are the limitations of line printing?



The first computer applications with huge volumes of data were generally printed on line printers, which print data line by line, in the order in which it is received. Stacks of output were generated as computer printers produced reports, billings, and program listings.

After line printers were developed that could print on paper sizes other than the industry standard of 14 7/8-by-11 inches, companies found that they could also publish their own documents (in-house reports, memos, correspondence, and manuals).

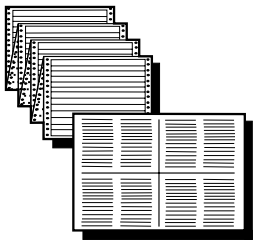
Obtaining the output for computerized information was easy because the data was generated and formatted automatically. As a result, companies often sacrificed the quality and flexibility associated with typesetting, opting instead for the speed with which large quantities of information could be printed by computer-driven line printers.

However, some of the following limitations of line printers adversely affected the quality of the printing:

- **Impact printing**. Most line printers are impact printers, which do not produce the high-quality printing that typesetting does. Because of mechanical wear and continual use of inked ribbons, the print quality produced by these printers degrades over time.
- **Uniformly spaced fonts**. Line printers usually use uniformly spaced fonts, whose characters have the same horizontal spacing. Uniformly spaced fonts are considered to be not as readable as typeset or typographic fonts. (Typographic fonts have characters with varying horizontal spacing between them; excess space between characters has been removed to improve the visual flow of text.) Pages printed with uniformly spaced fonts contain fewer characters than pages printed with typographic fonts.
- **Limited page layout**. With line printers, page layouts are limited by the fact that data can be placed only line by line on the page, in the order in which the printer receives it. To change the page layout, you must send the data to the printer in a new order, which requires a change to your application.
- **Managing preprinted forms**. To improve the appearance of the printed output, you can use preprinted forms to provide additional typefaces, graphics, and attractive page layouts on which computer data can be printed. Preprinted forms, however, require operator intervention to change them at the printer and are expensive to print, store, and modify. In addition, if you want to redesign a form, you must scrap the existing supply of preprinted forms and create a new form.
- **Use of multipart forms**. If you want to print multiple copies of a single output file on an impact printer, you must use multipart forms with carbon paper. These forms are more expensive than single-part forms and allow no flexibility in varying the number of copies from page to page. The print quality of the copies may be poor, and you must decollate the multipart form and handle each part separately when distributing it.
- **Merging text with graphics**. Although companies use computers to create graphics, they find merging graphics and text on the same page difficult. Because graphics are often printed on plotters, and text is printed on line printers, the only way to combine the text and graphics is to manually cut and paste them together.

Advanced Function Presentation overcomes these limitations and can improve your company's printing as well as its ability to handle information before printing or instead of printing.

Can I print my line-printer applications with AFP?

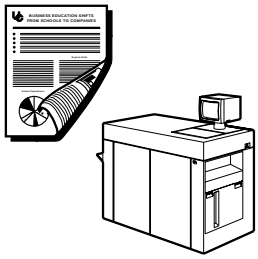


With AFP, you can print your line-printer applications on AFP printers. Because formatting controls can be external to the application program in AFP products, little or no modification to the application program is required to print the data on AFP printers.

These same applications can also be processed and improved by some of the functions available on AFP printers. For example, you can add overlays and rotated text to data formatted for a line printer.

With your existing applications, you can also use an AFP printer to change fonts and line spacing. If you don't change your application program, you can continue to print the output on line printers, if necessary.

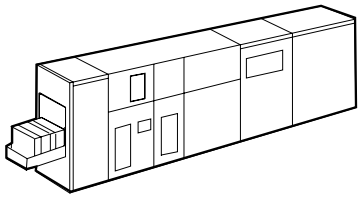
What are some other AFP printer features?



In the past, high-speed system printers did not provide a variety of features. Printing on continuous-forms output was the usual procedure but was not always what was needed, and printing on two sides of the paper was not possible. A printer operator had to separate jobs in the output stacker and load and unload special forms. Rarely was printer operation a “lights out” operation, with no one present. Human intervention was usually necessary, which was expensive.

With AFP printers, you can choose from a variety of printer features: printing on either cut-sheet paper or continuous-forms paper; printing on both sides of a sheet of cut-sheet paper; or bursting, trimming, and stacking operations to separate continuous-forms output into cut-sheet, collated output. Other features include offset stacking of different jobs in the output stacker, which makes separating jobs easier, and printing on a variety of paper sizes, allowing you to customize the printed output. Some AFP printers can print on envelopes, print with either single-byte or double-byte fonts, highlight errors, apply a gray scale or color, and compensate for disabled mechanisms. All of the features can operate without human intervention.

What are preprocessing and postprocessing devices?



You can attach additional devices to your computer printers to provide special document-handling capabilities.

Examples of preprocessing devices (equipment attached to the *input* side of the printer) include devices to feed paper from paper rolls and from multiple input bins that contain a variety of printing media, such as adhesive labels and card stock.

Examples of postprocessing devices (equipment attached to the *output* side of the printer) include devices that:

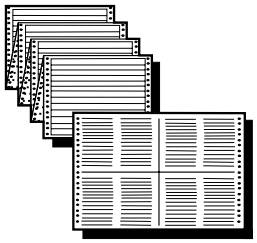
- Print with MICR fonts
- Print color
- Drill holes
- Bind
- Staple
- Cut
- Perforate
- Burst
- Trim
- Stack
- Collate
- Stuff envelopes

With AFP, you can use some or all of these devices attached to your printers. For information about postprocessing devices for AFP printers, see “Who are Pennant's cooperative business partners?” on page 68.

What are some additional capabilities of AFP?

AFP has additional capabilities that can enrich how you present information.

Why would I use condensed printing?



Data from application programs is typically printed on large-size paper. Many times, printed information from reports and program listings does not fill the sheet, which wastes paper. Output printed on large-size paper often has to be reduced for presentations or distribution, and large-size paper requires more storage space.

With AFP products, you can print with smaller fonts, thus decreasing the size of paper needed to print the data.

For example, by specifying two-up, three-up, or four-up printing, you can print two, three, or four pages of data on one side of a sheet of paper. Using a printer that can print on both sides of a sheet (duplex printing), you can further reduce the amount of paper used.

Customers have reported to Pennant some of the following benefits from using AFP products for condensed printing:

- An oil company saved 1000 boxes of paper a month.
- A bank increased printer throughput by 35–40%.
- A printing firm saved $30,000 a month on paper.
- Another bank saved $200,000 a month on paper.

What does orienting data on a page mean?

AFP printers can print text, images, graphics, and bar codes in up to four inline directions. For each direction, text characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 5.

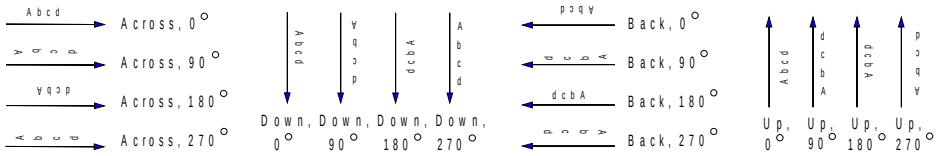
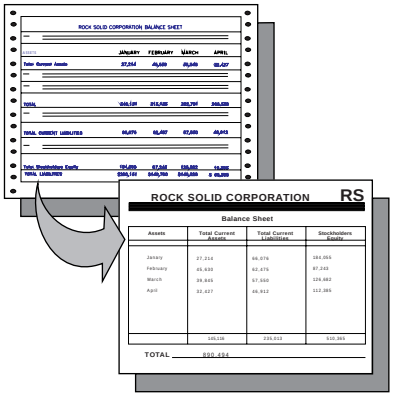


Figure 5. Orientations available on AFP printers

To learn which orientations are available on your printers, refer to *Advanced Function Presentation: Printer Information*.

What does flexibility in a page layout mean?



The layout of the page dramatically affects the way in which the reader perceives it. An attractive layout with adequate margins, plenty of white space, and columns designed to accommodate the text not only looks more professional but is easier to read. In addition, more information can be placed on the page without sacrificing legibility.

With AFP products, you can publish documents such as reports, letters, and memos with professional-looking page layouts and, without much effort, you can also adopt new layouts to fit your system printing needs.

What does indexing a document mean?

In AFP, indexing a document consists of:

- Defining the boundaries of groups of pages in the document, for example, the start and end of the statement for each customer in a file containing many customer statements
- Identifying a single page or a group of pages with an indexing *tag* containing an attribute name and value, for example, an account number attribute associated with the account number of each customer

Indexing a document enhances your ability to view, archive, or retrieve individual pages or groups of pages from a large document, such as a customer statement run containing statements for 1000 customers. With the Viewer application of AFP Workbench for Windows, you can locate a group of pages using the indexing attribute names and values defined for each group. You can navigate through a large file to locate a single customer statement more quickly than by performing a string search on, for example, a customer's name.

For the AFP Workbench for Windows product or for an archival or retrieval program to take full advantage of the indexing information in a document, you can use ACIF to create a MO:DCA-P *index object* file that identifies the location of all of the groups and tags in the document.

Tell me about AFP resources

The following information provides details about AFP resources: fonts, overlays, page segments, page definitions, and form definitions.

Fonts

To present text, you need fonts. To add variety to your documents, you can include fonts of various sizes, styles, weights, orientations, and attributes. A font is a collection of graphic characters sharing the same type family, style, weight, width, and size. Under the control of AFP software, AFP printers can print characters from a variety of fonts on the same page.

Most typewriters and line printers use what are known as *monospaced* (or uniformly spaced) fonts. Each monospaced character occupies a space of the same width. Thus, the lowercase “i” and the uppercase “M” occupy the same amount of space. *Typographic* fonts (proportionally spaced fonts) differ from monospaced fonts in that each character has spacing established by its shape and proportion, similar to the spacing of fonts used in typesetting. The lowercase “i” has a narrow width; the uppercase “M” has a wider width. *Mixed-pitch* fonts simulate proportionally spaced fonts, except that the characters have a limited set of widths. Figure 6 shows samples of monospaced, typographic, and mixed-pitch fonts.

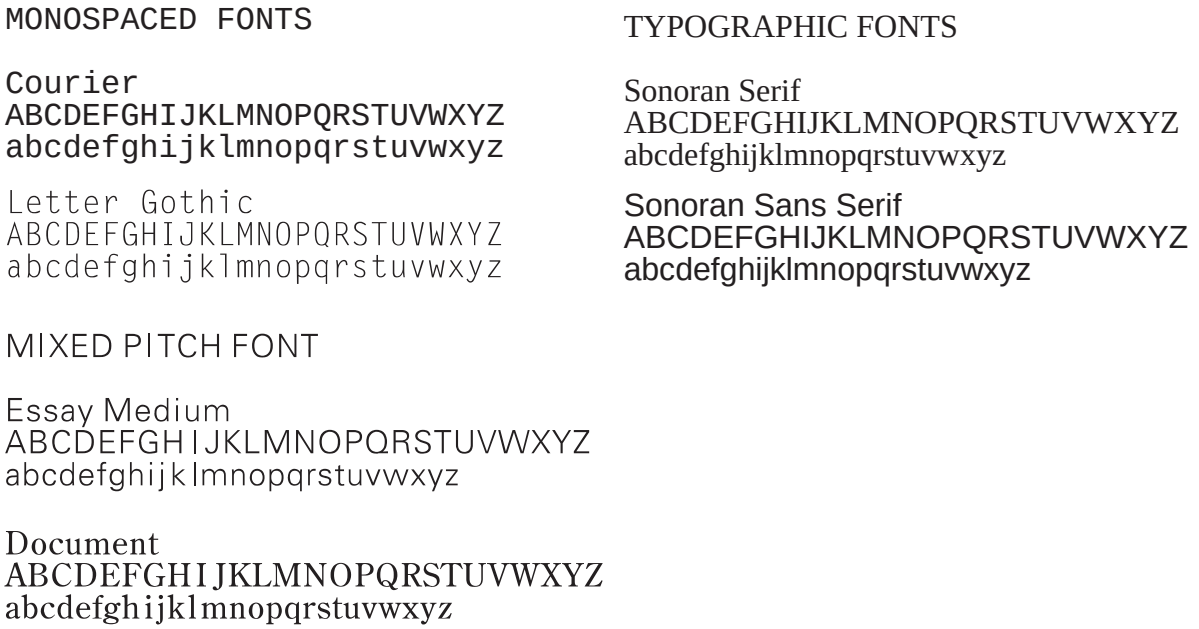


Figure 6. Samples of monospaced, typographic, and mixed-pitch fonts

Generally, typographic fonts are considered more legible than monospaced fonts and produce more readable text. In addition to improving the appearance of documents, typographic fonts allow a greater number of characters to be printed on a page. You can expect to print from 20 to 70% more information on the page, with an average increase of 46%, thus reducing the number of pages required to print the same information.

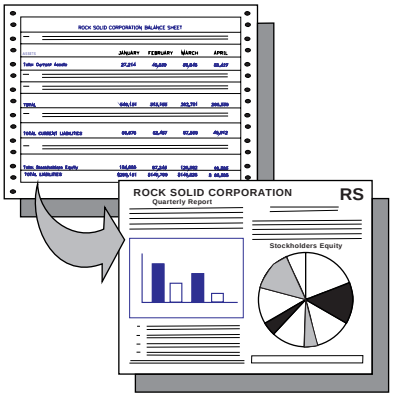
Fonts are stored in several different formats. *Raster fonts* are fonts whose characters are raster patterns, which are patterns of pels forming the shape and fill of each character. Figure 7 illustrates two font characters formed by raster patterns. The character on the right contains more pels (picture elements), meaning that it has a higher resolution than the character on the left. *Outline fonts* are fonts whose character shapes are defined mathematically. Outline fonts can be scaled (enlarged or shrunk) in size. Font *metrics* consist of measurement information that define individual character values such as height, width, and space, as well as overall font values such as averages and maximums of character heights and widths. Font metrics can be expressed in specified fixed units, such as pels, or in relative units independent of both the resolution and size of the font.

Figure 7. Raster font characters with different resolutions

With AFP, you can use larger fonts for labels, letterheads, and executive presentations, and you can use **Boldface** and *italic* typefaces, as well as different point sizes of type, for emphasis. With the wide variety of fonts available to you with AFP, you can select the fonts that are best suited to your requirements.

Fonts are supplied with some AFP programs or can be ordered as separate licensed programs. You can use the supplied fonts, or you can select and purchase from an extensive list of IBM font licensed programs to bring variety and function to your documents. In addition, you can use programs supplied by Pennant's cooperative business partners to modify existing fonts or to create new characters and new fonts. You can also purchase fonts in Adobe Type 1 outline format and prepare them for use on AFP printers with the PSF/2 Type Transformer.

Graphics and images



Graphics and images improve the quality and appearance of printed documents, and signatures and logos add a personal touch to correspondence. Graphs, pie charts, and bar charts are often more effective in presenting quantitative information than are tables and matrices.

Graphics data is stored in vector representation. Graphics data contains commands to draw lines, arcs, and circles and can be used to represent something as complex as a three-dimensional engineering drawing. Figure 8 shows an example of graphics data you can include in a document and print on AFP printers.

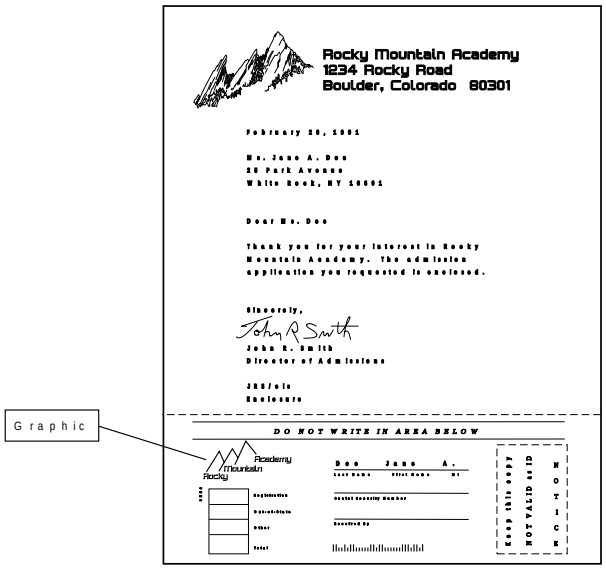


Figure 8. Example of graphics data

Image data consists of a series of picture elements (pels) arranged in rows and columns to form a pattern. Figure 9 shows an example of images you can include in a document and print on AFP printers. Images can be uncompressed, in which each bit of data represents a unique picture element on the page. Images can also be compressed to save storage space, transmission time, and printer memory. Many AFP printers have special features that decompress compressed images in the printer. AFP supports common industry compression algorithms such as CCITT Group 3 and Group 4, which are usually used by facsimile machines and scanners.

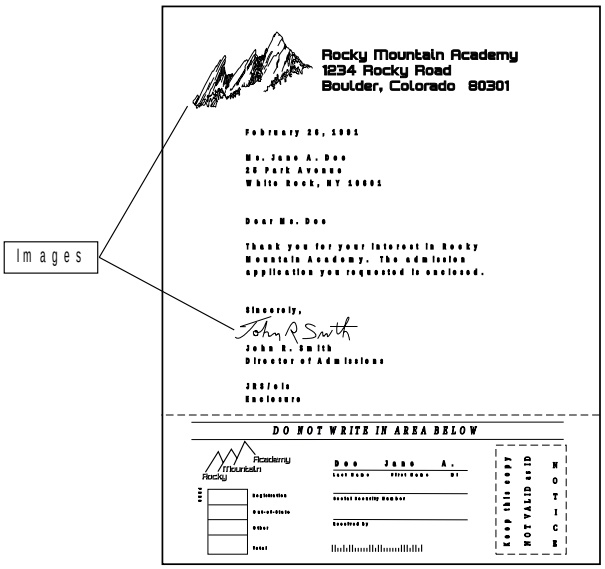


Figure 9. Example of images

You can use several different methods to create and include graphics and images in your documents:

- You can use an image or graphics editor to create your own images composed of dot patterns called pels.
- Using a transform program, you can convert vector graphics (graphics created to be printed on a plotter and made up of a series of lines) to images.
- You can use a scanning device to scan pictures or photographs as image data. You can place the images in a document or store them in page-segment or overlay resources.

After you create a page segment containing, for example, a signature, logo, or drawing, you can store it in a system resource library so that it can be used by many different documents printed on AFP printers.

Using electronic artwork in printed documents saves you the time and expense of the manual cut-and-paste method of combining graphics, images, and text.

A utility company reported to Pennant that it has received fewer customer complaints after using AFP products to imbed an average monthly usage graph of customers' energy consumption in their monthly billings.

Overlays

Overlays, which are sometimes called electronic forms, are collections of constant data stored as resources. Overlays are primarily used in place of preprinted forms. Overlays can be combined with variable data (such as names, addresses, telephone numbers, billing information, and insurance data) from your applications and printed on an AFP printer. Figure 10 shows an example of a printed overlay that contains variable data.

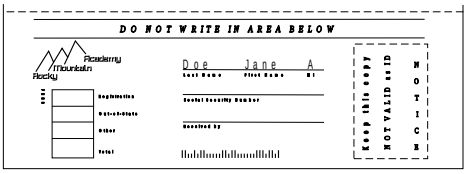


Figure 10. Overlay printed with variable data

Creating your own overlays saves you the cost of designing, printing, and storing preprinted forms and the time required for an operator to load the forms into the printer. You can print multiple copies of the forms, eliminating the need for carbon copies. You can even suppress certain fields of data, eliminating the need for spot carbons. You can, with some AFP printers, print overlays on both sides of the paper. Best of all, you can quickly and easily update overlays, which saves you the scrap cost of outdated preprinted forms and the cost of designing, implementing, and storing new forms.

Customers have reported to Pennant the following benefits from using AFP products for creating overlays:

- A bank saved 60 hours of overtime a month by eliminating the need for operator intervention to change preprinted forms at the printer.
- An insurance company saved $500,000 a year by creating only 30 overlays to replace their larger inventory of existing preprinted forms.
- An investment firm has saved $500,000 a year by using overlays rather than preprinted forms.

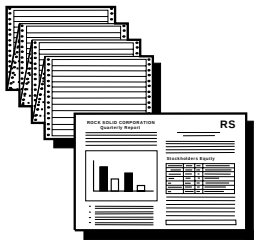
Bar codes

The use of bar codes has revolutionized the way companies operate in some areas of business. Bar codes, either printed directly on items or printed on labels attached to items, are useful for pricing, distribution, billing, and inventory control.

The bar code information can be read by a scanning device and converted into a form readable by the user. At a supermarket, for example, scanning the bar code on a product automatically adds the price of the product to the grocery receipt, thereby speeding the checkout process.

With AFP, you can add bar codes to your printed output or products and can print these bar codes on adhesive labels, card stock, or standard paper for a variety of applications. Data can be printed in bar-code format by an application, and these bar codes can be intermixed with text, graphics, and images on a single page. You can add bar codes to documents to turn them into mailers and use them for survey results and customer responses.

Form definitions and page definitions



Most application print data today contains formatting controls within the data file itself. Changing the format or layout of the page requires the time and expertise of an application programmer to modify the application program.

With AFP licensed programs, you can create formatting controls external to the application program. These controls are called form definitions and page definitions, and they control how data is formatted for printing. After you create these form definitions and page definitions and store them in system libraries, multiple applications can use these same formatting resources, or a single application can be formatted in several different ways within the running of a single job. Using these external formatting resources frees the application programmer from concerns about formatting and page layout.

One customer reported to Pennant that the productivity of its application programmers increased by 20% by using AFP products for external formatting of application data.

Key to understanding form definitions and page definitions is understanding the terms *physical form* and *logical page*. Form definitions specify the attributes of the physical form (the actual sheet of paper), such as the number of copies and whether the document should be printed on one side or two sides of the sheet. Page definitions specify the attributes of a logical page (the specified area on the sheet of paper where printing of the page data occurs), such as its orientation and its length and width (thus allowing for top, bottom, and side margins).

What do form definitions do?

With a form definition, you can specify modifications that distinguish one copy of a sheet from another, both of which are produced from the same source data. Not all of the capabilities that can be specified in a form definition can be used by all types of printers, however, and the contents of a form definition can differ across operating systems.

Using form definitions, you can do the following:

- Position the logical page on the physical form
- Print on both sides of a sheet of paper (duplex printing)
- Set different page offsets for the front and back sides of a duplexed sheet
- Include overlays
- Select the number of copies of any sheet (to replace traditional multiple part forms)
- Suppress selected fields (to replace the use of spot carbons)
- Specify offset-stacking of cut-sheet output or edgemarking of continuous-forms output
- Select among multiple paper sources
- Select the level of print quality (4224, 4230, and 4234 only)
- Specify the page presentation (portrait or landscape)
- For the 3800, activate the forms flash function and limit the operator's ability to adjust the horizontal position of the print area on the sheet

What do page definitions do?

Page definitions, which are used in the System/390 environment, allow you to take advantage of AFP capabilities with little or no change to your application programs that generate data formatted for a line printer. Not all of the capabilities that can be specified in a page definition can be used by all types of printers, and the contents of a page definition can differ across operating systems.

Using page definitions, you can specify the following:

- Width and height of the logical page
- Positioning of overlays and page segments relative to the individual print line
- Print direction of the logical page
- Starting position for the first print line or record
- Line spacing
- Formatting instructions for individual lines and for specific fields within a line, including:
  - Font changes
  - Print direction of the line or field
  - Line or field origin (first print position)
  - Skipping and spacing
  - Suppression of a specific line or field
  - Inclusion of constant data not generated by the application program
  - Color
- A list of page segments to be loaded in the printer before printing begins
- A list of overlays to be loaded in the printer before printing begins
- Number of lines for each logical page
- Form feeds
- Multiple-up printing (arranging more than one page of data on one side of a single sheet)
- Conditional processing

On OS/400 systems, the function of page definitions is replaced by AS/400 Data Description Specifications (DDS). DDS, which you can use to create externally described Printer Files, also provide support for the following AFP capabilities:

- Including electronic forms (overlays)
- Selecting different fonts for lines or fields of data
- Rotating fields of data 90°, 180°, or 270°
- Including vertical or horizontal rules on a page
- Drawing boxes
- Including graphics and images on a page

Chapter 4. What are some of the AFP products?

This chapter describes Pennant's Advanced Function Presentation (AFP) products as well as some of the products provided by Pennant's cooperative software and hardware business partners. Other companies may also provide AFP-compatible products.

How about an overview of AFP products?

Figure 11 shows an overview of AFP, with the various products that produce resources and text data feeding into the printer driver and then being viewed or printed. You do not need all the products shown in the figure. You do, however, need products to supply or create the resources; you need a printer driver (Print Services Facility) to drive the printer; and you need the Viewer application of the AFP Workbench for Windows product to display the information.

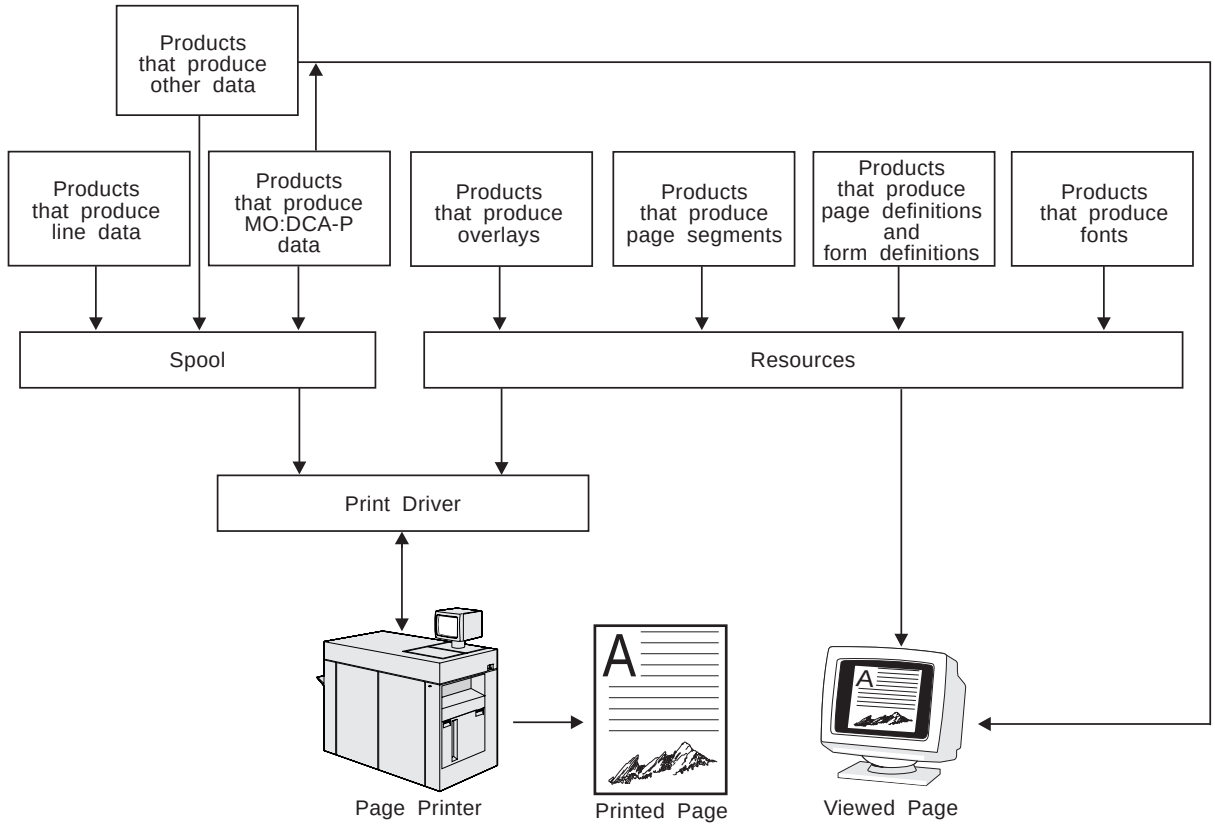


Figure 11. Overview of AFP products

Table 2 lists the components of AFP and the products that supply or create them.

Table 2. AFP components and the products that supply or create them

Type of Component	Supplied or Created	Products
Fonts	Supplied by	Print Services Facility Typographic Font Licensed Programs OS/400
	Created by	PSF/2 Type Transformer Elixir (See note.) ISIS (See note.)
Overlays	Created by	Overlay Generation Language/370 AFP Utilities/400 Document Composition Facility Elixir (See note.) ISIS (See note.) AFP Workbench for Windows PSF/2 using IBM AFPDS Windows Driver
Page segments	Created by	Graphical Data Display Manager AFP Utilities/400 Elixir (See note.) ISIS (See note.) PSF/2 using IBM AFPDS Windows Driver AFP Workbench for Windows using IBM AFPDS Windows Driver
Form definitions	Supplied by	OS/400 Print Services Facility
	Created by	Page Printer Formatting Aid/370 Elixir (See note.) ISIS (See note.)
Page definitions	Supplied by	Print Services Facility
	Created by	Page Printer Formatting Aid/370 Elixir (See note.) ISIS (See note.)
Text formatting and inclusion of page segments	Created by	Document Composition Facility AFP API BookMaster PrintManager/400 Data Description Specifications (OS/400 only) AFP Utilities/400
Word processing	Created by	DisplayWrite/370 PC programs

Note: A Pennant cooperative business partner. For product information, see “Who are Pennant's cooperative business partners?” on page 68.

To learn which products run in which environments, read the following product descriptions.

Advanced Function Presentation Application Programming Interface (AFP API)

AFP API provides a high-level, application-programming interface that allows programs written in the COBOL (VS COBOL II Release 3.0 or higher) and PL/1 (OS PL/I Version 2 Release 3.0 or higher) programming languages to produce an AFP data stream directly. AFP API thus enables application programmers to format complex output without knowing the syntax and semantics of MO:DCA-P. AFP API enables development of complex, production-printing applications with enormous savings in time and improvements in output appearance because it gives high-level language access to advanced formatting functions in terms the application programmer can easily understand and use in existing applications.

AFP API is available at no extra charge with PSF/MVS 2.1.1 and PSF/VM 2.1.1.

What does AFP API do?

AFP API allows you to create new print applications with formatting tailored to the requirements of each page of data. For example, in creating a bank statement, you can position rules and fixed- or variable-depth boxes whether the customer's last transaction falls on the page, whether the customer has one or many transactions. You can add shading, use typographic fonts, and include graphics or special messages at different points on each page, according to the characteristics of the data. Each customer receives a statement designed to most effectively communicate the information needed for his or her business.

The design of most production print applications is limited by the methods used to create the print output. The external data formatting provided by AFP page definitions and form definitions contains many new and rich capabilities, but the application is still tied to a static page format. For example, every page must contain room for 40 transaction items, regardless of the number of transactions for an individual customer.

Without AFP API, one way to create applications that could take full advantage of the flexibility and power of AFP was to program the output in hexadecimal MO:DCA-P structured fields. While this is certainly possible, and the structured fields are fully documented, the process required the programmer to learn an entirely new technique that was basically foreign to most high-level language programmers. With AFP API, a programmer familiar with COBOL or PL/1 can invoke powerful AFP functions using familiar COBOL or PL/1 structures and calls that are easy to learn and understand. These calls allow the program to specify and change such AFP formatting options as:

- The position and orientation of text
- Fonts used for printing lines and fields
- Rules and boxes with varying sizes and positions
- Shading for boxes or rectangular areas
- Color for rules, boxes, or fonts
- Page segments, overlays, images and graphics

AFP API also provides high-level language programmers with formatting capabilities that were not easily available even with MO:DCA-P structured fields. These include:

- Centering and justifying text using typographic fonts
- Flowing text into a paragraph or a table
- Saving areas of formatted text and objects for reuse

AFP API also allows the programmer to add indexing tags to the output document. These tags can be used by the Viewer application to navigate through the document and locate specific pages or groups of pages, such as the statement for customer number “54321.” The indexing tags can also be used by other applications such as archival and retrieval applications to select and locate specific pages. The AFP Conversion and Indexing Facility (ACIF) can use these tags to create a separate index object file for more efficient processing by the Viewer or other applications.

Advanced Function Presentation Conversion and Indexing Facility (ACIF)

ACIF is an application development tool that assists you in creating applications that can be printed, viewed, distributed, archived, and retrieved with fidelity across systems and platforms.

ACIF is available at no extra charge with PSF/MVS 2.1.1 and PSF/VM 2.1.1.

What does ACIF do?

ACIF is a batch program that provides four separate functions:

- Converting line-format print files to MO:DCA-P documents
- Adding indexing tags to MO:DCA-P documents
- Creating a separate index object file from the indexing tags in a MO:DCA-P document
- Retrieving and packaging AFP resources needed for printing or viewing a MO:DCA-P document

Each of these functions, which can be invoked separately, enable you to view and print your documents (or selected pages from your documents) with fidelity on different AFP platforms and at different times, even years apart. The following sections describe each function and its capabilities.

Converting line-format print files

ACIF can convert a System/390 line-format print file to a MO:DCA-P document. ACIF combines the formatting information from the page definition used for printing the line-format data to produce an AFP document composed of MO:DCA-P structured fields. This document is now platform-independent; unlike System/390 line-format data, the MO:DCA-P document can be printed by a PSF printer driver on any AFP platform (System/390, OS/400, OS/2, RISC System/6000). The MO:DCA-P document can also be viewed using the Viewer application of AFP Workbench. The Viewer could not have processed the original System/390 line-format print file.

ACIF can convert System/390 print files that contain all line-format print records as well as those that contain a mixture of MO:DCA-P structured fields and line data. ACIF can handle all functions that can be printed using Version 2 of PSF/MVS or PSF/VM, including:

- ANSI or machine carriage controls
- Table reference characters
- Imbedded structured fields
- Inline images or graphics
- Overlays
- A page definition containing controls for conditional processing

Adding indexing tags to MO:DCA-P documents

Using ACIF, you can add indexing tags to documents, based on the value of selected fields within the document. You can create up to eight separate indexing tags for a group of pages based on attributes such as the account number, customer name, type of account, zip code, and so on. You can even create an indexing tag from multiple separate attributes; for example, you can create an indexing tag containing the fields “name-city-state.” Indexing tags, which are MO:DCA-P structured fields, identify pages or groups of pages within the document that contain specific values for each indexing attribute. For example, if the document is indexed by account numbers, all consecutive pages belonging to account 54321 are indexed as a group.

Other applications, such as the Viewer application of AFP Workbench for Windows or an archival and retrieval application, can read the tags in the document to locate pages containing specific indexing tags. The Viewer application can use the indexing tags to display statement pages for a specific account. An archival and retrieval program can use the tags to retrieve only the pages associated with a particular account number.

Usually, you use ACIF to index a line-format print file at the same time you are using ACIF to convert the file to a MO:DCA-P document. To index a file using ACIF, you must specify which fields in the document contain the indexing attribute values and where they are positioned. This is usually easy to do for line-format print files. A field such as account number is always found in a fixed location, such as in bytes 10-16 of the third record on each page. Locating specific fields in a MO:DCA-P document may not be so simple, because these documents consist of variable-length structured fields instead of fixed-length print records. Instead of using ACIF to add indexing tags to an existing MO:DCA-P document, you would normally use the application that creates the document to add the tags while you are creating the document. Both AFP API and DCF allow you to insert indexing tags in the AFP document while you are creating it.

Creating a separate index object file

ACIF reads a MO:DCA-P document containing indexing tags and uses those tags to build a separate file that contains the pointers to pages or page groups containing each indexing tag. ACIF can build the index object file from indexing tags it inserted in the document or from tags inserted by another application such as DCF, AFP API, or a user print application that creates MO:DCA-P documents.

The Viewer application of AFP Workbench will use this index object file to more quickly locate specific pages in the document being viewed. Other applications can also use the index. For example, an archival and retrieval application might use the index object file to locate specific pages for retrieval or to segment a large document for efficient storage.

Retrieving and packaging AFP resources

ACIF will identify, locate, and store into one file all AFP print resources that will be needed when an AFP document is printed or viewed. This includes fonts, page segments, overlays, and the form definition used for printing the document. You can instruct ACIF to retrieve all resources or only certain resource types. ACIF will scan the MO:DCA-P document and its form definition to identify each resource needed by the document, locate those resources in AFP resource libraries, and copy them to a single resource file. This resource file can now be stored with the document when it is archived or sent with the document to another system for printing or to AFP Workbench for viewing.

Keeping a copy of the original resources means that you are guaranteed fidelity when you later print the document. Because you have the original resources used for printing the file, you can print it just as it originally printed. You do not have to worry about whether someone changed the overlay or deleted the page segment after the file was printed.

AFP Workbench for Windows

Advanced Function Presentation Workbench for Windows Version 1.00 has a Viewer application with which you can display your AFP files and resources on your workstation with Windows 3.0 or above or with WIN-OS/2 running under OS/2 2.0 or later.

The Viewer application lets you display AFP files that are in MO:DCA-P format, including page segments and overlays. When displaying a document, the Viewer can use a form definition and merges onto the display any overlays referenced by the form definition. Viewer also merges page segments and page overlays referenced by the document. These resources must be available on the workstation for Viewer to access them.

When displaying text, the Viewer uses Type 1 outline fonts. AFP Workbench for Windows provides the IBM Core Interchange fonts in Type 1 outline format, which allows Viewer to display with fidelity any document formatted for printing using the IBM Core Interchange fonts. You can also use any of the thousands of available Adobe Type Manager (ATM) outline fonts with the Viewer. To use these fonts for printing, you can convert the outlines to AFP raster fonts using the Type Transformer application provided with PSF/2 and then reference them when creating AFP documents. If your document needs a font that is not available to Viewer in ATM format, Viewer substitutes an available ATM font to use in displaying the document. In this case, Viewer cannot guarantee total fidelity of the display with the printed version of your document.

Viewer can also display ASCII text files. Figure 12 shows the types of files AFP Workbench for Windows accepts as input and produces as output.

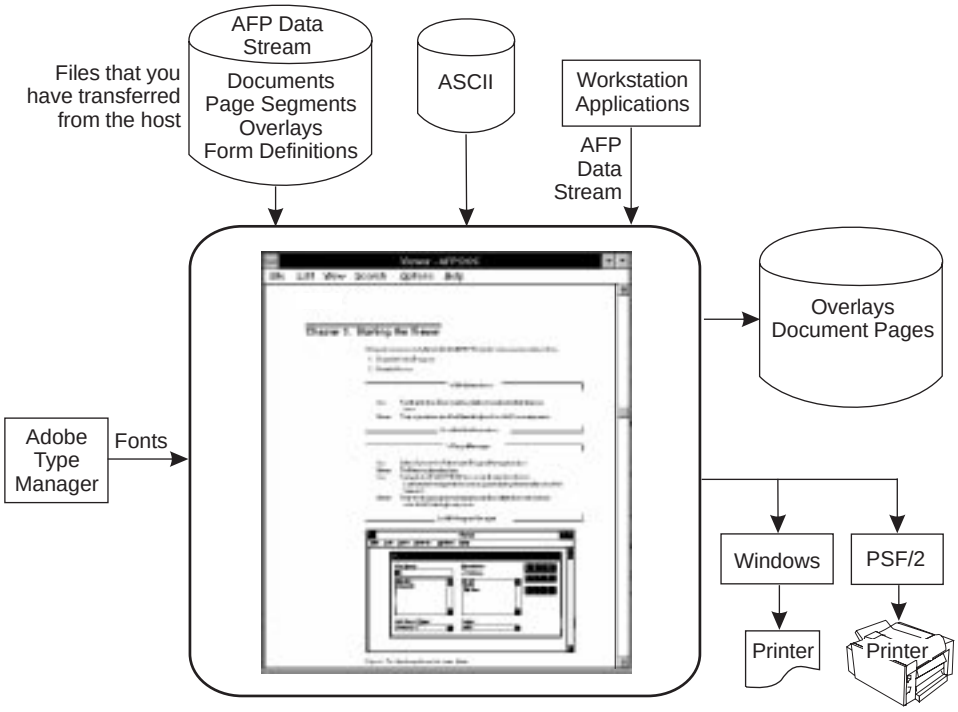


Figure 12. AFP Workbench for Windows: the Viewer Application

You can use AFP Workbench for Windows to:

- Display AFP documents, page segments, and overlays
- Display ASCII files (ignoring graphic controls)
- Print files and parts of files on a printer attached to PSF/2 or Windows
- Clip a portion of the displayed page and scale the clipped area, for example, to improve readability
- Copy one or more pages from an AFP document into a new AFP document
- Convert a page or page segment to an AFP overlay
- Convert an AFP overlay or page segment to a page
- Change the form definition used to display an AFP file
- View your documents in multiple-up presentation
- Navigate through or search a document using indexing information, sheet numbers, page identifiers, or keyword strings.

The IBM AFPDS Windows Driver, which is provided with AFP Workbench for Windows, enables you to you to convert the data from any Microsoft Windows application into an AFP document, overlay, or page segment. After installing the IBM AFPDS Windows Driver as a Windows printer driver, you can use the print function from any Windows application to perform this conversion. A setting for the driver program determines which type of AFP output you write to a file. The file can then be printed with PSF/2 or viewed with the AFP Workbench for Windows.

How do ACIF, AFP API, DCF and the Viewer work together?

The Viewer application of AFP Workbench for Windows allows you to view an AFP document that is in MO:DCA-P format. If the document contains indexing tags, Viewer can use these to help you navigate through the document to locate specific pages.

You can use ACIF, AFP API, and DCF to create AFP documents containing indexing tags and then view the documents using the Viewer application, as shown in Figure 13. The application you use depends on the type of print application you are creating.

- Use ACIF to convert existing System/390 line-format print applications to MO:DCA-P documents.
- Use AFP API to create production print applications using programs written in COBOL or PL/1.
- Use DCF to create text documents such as instruction manuals, reports, and catalogs.

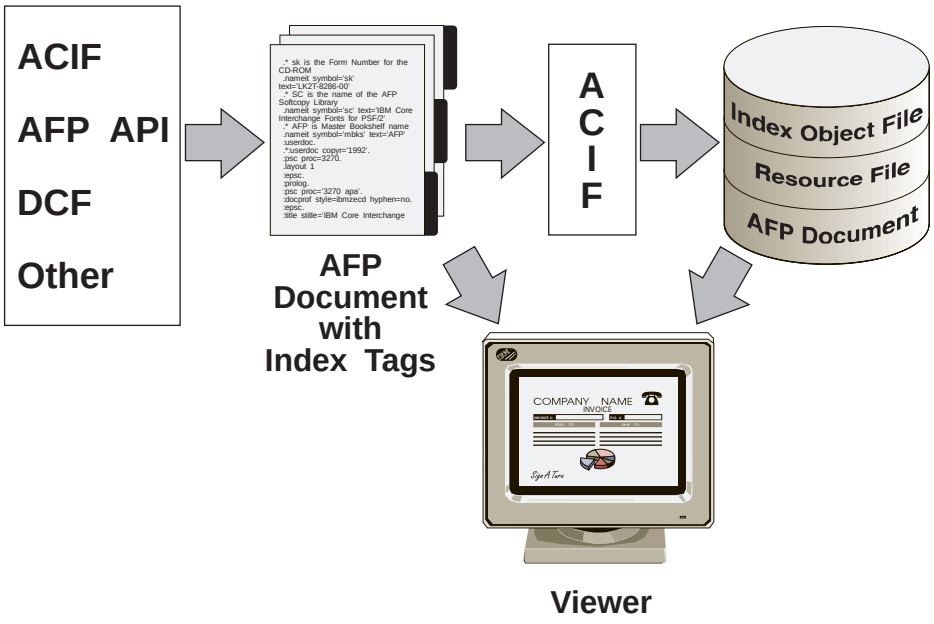


Figure 13. Using AFP API and DCF with ACIF and Viewer

You can include indexing tags in the AFP document you are creating with each of the three applications.

ACIF, in addition to creating an AFP document from line data, provides two additional functions to assist you in viewing a MO:DCA-P document created from any source (ACIF, AFP API, DCF, or other application). First, if requested, ACIF gathers the AFP resources needed for printing and viewing the document to send them with the document to the Viewer. Second, ACIF creates a separate index object file from indexing tags in the document. You can use the index object file with Viewer to more efficiently navigate through the document.

The MO:DCA-P documents created by ACIF, AFP API, and DCF are platform-independent and can be printed on AFP printers by the AFP print drivers on all supported platforms: System/390, AS/400, OS/2, and RISC System/6000. Sending the print resource file created by ACIF with the document guarantees that the document will print with fidelity on any system. Having the resource file also guarantees fidelity of printing and viewing any time in the future, when you retrieve the document from archived storage.

Advanced Function Printing in the OS/400 environment

The OS/400 incorporates AFP print capabilities as part of the base operating system. The OS/400 AFP capabilities combine print data with resources to manage and control data transmitted to AFP printers.

You can transmit AFP resources used with PSF/MVS, PSF/VM, PSF/VSE, and PSF/2 to the OS/400 and use the resources to print native OS/400 applications. Many AFP functions, such as drawing rules, including images and graphics, and using overlays, can be used through Data Description Specifications (DDS), which is part of the OS/400 operating system.

The OS/400 processes three types of data for printing:

- MO:DCA-P data, which is data that has already been composed into pages and which includes data placement and presentation information (such as what font to use) along with the data to be printed
- SCS data, which is generated natively and transformed to AFP data when you are printing a document on an AFP printer
- IPDS data, which is generated natively and transformed to AFP data when you are printing a document on an AFP printer

The OS/400 supports two additional types of data for printing, if the data was sent from a System/390:

- Line data, which is data that has been prepared for printing on line printers and which does not contain any data placement or presentation information needed for printing on page printers
- Mixed data, which is a data stream that is a combination of line data and MO:DCA-P data

The OS/400 transforms these data streams into the IPDS data stream required by each printer, using processing and printing options specified by the user and the installation, and then transmits the data to the printer.

The OS/400 manages AFP resources, ensuring that the resources requested for a print job are available. Resources can be stored in libraries or contained in the print job.

In addition, the OS/400 does the following:

- Verifies a part of the syntax of the input data stream (the printer verifies the rest of the syntax)
- Provides diagnostic aids, which provide information that can be used for problem determination
- Reports the status of a printer to the system operator
- Provides limited accounting information
- Provides error-recovery procedures for AFP printers, meaning that if a job does not print due to a printer problem, the OS/400 retransmits the affected pages to the printer after the printer problem has been fixed.

You can use other programs described in this publication to create additional resources.

Advanced Function Printing Utilities/400

The Advanced Function Printing Utilities/400 (AFP Utilities) provide resource creation and management on the AS/400. Using the utilities, you can enhance the appearance of your output and reduce the cost of printing text and graphics. Using these utilities, you can:

- Print text, lines, boxes, images, or bar codes at any point on a page
- Print text in a variety of type styles
- Switch fonts within a printed page
- Use images to print line drawings, bar charts, logos, tables, and signatures
- Combine text with images on the same page
- Electronically store and later print forms and letterheads that are always printed with the same, predetermined type style
- Print bar codes in any size with a number of variations

Using the interactive interface provided by AFP Utilities, you can perform your tasks by selecting options or by typing choices on the menu displays.

The AFP Utilities/400 product consists of three utilities:

- Overlay utility
- Print format utility
- Resource management utility

The overlay utility

Using the overlay utility, you can create overlays that are printed together with variable data from an application program or from a database file. You can:

- Interactively design an overlay on a display screen
- Store, in your file, the source data of the overlay you designed
- Modify the previously stored overlay source data
- Create an overlay object from the overlay source data
- Print the overlay object

The print format utility

Using the print format utility, and without writing any application programs, you can interactively design your printout on the screen. You can print a database file member in various formats, for example, on cut-sheet paper, on labels, with various fonts, or with bar codes. You can also place images contained in page segments on a page. You can:

- Interactively design the layout of a record. You can define headings, boxes, or logos that contain texts, lines, boxes, or images to be printed in addition to the data in the database file member
- Interactively design the layout of a page
- Save the record layout and page layout as a printout format definition in your file
- Print a database file member according to the printout format definition

By using different definitions for the printout format, you can create various kinds of output from one database file member. For example, you can print a list of products, a product description, or even delivery labels, all from one database file member.

The resource management utility

Using the interactive resource management utility, you can convert an image to a page segment and then store it in the AS/400 system libraries. (The images used by the overlay utility and the print format utility must be stored as page segments in the AS/400 system before they can be used by the utilities.) Using the resource management utility, you can:

- Create a page segment from a physical file member or from a personal computer document
- Copy, delete, and print the page segment or display and change the description of the page segment
- Copy, delete, and print an overlay object or display and change the description of the overlay object

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BookMaster

BookMaster is a powerful text-processing program you can use to create large, complex documents. BookMaster uses a superset of DCF's Generalized Markup Language (GML) (a high-level programming language), predesigned style files, and the SCRIPT/VS text formatter to format text, automatically generate indexes and tables of contents, and include page segments and various fonts. SCRIPT/VS interprets the GML markup (BookMaster tags) as instructions to perform in formatting the document.

DisplayWrite/370 (DW/370)

DisplayWrite/370 (DW/370) is a word-processing program you can use to combine text and graphics for printing on AFP printers. DW/370 menus provide easy-to-use interfaces for you to create office correspondence, memos, and letters. DW/370 provides a range of typographic fonts to enhance the appearance and readability of your documents.

Document Composition Facility (DCF)

Document Composition Facility (DCF) is a text-processing program you can use to create large, complex printed documents. You can order a DCF licensed program for operating systems running in the Multiple Virtual Storage (MVS), Virtual Machine (VM), and Virtual Storage Extended (VSE) environments.

DCF contains a text formatter, SCRIPT/VS, which can process documents that include SCRIPT/VS control words and Generalized Markup Language (GML) tags, along with the text. During formatting, SCRIPT/VS matches each control word or tag with a set of instructions to format the document. For example, control words call a specific font, create a paragraph, insert blank lines, indent lines, imbed a file or page segment, and so on. After formatting is complete, you can print the document on a variety of line and AFP printers.

You can use GML tags (a type of shorthand-text markup that describes the parts of the document being formatted) instead of explicit SCRIPT control words to achieve standardized formatting. DCF provides a starter set of GML tags to help you get started using DCF.

Some of DCF's text-composition functions include:

- Horizontal and vertical rules
- Character alignment (left, right, and center)
- Proportional horizontal and vertical justification
- Document publishing functions such as lists, headings, and footnotes
- Automatic generation of tables of contents and indexes

With DCF, you can specify typographic fonts in your document and imbed page segments and place them anywhere on the page.

With DCF 1.4.0 and APAR PN36437 applied, you can add navigation information to your document for use with the Viewer Application of AFP Workbench for Windows. You can identify groups of pages within the output and associate navigation information with either these groups of pages or with individual pages containing specific fields of data. For example, if you are producing a set of insurance policies, you can mark the group of pages belonging to each policy and then associate the groups with the insured person's name and policy number. You can also add navigation information to identify different sections of each policy, such as the Benefits and Disclaimer sections.

If you are using the GML Starter Set, you can automatically have navigation information added to the output document without changing the document itself, simply by specifying an option when you invoke the SCRIPT command to format the document. Whether you use the GML Starter Set or insert your own navigation information, you can use AFP Workbench to retrieve the information.

Graphical Data Display Manager (GDDM)

Graphical Data Display Manager (GDDM) is a set of licensed programs, available on System/390 and OS/400 platforms, that application programs can use to create page segments. GDDM also takes vector graphics data from other application programs, such as Interactive Presentation Graphics, CAD/CAM, and Interactive Chart Utility, and converts it into page segments needed for printing on AFP printers. Using GDDM you can create graphics for computer-aided design, business- and presentation-graphics, and engineering drawings.

After the page segment is created or the vector graphics data is converted into a page segment, the page segment can be printed by itself, included in a document by AFP API, BookMaster, DCF, or DW/370, or included in an overlay by OGL/370.

Overlay Generation Language/370 (OGL/370)

Overlay Generation Language/370 (OGL/370) is a batch program you can use to create and modify electronic versions of your preprinted forms. These electronic versions are called overlays. You can use OGL/370 in the MVS, VM, and VSE operating environments.

After you create an overlay, OGL/370 can store it in a resource library. You can then use the overlay with your application programs such as AFP API or DCF, printing up to eight different overlays on a side of a sheet of paper.

With OGL/370, you can:

- Define and place rules, paths, and boxes
- Define full circles, quarter circles, and half circles
- Specify the thickness of horizontal and vertical rules
- Select fonts for text (both single-byte and double-byte character sets)
- Rotate blocks of text
- Place text within boxes and circles
- Underscore text
- Specify text justification
- Create and place images
- Include in an overlay the graphics, logos, and signatures already stored in a resource library
- Apply shading to boxes in two different pel patterns and in varying intensities

Page Printer Formatting Aid/370 (PPFA/370)

Page Printer Formatting Aid/370 (PPFA/370) is a batch program you can use to create form definitions and page definitions. After creating these resources, you can store them in a resource library, after which you and other users can use them for printing application data. (“What do form definitions do?” on page 40 and “What do page definitions do?” on page 41 provide more information about the contents and functions of page definitions and form definitions.) You can use PPFA/370 in the MVS, VM, and VSE operating environments.

Print Services Facility (PSF)

The licensed PSF printer-driver program is available for the following operating-system environments:

- AIX
- MVS
- OS/2
- VM
- VSE

PSF has similar capabilities in all environments, plus differences unique to the operating system on which it is running. In the OS/400 environment, the PSF function is part of the operating system.

PSF combines print data with resources to manage and control data transmitted to AFP printers. PSF takes as input various data streams, transforms these data streams into the data stream required by each printer (using processing and printing options specified by the user and the installation), and then transmits the data to the printer.

PSF manages resources, ensuring that the resources requested for a print job are available. The resources can be stored in libraries or contained in the print job, and they can be public resources (available for use by anyone) or private resources (available for use by only the owner).

In addition, PSF does the following:

- Verifies a part of the syntax of the input data stream (the printer verifies the rest of the syntax)
- Provides diagnostic aids, which provide information that can be used for problem determination
- Reports the status of a printer to the system operator
- Provides accounting information
- Provides error-recovery procedures for AFP printers, meaning that if a job does not print due to a printer problem, PSF retransmits the affected pages to the printer at a later time

With PSF, you receive a starter set of resources. You can create additional resources by using other programs. Your Pennant marketing representative can provide you with a complimentary AFP Resource Starter Set for PSF/MVS, PSF/VM, and PSF/VSE that includes samples of over 40 complex business applications such as financial statements, utility billing statements, retail labels with bar codes, insurance forms, MICR check encoding, and postal bar coding.

Print Services Facility in the System/390 environment

The System/390-based PSF printer drivers provide the capabilities described under “Print Services Facility (PSF)” on page 58, in addition to capabilities unique to the System/390. You can order PSF for the MVS, VM, and VSE environments.

In the System/390 environment, PSF processes two types of data for printing:

- MO:DCA-P data, which is data that has already been composed into pages and which includes data placement and presentation information (such as which font to use), along with the data to be printed
- Line data, which is data prepared for printing on line printers and which does not contain any data placement or presentation information needed for printing on page printers

PSF can also process a data stream that is a combination of line data and MO:DCA-P data.

In addition, PSF:

- Provides exit routines, with which a system programmer can customize certain aspects of PSF (PSF/MVS and PSF/VM only)
- Provides labeling support for secure printing environments (PSF/MVS and PSF/VM only)
- Provides the Page Printer Migration Programs feature (PSF/MVS only)
- Provides the AFP API program (PSF/MVS and PSF/VM only)
- Provides the ACIF program (PSF/MVS and PSF/VM only)

Page Printer Migration Programs (PPMP) is an optional feature of the PSF/MVS licensed program. You can use PPMP to convert Xerox Laser Printer System print files so that they will print on AFP printers.

Print Services Facility/2 (PSF/2)

Print Services Facility/2, an OS/2-based program that operates in a local area network (LAN) environment, provides an easy-to-use Presentation Manager window interface. PSF/2 provides the capabilities described under “Print Services Facility (PSF)” on page 58, in addition to capabilities unique to the OS/2 environment.

PSF/2 1.1 supplies the Distributed Print Function (DPF), a component that provides distributed printing from PSF/MVS, PSF/VM, PSF/VSE, and OS/400. With DPF, the AFP printer driver on the System/390 or OS/400 system creates an IPDS data stream, which is transmitted to PSF/2 for printing. Fonts, overlays, and page segments created on the System/390 or OS/400 can be sent to and stored in the DPF resource library to reduce subsequent transmission time and data traffic.

PSF/2 accepts MO:DCA-P data, ASCII data, OS/2 graphics data in metafile format, and PostScript Level 1 data and provides a generalized transform exit to allow PSF/2 to accept a wider variety of data streams.

PSF/2 supports such applications as MicroSoft Windows, WordPerfect, OS/2 Presentation Manager, and AFP applications. PSF/2 can also receive print jobs from OS/2, DOS, and Windows clients located on a Novell NetWare 3.11 LAN, an IBM LAN Server, and an OS/2 TCP/IP network. Using TCP/IP, PSF/2 can be a full-function print server for the UNIX environment, including AIX.

PSF/2 provides user exits you can use to customize activities such as accounting, security, and separating jobs.

Type Transformer, which is part of PSF/2, rasterizes any Adobe Type 1 outline font into sizes ranging from 1 to 72 points, in 1-point increments, within AFP limits. After the fonts have been rasterized, they can be stored in the OS/2, MVS, VM, VSE, AIX, or OS/400 environments for use with any AFP printer. The IBM Core Interchange fonts (in Type 1 outline format) are included with PSF/2 1.1 for use by the Type Transformer and PostScript functions.

You can print files by using a Presentation Manager window interface. Using a mouse or keyboard, you select files from a list for printing. PSF/2 converts the file to the appropriate data stream, directs it to the appropriate printer, and selects the printing resources needed. You also use the Presentation Manager window interface to manage resources and control the supported printers.

The IBM AFPDS Windows Driver, which is provided with PSF/2, enables you to convert the data from any Microsoft Windows application into an AFP document, overlay, or page segment. After installing the IBM AFPDS Windows Driver as a Windows printer driver, you can use the print function from any Windows application to perform this conversion. A setting for the driver program determines which type of AFP output you write to a file. The file can then be printed with PSF/2 or viewed with the AFP Workbench for Windows.

Print Services Facility/6000 (PSF/6000)

Print Services Facility/6000 is a print server running on AIX 3.2.2, which in turn runs on a RISC System/6000. PSF/6000, which runs on a stand-alone AIX system or on a local area network, provides the capabilities described under “Print Services Facility (PSF)” on page 58, in addition to capabilities unique to the AIX environment.

PSF/6000 supports the following data streams:

- MO:DCA-P
- ASCII
- PostScript Level 1
- ditroff

PSF/6000 has standalone programs you can use to transform ditroff and PostScript Level 1 data into an AFP data stream without printing the output. In addition, when you submit a print job, PSF/6000 invokes the appropriate transforms for all of the supported input data streams to create the IPDS, PPDS, HP PCL4, or HP PCL5 data streams, depending on the data stream required by the printer to which the print job is directed. PSF/6000 can print ASCII jobs with higher resolution and greater speed than the same jobs can be printed on a non-AFP printer.

To submit print jobs, you can use either standard AIX print commands or PSF/6000 System Management Information Tool (SMIT) panels.

PSF/6000 provides user exits you can use to customize activities such as accounting, security, and separating jobs.

Using the Network File System (NFS), you can access AFP resources on MVS, VM, and OS/2 systems without moving them to the RISC System/6000. You can also use the powerful networking capabilities of the AIX operating system to submit print jobs to PSF/6000 from MVS, VM, and OS/2 systems.

Remote PrintManager 2.0 (RPM 2.0)

Remote PrintManager 2.0 (RPM 2.0) is an IBM personal computer system program for the Personal Computer AT or the Personal System/2 (only on machines that don't use micro channels). RPM runs in conjunction with PSF/MVS, PSF/VM, PSF/VSE, or OS/400 to expand connectivity options for some AFP printers. By attaching channel-attached printers to RPM rather than directly to the computer, you can extend the distance printers can be located from the computer.

PSF/MVS, PSF/VM, PSF/VSE, or OS/400 exchange data with RPM 2.0 using a System Network Architecture (SNA) communication session that connects the host system with the personal computer. (In this context, the word host means the MVS, VM, VSE, and OS/400 operating systems.) An emulated S/370 channel connects the printer to the personal computer.

The SNA session that connects the host system and RPM 2.0 can span a variety of communication network configurations. The personal computer can be attached to the communication network through a Synchronous Data Link Control link (SDLC) or a token-ring network, and communication can be direct or indirect, through intermediate network components.

For PSF/MVS and PSF/VSE, RPM provides a resource library at the printer location, in which fonts, overlays, and page segments can be stored. The first time a designated resource is transmitted from the host through RPM 2.0 to the printer, RPM 2.0 saves the resource on the personal computer's fixed disk. When the printer next requires the resource, RPM 2.0 loads the resource from its resource library into the printer using the high-speed channel that connects the personal computer with the printer. In this way, the resource is not retransmitted from the host, which saves transmission time and expense. The RPM 2.0 resource library function is not available in OS/400 and PSF/VM installations.

AFP fonts

Pennant supplies the following types of fonts for use in AFP:

- Compatibility fonts for AFP compatibility with line-printer and typewriter fonts
- Font licensed programs
- Core Interchange fonts
- Core Interchange outline fonts
- 4028 font metrics

Table 3 on page 65 summarizes the properties of the fonts.

Compatibility fonts

The following AFP licensed programs supply compatibility fonts:

- PSF/MVS
- PSF/VM
- PSF/VSE
- PSF/2
- PSF/6000
- OS/400

The fonts shipped with PSF Version 1 and with OS/400 Version 2 Release 1 include uniformly spaced and mixed-pitch type families such as Courier, Document, Essay, Letter Gothic, Prestige, and Orator. The compatibility fonts were derived from fonts available for the IBM 3800 Printing Subsystem Model 1 and Model 3 and the IBM 6670 Information Distributor.

Additional uniformly spaced and typographic families are shipped with Version 2 of PSF/MVS, PSF/VM, PSF/VSE, and with OS/400 Version 2 Release 2. Some of these additional fonts emulate fonts resident in the IBM Proprinter, while others allow for printing symbols and columnar data such as customer billings.

Font licensed programs

The font licensed programs, which you can order separately, include uniformly spaced and typographic fonts in many sizes. Some of the uniformly spaced font licensed programs include APL2, Bar Code and Optical Character Recognition, and DATA1.

Typographic font licensed programs contain fonts ranging in size from 4 points to 72 points. (This size range is a limitation of raster fonts only.) These fonts include the following type families:

- Century Schoolbook
- ITC Avant Garde Gothic
- ITC Souvenir
- Monotype Garamond
- Sonoran Sans Serif
- Sonoran Serif

IBM Core Interchange fonts

Pennant Systems provides the IBM Core Interchange fonts to increase the fidelity of documents exchanged between different applications and to create a standard printing environment across different platforms. Pennant encourages customers to use these strategic raster fonts, which provide the following benefits:

- Font metrics that are consistent with Adobe outline font metrics
- Consistent page layouts between 240-pel and 300-pel printers
- Support for many national languages
- Larger character sets than those provided by the Sonoran fonts

The following AFP licensed programs provide the IBM Core Interchange fonts as free, optional features:

- PSF/MVS Version 2
- PSF/VM Version 2
- PSF/VSE Version 2
- PSF/2 Version 1
- PSF/6000 Version 1.1.0

With OS/400 Version 2 Release 2, you can purchase the Core Interchange fonts for a minimal fee.

The Core Interchange fonts include type families such as Courier, Helvetica, and Times New Roman and include characters from language groups such as:

- Latin1 (for example, English, Spanish, German, French, and Italian)
- Latin2, Latin3, and Latin5 (for example, Czech, Turkish, and Esperanto)
- Latin4 (for example, Latvian and Lithuanian)
- Cyrillic (for example, Russian and Serbian)
- Greek
- Arabic
- Hebrew
- Thai
- Symbols

IBM Core Interchange outline fonts

Pennant supplies Core Interchange outline fonts, which are outline versions of the IBM Core Interchange fonts, to be used by AFP Workbench for Windows. The outline fonts are in Type 1 format and include the Latin1, Latin2, Latin3, Latin4, and Latin5 character sets and symbols. These outline fonts are also provided with PSF/2 and PSF/6000, so that you can transform PostScript files.

4028 font metrics

4028 Font Metrics are not fonts in the typical sense, but they allow for text to be formatted in the host and then printed on the IBM LaserPrinter 4028 with its internal fonts and associated font cards. The 4028 Font Metrics, which are shipped with PSF/MVS 2.1.0, PSF/VM 2.1.0, and PSF/VSE 2.2.0, contain metric information equivalent to that of fonts available with the LaserPrinter.

The 4028 Font Metrics includes metric information for uniformly spaced, mixed-pitch, and typographic type families including Courier, Document, Essay, Letter Gothic, Helvetica, and Times New Roman.

Can you summarize AFP fonts?

Table 3 summarizes the fonts described in this chapter.

Table 3. Summary of Pennant fonts

Font	Available With	Spacing Character-istics	Type of Font
Compatibility fonts	OS/400 Version 2.1 or later PSF/MVS Version 1 or later PSF/VM Version 1 or later PSF/VSE Version 1 or later	Uniformly spaced Mixed-pitch	Raster
	OS/400 Version 2.2 PSF/MVS Version 2.1.1 PSF/VM Version 2.1.1 PSF/VSE Version 2.2.0 PSF/2 Version 1.1.0 PSF/6000 Version 1.1.0	Uniformly spaced Mixed-pitch ProPrinter	Raster
Font licensed programs	Ordered separately	Uniformly spaced Typographic	Raster
IBM Core Interchange fonts	OS/400 Version 2.2 or later***** PSF/MVS Version 2.1.0 PSF/VM Version 2.1.0 PSF/VSE Version 2.1.0 PSF/2 Version 1.10 PSF/6000 Version 1.1.0 AFP Workbench for Windows Version 1.0	Uniformly spaced Typographic	Raster
Core Interchange outline fonts	Type Transformer (PSF/2 Version 1.10) PSF/6000 Version 1.1.0	Uniformly spaced Typographic	Outline
4028 Font Metrics	PSF/MVS Version 2.1.0 PSF/VM Version 2.1.0 PSF/VSE Version 2.1.0	Uniformly spaced Mixed-pitch Typographic	Metric

Note: ***** Must be ordered separately.

In addition to fonts supplied by Pennant Systems, you can use fonts supplied by other companies and by Pennant's business partners.

Who uses AFP products?

AFP products are designed for users with various skills. Table 4 shows the basic types of user skills needed to use the products.

Table 4. Types of users of AFP products

AFP Product	**Types of Users**
AFP Conversion and Indexing Facility	application programmer
AFP Application Programming Interface	application programmer
AFP Workbench for Windows	end user application programmer
AS/400	end user application programmer
AS/400 AFP Utilities	end user application programmer forms designer
BookMaster	end user
Document Composition Facility	end user application programmer
DisplayWrite/370	end user application programmer
Graphical Data Display Manager	application programmer graphics designer
Overlay Generation Language/370	end user forms designer application programmer
Page Printer Formatting Aid/370	application programmer
PSF/2	LAN administrator end user
PSF/6000	LAN administrator end user
Remote PrintManager	system programmer
PSF/MVS PSF/VM PSF/VSE	system programmer application programmer end user
Typographic font licensed programs	end user font administrator application programmer

IBM provides a variety of courses designed to meet the needs of AFP customers. See your IBM or Pennant marketing representative for information about these courses.

What are the AFP licensed program numbers?

Table 5 lists the AFP products and their program numbers. You must use these program numbers to order the products.

Table 5 (Page 1 of 2). AFP products and program numbers

Licensed Program	**Program Number**
Advanced Function Presentation Application Programming Interface	Shipped with PSF/MVS 2.1.1 and PSF/VM 2.1.1
Advanced Function Presentation Conversion and Indexing Facility	Shipped with PSF/MVS 2.1.1 and PSF/VM 2.1.1
Advanced Function Presentation Workbench for Windows	5621-421
AFP Utilities/400	5738-AF1
Document Composition Facility	5748-XX9
Operating System/400	5738-SS1
Overlay Generation Language/370	5688-191
Page Printer Formatting Aid/370	5688-190
Print Services Facility/2 Version 1 Print Services Facility/6000 Version 1	20G0732 5765-140
Print Services Facility/MVS Version 2 Print Services Facility/VM Version 2 Print Services Facility/VSE Version 2	5695-040 5684-141 5686-040
Remote PrintManager Version 2.0	25F5-944
Font Licensed Programs	
AFP DBCS Fonts/400	5738-FN1
Advanced Function Printing Fonts/400	5738-FNT
APL2	5771-ADB
AS/400 Core Interchange Fonts RPQ # 8A5060	5799-FDK
Bar Code/Optical Character Recognition	5688-021
Century Schoolbook	5771-ADJ
ITC Avant Garde Gothic	5771-ADL
ITC Souvenir	5771-ADQ
Mathematics and Science	5771-ADT
Monotype Garamond	5771-AFK
Pi and Specials	5771-ABC
Sonoran Sans Serif	5771-ABB
Sonoran Sans Serif Condensed	5771-AFL
Sonoran Sans Serif Expanded	5771-AFN
Sonoran Sans Serif Headliner	5771-ADX
Sonoran Serif	5771-ABA

Table 5 (Page 2 of 2). AFP products and program numbers	
Licensed Program	**Program Number**
Sonoran Serif Headliner	5771-ADW

Who are Pennant's cooperative business partners?

IBM Pennant has cooperative business partnerships with the following hardware and software companies and continues updating the list as opportunities and needs change. Other companies provide hardware, software, and services for AFP but are not business partners. Contact your Pennant marketing representative for the most up-to-date list of business partners.

Pennant's cooperative business partners are:

- BESTE Bunch Company, Inc.
- Elixir Technologies Corporation
- ISIS Information Systems, Incorporated
- Roll Systems
- TROY, A Division of Pierce Companies, Incorporated
- Wallace Computer

What does BESTE Bunch provide for AFP?

The BESTE Bunch Company provides preprocessing and postprocessing equipment that attaches to Pennant's AFP printers:

- BESTE Bunch Spot Color Imprinter (provides up to 3 additional colors for a single sheet of output, applies color logos, borders, and repeating text)
- BESTE Bunch Selectable Imprinter (provides the same color support as provided by the Spot Color Imprinter, but you can select a different color plate for each sheet of output)
- BESTE Bunch Folder/Job Separator (fanfolds output from either a printer or the Imprinter)
- BESTE Bunch Forms Processor (makes line hole punches and cross perforates roll paper)
- BESTE Bunch 50-Inch Jumbo Unwind (feeds nonperforated, nonpunched, blank roll paper into the forms processor or feeds perforated, punched-roll paper into a laser printer)
- BESTE Bunch 50-Inch Jumbo Rewind (rewinds roll paper)

What does Elixir Technologies Corporation provide for AFP?

Elixir offers DOS-based, interactive software tools with which you can import, create, and maintain resources such as documents, overlays, fonts, page segments, page definitions, and form definitions. Elixir's mouse-driven user interface insulates you from the complexities of the DOS operating system and provides access to WYSIWYG (what you see is what you get) tools.

Elixir's Desktop for AFP comprises:

- ElixirForm for AFP, for creating and editing overlays
- ElixirFont for AFP and Font Generator, for creating and managing fonts and creating raster fonts from outlines
- ElixirImage for AFP, for creating and managing page segments and images
- PCL Converter for AFP, for converting PCL format to AFP format
- Application Builder for AFP, for creating and managing page definitions and form definitions

You can import AFP resources, edit and manipulate them, and then export them for use in applications.

Elixir offers a similar software package for the OS/400 environment: Elixir/400 for AFP.

What does ISIS Information Systems, Inc. provide for AFP?

ISIS Information Systems offers interactive, WYSIWYG, user-friendly products that run on a PS/2 workstation under DOS or OS/2. ISIS's OverView for Pennant Systems' AFP printers provides a package you can use to design and manage AFP forms, overlays, page segments, form definitions, and page definitions. The products include:

- FormsDesigner, for working with all AFP resources
- FormsManager, for creating AFP applications
- AFPDS Compiler, for creating overlays, page definitions, form definitions for use on OS/400 and OS/2
- APPC Communications Module, which enhances PS/2 to host communication
- FormsLoader, which converts overlays to PCL4 format
- Font and Image Editor, for creating, editing, and managing fonts
- FormsDesigner for AS/400, for creating overlays, page segments, page definitions, and form definitions

What does Roll Systems, Inc, provide for AFP?

Roll Systems, Inc. offers pre- and postprocessing hardware equipment to attach to Pennant's 38xx and 3900 continuous-forms printers. The equipment includes:

- Roll-to-Separate/Fold System
- Roll-to-Roll System
- Cutter-Trimmer-Stacker
- High Capacity Sheet Feeder for the 3827 and 3828 printers

What does TROY, A Division of Pierce Companies, Inc. provide for AFP?

TROY's TMP MICR Printer attaches as a postprocessing device to Pennant's high-volume, continuous-forms 3835 and 3900 printers and prints documents such as checks with magnetic ink character recognition (MICR) fonts.

What does Wallace Computer provide for AFP?

Wallace Computer offers pre- and postprocessing hardware equipment that attaches to Pennant's continuous-forms printers:

- Printed Forms Transport (allows movement of output from a folding table to an inserter)
- MiniUnwind 51 (unwinds roll paper up to 30 inches in diameter)
- LaserDivi (bursts, sorts, folds, and stacks output)
- LaserBin 180 (distributes and stores output in bins)
- LaserWrapper (seals output in plastic film)
- LaserFold (folds, glues, seals, and perforates output to create self-mailers)
- JobSeparator 121 (cuts and offset stacks output)

Chapter 5. What are some AFP applications?

This chapter contains examples of applications showing how AFP can help your business, whether you are in the finance, manufacturing, retail, insurance, publishing, or other industry. Using the AFP integrated family of products, you can:

- Create and manage reusable document resources such as overlays, fonts, images, and graphics
- View an exact facsimile of a document on your personal computer display
- Print a document from any of the major computing environments: OS/2, Windows, DOS, AIX, OS/400, and System/390 (MVS, VM, and VSE)

These examples show you how AFP can help you control costs and increase productivity in your business. The examples can work on operating systems other than those shown in the examples.

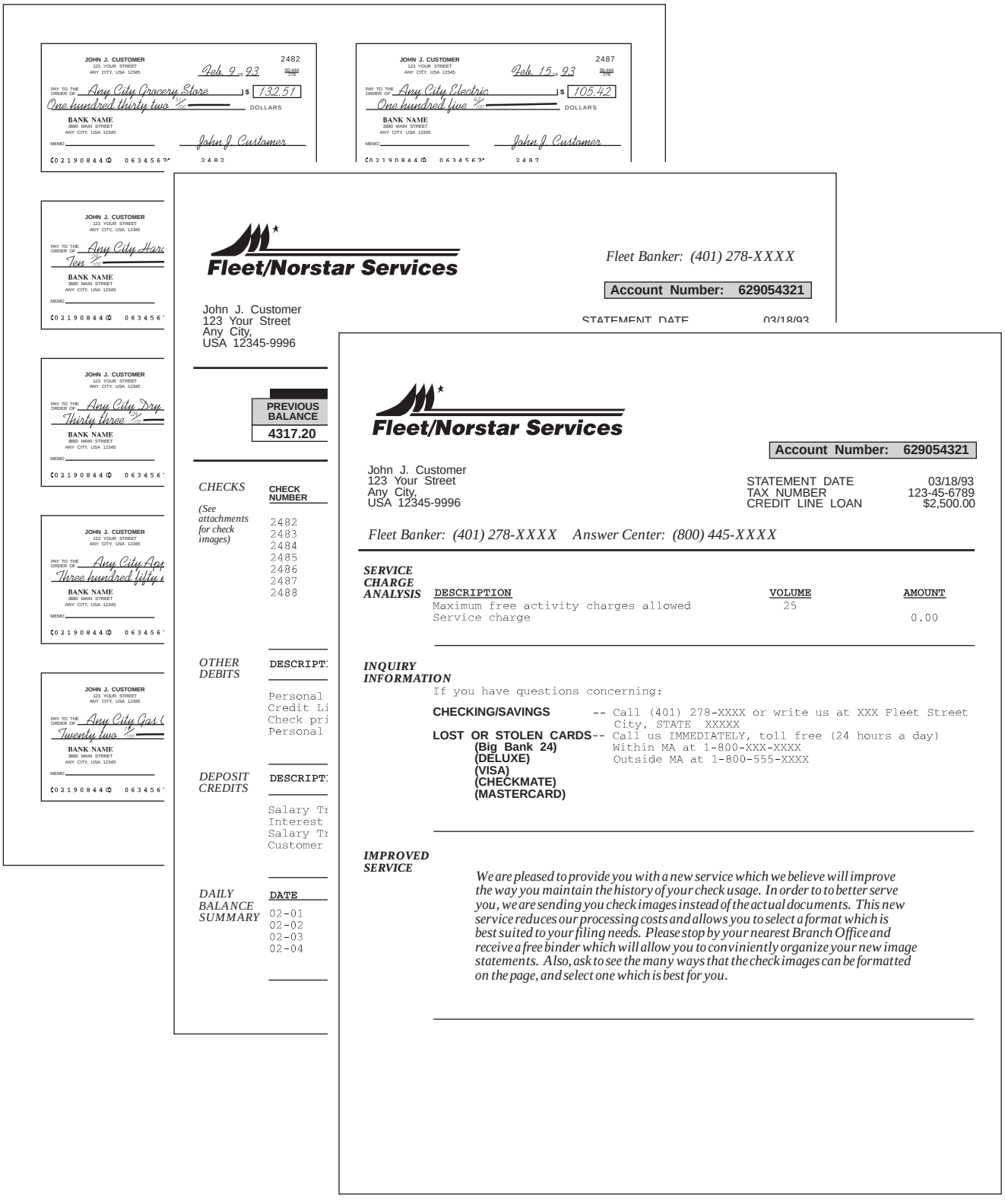


Figure 14. Finance-industry application

Finance-industry application

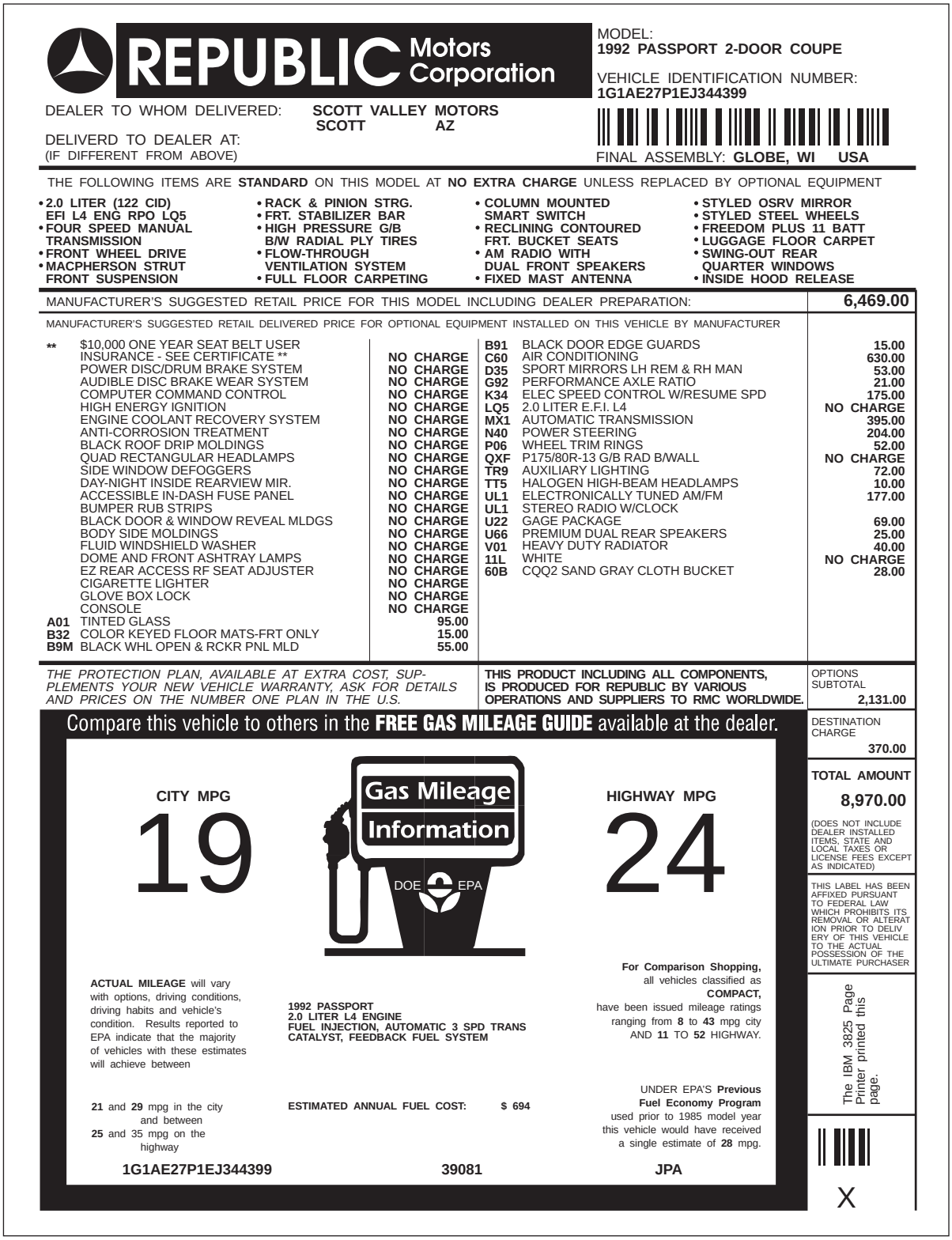
Figure 14 shows a finance-industry application: an example of a bank statement. This statement has been designed to help bank customers easily locate, read, and understand the financial summary information, the transaction types, and the personalized service information.

How did AFP improve the presentation of this application?

- An *overlay* replaces a preprinted form. The overlay uses lines and shading to create boxes containing the variable information. The overlay specifies a logo and a large typographic font for the name of the bank. Additional fonts are specified to fill in the titles of each box containing the variable information.
- A *uniformly spaced font* is used to print the application data and the numeric information in tabular form.
- The transaction types are clearly differentiated using horizontal rules between sections of the statement.
- Check images are included in a compact, convenient format for the customers' records.

How do AFP products work together to create this type of application?

- The application, which uses AFP resources, is created on a System/390 running the MVS operating system:
  - To create the application, a programmer writes code in COBOL or PL/1 and then uses Advanced Function Presentation Application Programming Interface (AFP API) to create an AFP data stream and enter indexing tags for customer account numbers, dates, and other keywords.
  - The application can use an overlay created, for example, using Elixir or ISIS's software for AFP or using Overlay Generation Language/370 (OGL/370).
  - A page segment containing the company logo is created, for example, using Elixir's software or Graphical Data Display Manager (GDDM).
  - The application uses fonts supplied by PSF/MVS.
  - The application uses a form definition created, for example, using Page Printer Formatting Aid/370 (PPFA/370) or Elixir's software for AFP.
- The application output is processed by Advanced Function Presentation Conversion and Indexing Facility (ACIF) to create an index object file and to retrieve the resources for viewing and printing.
- Statements can be archived on a LAN file server, where they can be:
  - Viewed at the workstation display using the Viewer application of AFP Workbench for Windows
  - Printed from Windows, DOS, or OS/2 on a printer driven by the PSF/2 LAN print server
  - Retrieved from storage anytime for either viewing or printing using index keywords built into the document



REPUBLIC Motors Corporation

MODEL:
1992 PASSPORT 2-DOOR COUPE

VEHICLE IDENTIFICATION NUMBER:
1G1AE27P1EJ344399

DEALER TO WHOM DELIVERED: **SCOTT VALLEY MOTORS**
SCOTT AZ

DELIVERD TO DEALER AT:
(IF DIFFERENT FROM ABOVE)

FINAL ASSEMBLY: **GLOBE, WI USA**

THE FOLLOWING ITEMS ARE **STANDARD** ON THIS MODEL AT **NO EXTRA CHARGE** UNLESS REPLACED BY OPTIONAL EQUIPMENT

- **2.0 LITER (122 CID) EFI L4 ENG RPO LQ5**
- **FOUR SPEED MANUAL TRANSMISSION**
- **FRONT WHEEL DRIVE**
- **MACPHERSON STRUT FRONT SUSPENSION**
- **RACK & PINION STRG.**
- **FRT. STABILIZER BAR**
- **HIGH PRESSURE G/B B/W RADIAL PLY TIRES**
- **FLOW-THROUGH VENTILATION SYSTEM**
- **FULL FLOOR CARPETING**
- **COLUMN MOUNTED SMART SWITCH**
- **RECLINING CONTOURED FRT. BUCKET SEATS**
- **AM RADIO WITH DUAL FRONT SPEAKERS**
- **FIXED MAST ANTENNA**
- **STYLED OSRV MIRROR**
- **STYLED STEEL WHEELS**
- **FREEDOM PLUS 11 BATT**
- **LUGGAGE FLOOR CARPET**
- **SWING-OUT REAR QUARTER WINDOWS**
- **INSIDE HOOD RELEASE**

MANUFACTURER'S SUGGESTED RETAIL PRICE FOR THIS MODEL INCLUDING DEALER PREPARATION: **6,469.00**

MANUFACTURER'S SUGGESTED RETAIL DELIVERED PRICE FOR OPTIONAL EQUIPMENT INSTALLED ON THIS VEHICLE BY MANUFACTURER

**	$10,000 ONE YEAR SEAT BELT USER INSURANCE - SEE CERTIFICATE **	NO CHARGE
	POWER DISC/DRUM BRAKE SYSTEM	NO CHARGE
	AUDIBLE DISC BRAKE WEAR SYSTEM	NO CHARGE
	COMPUTER COMMAND CONTROL	NO CHARGE
	HIGH ENERGY IGNITION	NO CHARGE
	ENGINE COOLANT RECOVERY SYSTEM	NO CHARGE
	ANTI-CORROSION TREATMENT	NO CHARGE
	BLACK ROOF DRIP MOLDINGS	NO CHARGE
	QUAD RECTANGULAR HEADLAMPS	NO CHARGE
	SIDE WINDOW DEFOGGERS	NO CHARGE
	DAY-NIGHT INSIDE REARVIEW MIR.	NO CHARGE
	ACCESSIBLE IN-DASH FUSE PANEL	NO CHARGE
	BUMPER RUB STRIPS	NO CHARGE
	BLACK DOOR & WINDOW REVEAL MLDGS	NO CHARGE
	BODY SIDE MOLDINGS	NO CHARGE
	FLUID WINDSHIELD WASHER	NO CHARGE
	DOME AND FRONT ASHTRAY LAMPS	NO CHARGE
	EZ REAR ACCESS RF SEAT ADJUSTER	NO CHARGE
	CIGARETTE LIGHTER	NO CHARGE
	GLOVE BOX LOCK	NO CHARGE
	CONSOLE	NO CHARGE
A01	TINTED GLASS	95.00
B32	COLOR KEYED FLOOR MATS-FRT ONLY	15.00
B9M	BLACK WHL OPEN & RCKR PNL MLD	55.00

B91	BLACK DOOR EDGE GUARDS	15.00
C60	AIR CONDITIONING	630.00
D35	SPORT MIRRORS LH REM & RH MAN	53.00
G92	PERFORMANCE AXLE RATIO	21.00
K34	ELEC SPEED CONTROL W/RESUME SPD	175.00
LQ5	2.0 LITER E.F.I. L4	NO CHARGE
MX1	AUTOMATIC TRANSMISSION	395.00
N40	POWER STEERING	204.00
P06	WHEEL TRIM RINGS	52.00
QXF	P175/80R-13 G/B RAD B/WALL	NO CHARGE
TR9	AUXILIARY LIGHTING	72.00
TT5	HALOGEN HIGH-BEAM HEADLAMPS	10.00
UL1	ELECTRONICALLY TUNED AM/FM	177.00
UL1	STEREO RADIO W/CLOCK	
U22	GAGE PACKAGE	69.00
U66	PREMIUM DUAL REAR SPEAKERS	25.00
V01	HEAVY DUTY RADIATOR	40.00
11L	WHITE	NO CHARGE
60B	CQQ2 SAND GRAY CLOTH BUCKET	28.00

THE PROTECTION PLAN, AVAILABLE AT EXTRA COST, SUPPLEMENTS YOUR NEW VEHICLE WARRANTY, ASK FOR DETAILS AND PRICES ON THE NUMBER ONE PLAN IN THE U.S.

THIS PRODUCT INCLUDING ALL COMPONENTS, IS PRODUCED FOR REPUBLIC BY VARIOUS OPERATIONS AND SUPPLIERS TO RMC WORLDWIDE.

OPTIONS SUBTOTAL **2,131.00**

DESTINATION CHARGE **370.00**

TOTAL AMOUNT 8,970.00

(DOES NOT INCLUDE DEALER INSTALLED ITEMS, STATE AND LOCAL TAXES OR LICENSE FEES EXCEPT AS INDICATED)

THIS LABEL HAS BEEN AFFIXED PURSUANT TO FEDERAL LAW WHICH PROHIBITS ITS REMOVAL OR ALTERATION PRIOR TO DELIVERY OF THIS VEHICLE TO THE ACTUAL POSSESSION OF THE ULTIMATE PURCHASER

The IBM 3825 Page Printer printed this page:

X

Compare this vehicle to others in the **FREE GAS MILEAGE GUIDE** available at the dealer.

CITY MPG
19

Gas Mileage Information
DOE EPA

HIGHWAY MPG
24

ACTUAL MILEAGE will vary with options, driving conditions, driving habits and vehicle's condition. Results reported to EPA indicate that the majority of vehicles with these estimates will achieve between

21 and **29** mpg in the city and between **25** and 35 mpg on the highway

1992 PASSPORT
2.0 LITER L4 ENGINE
FUEL INJECTION, AUTOMATIC 3 SPD TRANS
CATALYST, FEEDBACK FUEL SYSTEM

ESTIMATED ANNUAL FUEL COST: $ 694

For Comparison Shopping, all vehicles classified as **COMPACT,** have been issued mileage ratings ranging from **8** to **43** mpg city AND **11** TO **52** HIGHWAY.

UNDER EPA'S **Previous Fuel Economy Program** used prior to 1985 model year this vehicle would have received a single estimate of **28** mpg.

1G1AE27P1EJ344399 **39081** **JPA**

Figure 15. Manufacturing-industry application

Manufacturing-industry application

Figure 15 shows a manufacturing-industry application: a customer disclosure form for an automobile dealership. The form contains information about the features available on the particular model of automobile, the charges for those features, and information about gas mileage.

This document has been designed for maximum readability by using AFP fonts and graphics. For example, the gas-mileage information is printed with both graphics and bold fonts to convey the information to the reader. The standard equipment list is emphasized by being printed with a bold font. In addition, bar codes have been used to improve handling and tracking by the dealership.

How did AFP improve the presentation of this application?

- An *overlay* replaces a preprinted form. The overlay uses rules of different thickness to create boxes containing the variable information. The overlay also includes a logo in the form of a page segment.
- *Typographic* and *uniformly spaced fonts* are used to print the variable information.
- Two *bar codes* are included on the form, produced by using a bar code font or using the bar-code printing function supported in the microcode of some printers.
- Graphics representing a gasoline pump and the large mileage numbers are included.

How do AFP products work together to create this type of application?

- The application, using AFP resources, is created on a System/390 running the VSE operating system:
  - An overlay is created, for example, using Overlay Generation Language/370 (OGL/370) or ISIS or Elixir's software packages for AFP.
  - Page segments containing the company logo and the gas pump and large mileage figures were created, for example, using Elixir's software package for AFP or Graphical Data Display Manager (GDDM).
  - The application uses AFP fonts supplied with PSF/VSE.
  - The application uses a page definition to format the variable data on the page. The page definition is created, for example, using Page Printer Formatting Aid/370 (PPFA/370) or Elixir's software package for AFP.
  - The application uses a form definition to specify the placement of the overlay. The form definition is created, for example, using PPFA/370 or Elixir's software package for AFP.
- The application is printed on an AFP printer driven by PSF/VSE.

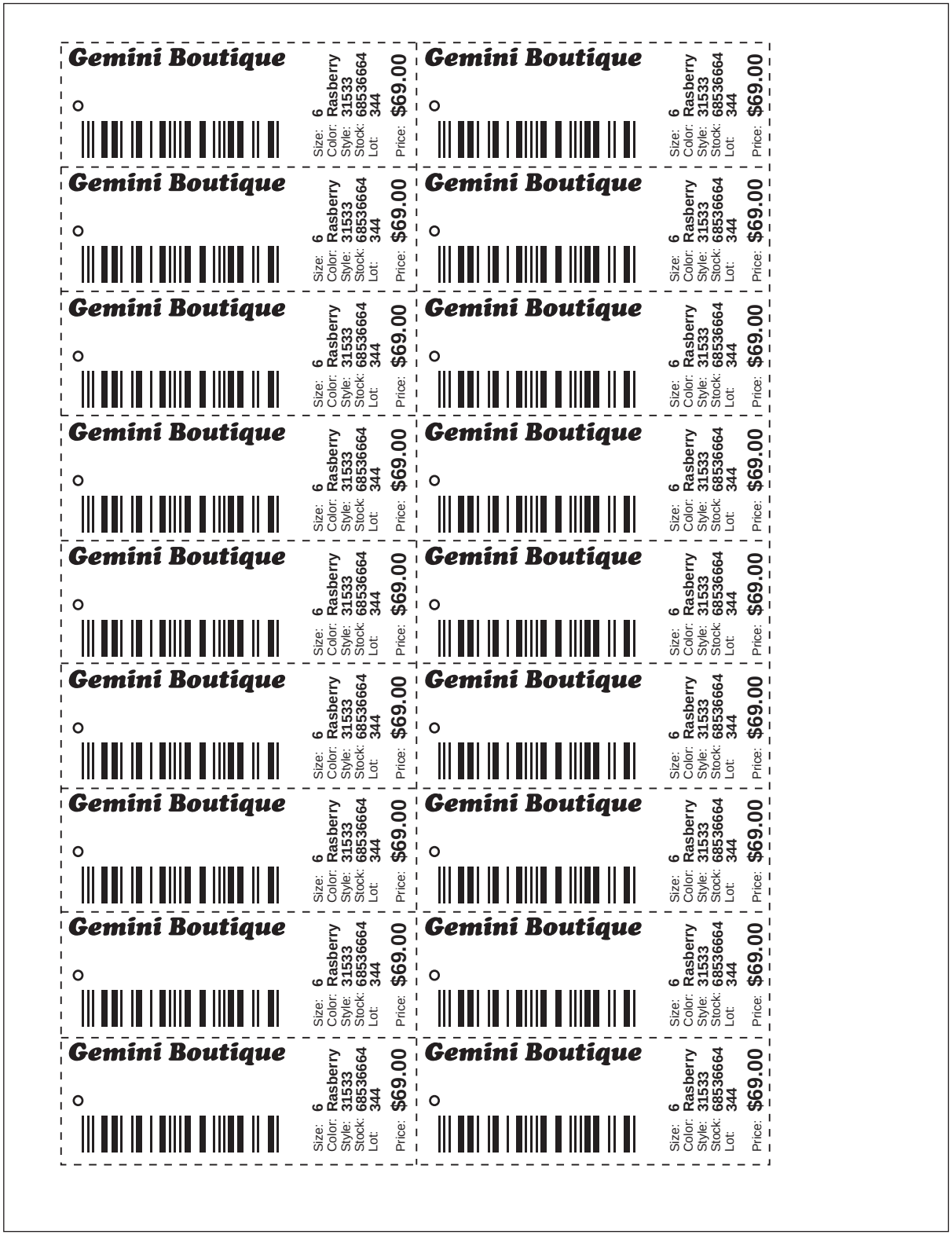


Figure 16. Retail-industry application

Retail-industry application

Figure 16 shows a retail-industry application: a sheet of price tags for garments stocked in a clothing boutique. These price tags contain the name of the boutique; inventory information such as size, color, and style; and the price of the garment. A bar code is printed on the price tag for inventory tracking and checkout, and the price tags are printed on card stock.

How did AFP improve the presentation of this application?

- *Typographic fonts* are used to print the constant and variable information.
- The pricing and inventory text is *rotated* (printed at a 270° orientation) on the tags.
- A *bar code* is included on each price tag to enable inventory information to be gathered electronically and to speed the check-out process.
- A *page segment* is created for the name of the boutique.
- The complete price-tag information is printed on perforated card stock, which is separated into individual price tags to be attached to the garments.

How do AFP products work together to create this type of application?

- This application, using AFP resources, is created on an AS/400 system:
  - The multiple bar-code forms are created, for example, using AS/400's Data Description Specification (DDS) or the AFP Utilities/400.
  - A page segment for the name of the boutique is scanned with a PC image product and converted to a page segment using AFP Utilities/400 or Elixir's software package for the AS/400.
  - The application uses AFP fonts supplied by AS/400.
- The application is printed using the AFP printing software built into the AS/400 system.

Insurance Specialists

100 Main Street
Longmont, CO
80501

Disability Income Policy

The Preferred Professional

Insured:	Policy Number:	Date of Issue:
RONALD ARRIGONI	483-19-00-3-D1	03-23-93

Insurance Specialists will pay the benefits provided in this Policy for loss due to injury or Sickness.

We have issued this Policy to You in consideration of the payment of the premium and the statements made in Your application. Your application is part of Your Policy.

NON-CANCELLABLE AND GUARANTEED CONTINUABLE TO AGE 65. NO CHANGE IN PREMIUM RATES. As long as the premium is paid on time, We cannot change Your Policy or its premium rate until the first premium due date after Your 65th birthday.

RENEWAL OPTIONS AFTER YOU REACH AGE 65. SUBJECT TO CHANGE IN PREMIUM RATES.
From age 65 to age 72, You may continue Your Policy for a Total Disability benefit with a limited benefit period while You are actively and regularly employed full time. This option is explained in PART 5.

When You are no longer actively and regularly employed after age 65 or when You reach 72, You may continue Your Policy for the rest of Your life. The benefit will be limited to a Hospital Confinement Indemnity. This benefit will take the place of all other benefits under the Policy. This option is explained in PART 6.

YOUR RIGHT TO CANCEL.
If You are not satisfied with your Policy, You may cancel it. Return the Policy to Us or Our agent by midnight of the tenth day after the date You receive it. If You return the Policy by mail, it must be properly addressed, postage prepaid, and postmarked no later than midnight of that tenth day. Our mailing address is 100 Main Street, Longmont, CO, 80501. Within ten days after We receive the Policy, We will refund any premium You have paid. The Policy will be considered to have never been issued.

READ YOUR POLICY CAREFULLY.
It is a legal contract between You and Us.

Signed for Insurance Specialists.

President **Secretary** **Countersigned by:**

Disability Income Policy

Enclosures 940 S-84 84-2

Figure 17. Insurance-industry application

Insurance-industry application

Figure 17 shows an insurance-industry application: the cover page of a disability income policy. This document presents both variable and constant policy information for a client. It uses several typographic fonts in addition to a company logo and electronic signatures.

Using AFP software products, the insurance company can create, modify, and customize policies for each client and can print them on demand on a wide range of high-quality AFP and non-AFP printers.

How did AFP improve the presentation of this application?

- Using a text-formatting program, the writer produces an attractive *page layout* and adds the company logo and signatures to the policy.
- *Page segments* are created for the company logo and the signatures.
- The writer uses control tags in the text-formatting program to include *variable data*, such as the name of the policy owner, number, and date of issue, in the *boilerplate* policy at the time of printing.
- The writer uses *typographic fonts* to print the policy and uses bold fonts for emphasis.

How do AFP products work together to create this type of application?

- At the branch office, the insurance agent enters the variable data using a personal computer.
- The agent sends the data to an MVS system at the regional office, where it is combined with these AFP resources:
  - Page segments created, for example, using Elixir's software package for AFP or Graphical Data Display Manager (GDDM)
  - A form definition created, for example, using Page Printer Formatting Aid/370 (PPFA/370) or Elixir's software package for AFP
  - The standard policy text formatted by Document Composition Facility (DCF)
- The data is printed at the regional office using an AFP printer attached to the MVS system.
- After transferring the document to the LAN at the branch office, the data can be:
  - Viewed at the workstation display using the Viewer application of AFP Workbench for Windows
  - Printed from Windows or OS/2 on a printer driven by PSF/2
  - Archived and retrieved on demand for viewing and printing

$$+ Q(k,m)\ \frac{\partial\varphi(s;k)}{\partial n_{km}} - Q(m,k)\frac{\partial\varphi(s;m)}{\partial n_{km}}\Big]w_\alpha(s;k,m)d\Gamma_{km} \qquad 3.6a$$

$$W(k,m)\Big]_\alpha \equiv \int_{\Gamma_{km}} (R(s;k,m) - R(s;m,k))w\ (s;k,m)d\Gamma_{km} \qquad 3.6b$$

and

$$U(k,m)\Big]_{\mu\alpha} \equiv \int_{\Gamma_{km}} \left(P(k,m)\phi_\mu(s;k,m) + Q(k,m)\frac{\partial\phi_\mu(s;k)}{\partial n_{km}} \right) w_\alpha(s;k,m)d\Gamma_{km} \qquad 3.6c$$

Where $\alpha = 1,...,L(k,m)$ and $\mu = 1,...,M(k)$. Then, representing $\{\theta_\mu(k)\}$, $\{W_\alpha(k,m)\}$, and $\{q_\alpha(k,m)\}$ as vectors $\theta(k)$, $W(k,m)$ and $q(k,m)$ and $\{U_{\mu\alpha}(k,m)\}$ as a matrix U(k,m) we have the interface constraints (3.4) in matrix form as:

$$U^T(k,m)\theta(k) - U^T(m,k)\theta(m) = W(k,m) - q(k,m). \qquad 3.7$$

(The notation U^T is used for the transpose of U.) If we assume that $\theta(0)\equiv 0$ (meaning that $\Psi_0\equiv 0$) and $W(0,k)\equiv 0$, then the discretized boundary conditions read

$$U^T(k,0)\theta(k) = W(k,0) - q(k,0). \qquad 3.8$$

In order to derive the discrete equations corresponding to equation (3.1) consider the functional

$$\Phi[\Psi] \equiv \int_\Omega \left\{ \frac{1}{2} \sum_{ij=1}^{n} a_{ij} \frac{\partial\psi}{\partial x_i} \frac{\partial\psi}{\partial x_j} + \frac{1}{2} b_1 \Psi^2 - b_2 \Psi \right\} d\Omega \qquad 3.9$$

where $d\Omega$ is the volume element Ω. Recalling the cellwise representation for Ψ, we have the discrete functional

$$\Phi[\Psi_k] = \sum_{k=1}^{K} \left\{ \int_{\Omega_k} \left(\frac{1}{2} \sum_{ij=1} a_{ij}^{(k)} \frac{\partial\psi_k}{\partial x_i} \frac{\partial\psi_k}{\partial x_j} + \frac{1}{2} b_1^{(k)} \Psi_k^2 - b_2^{(k)} \Psi_k \right) d\Omega_k \right\} \qquad 3.10$$

We next substitute the representation (3.2) into (3.10), discarding the items which do not have a dependence on the θ's. These "discarded" terms are

$$\frac{1}{2}\int_{\Omega_k} a_{ij} \frac{\partial\varphi(x;k)}{\partial x_i} \frac{\partial\varphi(x;k)}{\partial x_j} d\Omega_k, \qquad \int_{\Omega_k} b_1^{(k)} \varphi^2(x;k)\, d\Omega_k, \qquad -\int_{\Omega_k} b_1^{(k)} \varphi(x;k)\, d\Omega_k. \qquad 3.11$$

The IBM 3825 Page Printer printed this page.

Advanced Function Printing programs prepared the page for printing.

Figure 18. Document-publishing application: technical report

Document-publishing application: a technical report

Figure 18 shows a document-publishing application: a page from a technical report containing a series of mathematical equations.

Many companies publish technical reports, but because reports often contain complex mathematical equations and other special font requirements, they often require typesetting by an outside printer. AFP can work with publishing products in the AIX environment to provide the functions needed to print these technical reports in-house, without the need for typesetting by an outside printer.

How did AFP improve the presentation of this application?

- A writer produces the application using publishing software, running under AIX, that produces PostScript output.
- The writer prints the PostScript application data on a high-speed AFP printer attached to a RISC System/6000.

How do AFP products work together to create this type of application?

- The writer uses a publishing program running under AIX to create the text and equations and to specify the fonts and the formatting. This program produces the PostScript data stream.
- The writer uses AIX print commands to send the job to an AFP printer attached to a RISC System/6000.
- PSF/6000 automatically converts the PostScript data generated by the publishing program to an IPDS data stream, which drives the printer.

Input Bin Pickup Roller Drive Belt

REMOVE: This removal can be done with the input bin in the machine.

1. Lower the elevator table.
2. Remove the covers from the input bin (front, rear, and top).
3. Disengage the forward feed roller assembly by spreading the spring clip on the pickup-roller bracket shaft, and pulling out the shaft (see Figure 33).
4. Remove the front pickup roller by loosening the setscrew.
5. Remove the front screw that fastens the front bracket and slide the front bracket of the forward feed roller assembly toward the front of the machine.
6. Remove the retaining clips from the two shafts.
7. Remove the screws that fasten the bearing at the front of the forward feed roller shaft.
8. Remove the bearing.
9. Remove the old belt from the shaft, and install a new one.

INSTALL:

Reassemble the pickup roller assembly by reversing the removal procedure.

Note: The separating rollers can be pulled clear of the forward feed rollers by reaching through the jam access opening (below knob A).

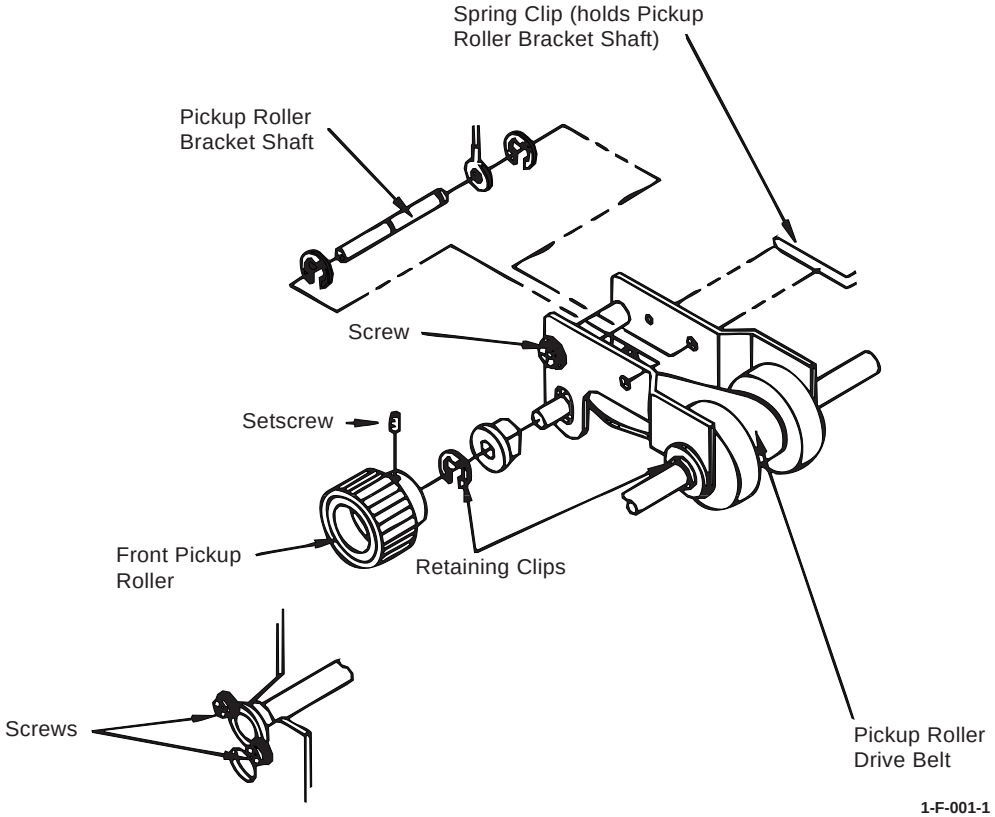


Figure 33. Input Bin Pickup Roller Drive Belt Removal

Figure 19. Document-publishing application: service manual

Document-publishing application: a service manual

Figure 19 shows a document-publishing application: a page from a service manual. This page presents information about installation and removal procedures and uses graphics to communicate precise information. Typographic fonts are used for headings, text, figure captions, and running footings.

Many companies publish service manuals containing text and graphics for their own internal use. Companies sometimes don't print such manuals but provide them online, so that employees can view them on computer screens located in their work areas, rather than using hard copies, which take up space, are often inconvenient, and may become out of date.

AFP products allow you to merge text and graphics automatically and either view or print them. In the example, the information in the service manual is viewed using AFP presentation capabilities.

How did AFP improve the presentation of this application?

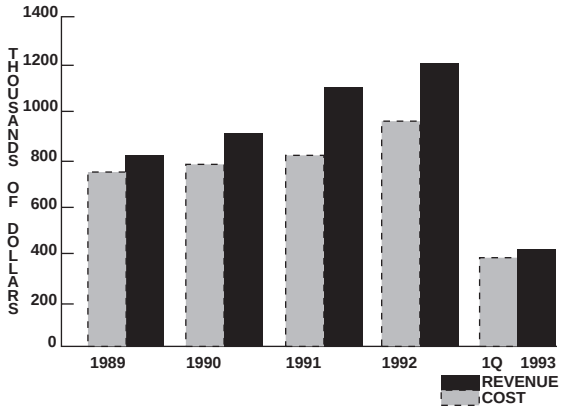
- A writer uses a word processing program to produce an attractive and functional *page layout* by using a two-column format and imbedding the graphics where they are needed.
- The writer uses *typographic fonts* to display or print the manual. The writer uses bold and italic fonts to emphasize information and uses condensed fonts for less important information.
- The writer uses an graphics program to produce the diagram, which is included in the text.

How do AFP products work together to create this type of application?

- The writer enters information for the manual using a workstation editing program such as MARKUP, which can include tags for formatting on Document Composition Facility (DCF) or BookMaster.
- An engineer or graphics designer uses CAD/CAM to create the engineering drawing and uses Graphical Data Display Manager (GDDM) to convert the drawing to a page segment.
- The writer uploads the information to VM and uses DCF to add indexing tags, include the page segments, and format it.
- The writer archives the document for retrieval from anywhere in the company.
- Any user can view the manual using the Viewer application of AFP Workbench for Windows or can print it on any printer supported by PSF/2.

The Energy Company News

Volume 22 Number 20 | Friday, May 14, 1993 | Fred Paul, Editor



EC Revenue
1989 - 1Q 1983

Record Profits

As evidenced by the revenue chart above, the Energy Company profits are at a record high. Predictions by EC analysts indicate this trend should continue through 1993. A possible explanation for the increase in profits is that fuel costs have lowered as a result of less demand due to energy conservation methods followed by our customers.

Gift Certificates Distributed

Energy Company gift certificates were distributed to all employees on February 4, 1993 in recognition of your contribution to our record profits. If you have not received your certificate please contact your manager immediately.

New Look for the Newsletter

The recently installed Advanced Function Printing software allows us to produce a far more interesting newsletter than ever before. Images such as the Energy Company logo, graphics, and pictures can be merged with the text. The Document Composistion Facility is used to compose the entire page, placing the images where desired and specifying different fonts for printing the text.

EC Donates $$ for Restoration

The Energy Company contributed $10,000 towards the restoration of the nearly 150-year-old Anderson School building. This historic building will be repaired and restored to its original appearance in time for its sesquicentennial celebration in June 1993. The restoration includes removing layers of paint and varnish from the mahogany banisters and moldings as well as installing leaded-glass windows in the main entrance. Also, the fresco on the ceiling in the main entrance will be cleaned and repaired. The following picture shows the building as it appears today.

150-year-old Anderson School building.

The IBM 3825 Page Printer printed this page.

Advanced Function Printing programs prepared the page for printing.

Figure 20. Document-publishing application: company newsletter

Document-publishing application: a company newsletter

Figure 20 shows a document-publishing application: a company newsletter. The newsletter presents information in the form of text, a bar chart, and a photograph. These elements, in addition to use of the company logo, typographic fonts, and rules, makes this page interesting, functional, and informative.

Many companies publish newsletters to communicate information about the company to employees and customers. Because of its visibility and the information it communicates, the newsletter must be of high quality. Many newsletters require typesetting by an outside printer, where the graphics, logo, and screened photograph are manually added to the prepared text page. Using AFP products, you can compose and publish a newsletter like this in-house.

How did AFP improve the presentation of this application?

- A writer uses a 2-column layout and horizontal rules of varying weights to separate the topics.
- The writer uses typographic fonts of different sizes to create interest and emphasize information.
- The writer enhances the presentation by including a bar chart showing revenues over a period of time, a photograph of the school being restored, and the company logo.

How do AFP products work together to create this type of application?

- The writer composes the newsletter on a PS/2 using WordPerfect and uses AFP fonts for the layout.
- The writer scans the photograph and converts it to a page segment.
- The application data is processed by PSF/2 running on an OS/2 server attached to a LAN.
- PSF/2 converts the WordPerfect data into the AFP format (IPDS) that can be printed on a high-speed AFP printer.

Appendix A. Where can I find additional information?

This appendix contains lists of publications providing more detailed information about AFP products. The titles and the order numbers for publications change occasionally. To verify current titles or order numbers and to order publications, contact your Pennant marketing representative. Your representative can also direct you to additional information about AFP products and can help you find educational classes to enhance your AFP knowledge and skills.

You can use any of the following methods to send comments about the publications:

- Reader's Comment Form in each publication
- Internet ID: pennant_pubs@vnet.ibm.com.
- IBM Mail Exchange ID: IEA USIB4TDB
- Fax number: 1-800-524-1519

Table 6. Advanced Function Presentation publications

Title	**Order Number**
Printing and Publishing Collection Kit	SK2T-2921
Advanced Function Presentation: Printer Information	G544-3290
Advanced Function Presentation: Printer Summary	G544-3135
AFP: Conversion and Indexing Facility User's Guide	G544-3824
AFP: Application Programming Interface Programming Guide and Reference	S544-3872
AFP: Application Programming Interface COBOL Language Reference	S544-3873
AFP: Application Programming Interface PL/1 Language Reference	S544-3874

Table 7. AFP Workbench for Windows publication	
Title	**Order Number**
AFP Workbench for Windows: Using the Viewer Application	G544-3813

Table 8. Data stream and object architecture publications	
Title	**Order Number**
Mixed Object Document Content Architecture Reference	SC31-6802
Presentation Text Object Content Architecture Reference	SC31-6803
Graphics Object Content Architecture Reference	SC31-6804
Image Object Content Architecture Reference	SC31-6805
Bar Code Object Content Architecture Reference	S544-3766
Font Object Content Architecture Reference	S544-3285
Intelligent Printer Data Stream Reference	S544-3417

Table 9. AS/400 publications	
Title	**Order Number**
Advanced Function Printing Utilities/400 User's Guide and Reference	SH18-2416
AS/400 Publications Guide	GC41-9678
AS/400 Guide to Programming for Printing	SC41-8194
IBM AS/400 Printing II	GG24-3704

Table 10. Document Composition Facility publications	
Title	**Order Number**
Document Composition Facility and Document Library Facility: General Information	GH20-9158
About DCF	G520-6362
Document Composition Facility: Introduction to Generalized Markup Language	G544-3192
Document Composition Facility: Generalized Markup Language Starter Set User's Guide	SH20-9186
Document Composition Facility: SCRIPT/VS User's Guide	S544-3191

Table 11. Font publications	
Title	**Order Number**
Font General Information Publications	
ABOUT TYPE: IBM's Guide for Type Users	G544-3122
ABOUT TYPE: IBM's Typographic Primer for Digitized Type	G544-3183
ABOUT TYPE: IBM's Code Pages for Digitized Type	S544-3802
ABOUT TYPE: IBM's Samples of Digitized Type	G544-3792
IBM Core Interchange Fonts	
ABOUT TYPE: IBM's Quick Reference for Coded Fonts	G544-3810
ABOUT TYPE: IBM's Technical Reference for Core Interchange Digitized Type	S544-3708
Quick Reference for Advanced Function Printing: IBM Core Interchange Fonts	G544-3804
IBM Compatibility Fonts and Font Licensed Programs	
ABOUT TYPE: IBM's Technical Reference for 240-Pel Digitized Type	S544-3516
Licensed Program Specifications for Advanced Function Printing: Font Licensed Programs	G544-3295
Licensed Program Specifications for Bar Code/Optical Character Recognition	G544-3141
Licensed Program Specifications for AS/400 Advanced Function Printing Fonts	G544-3773
Quick Reference for Advanced Function Printing: OS/400 Compatibility Fonts	G544-3771
Quick Reference for Advanced Function Printing: Compatibility Fonts	G544-3803
Licensed Program Specifications Advanced Function Printing: Postal Bar Code Fonts	G544-3868
Quick Reference for Postnet Bar Code Fonts	G544-3818
IBM 4028 Font Metrics	
ABOUT TYPE: IBM's Technical Reference for 4028 Font Metrics	S544-3709
Licensed Program Specifications for Advanced Function Printing: IBM LaserPrinter 4028 Font Metrics Available with Print Services Facility	G544-3706

Table 12. Overlay Generation Language/370 publications	
Title	**Order Number**
Overlay Generation Language/370: Getting Started	G544-3691
Overlay Generation Language/370: Quick Reference	S544-3703
Overlay Generation Language/370: User's Guide and Reference	S544-3702

Table 13. Page Printer Formatting Aid/370 publications	
Title	**Order Number**
Page Printer Formatting Aid/370: Command Quick Reference	G544-3701
Page Printer Formatting Aid/370: User's Guide and Reference	S544-3700

Table 14. Print Services Facility/6000 publications	
Title	**Order Number**
AIX Print Services Facility/6000: Print Services Facility for AIX Users	G544-3814
AIX Print Services Facility/6000: AIX for Print Services Facility Users	G544-3877
IBM AIX Print Services Facility/6000: Print Submission	S544-3878
IBM AIX Print Services Facility/6000: Print Administration	S544-3817

Table 15. Print Services Facility/MVS publications	
Title	**Order Number**
Print Services Facility/MVS: Application Programming Guide	S544-3673
Print Services Facility/MVS: System Programming Guide	S544-3672
Print Services Facility: Security Guide	S544-3291
Page Printer Migration: General Information	G544-3227
Page Printer Migration: Programming Guide	S544-3228

Table 16. Print Services Facility/VM publications	
Title	**Order Number**
Print Services Facility/VM: Application Programming Guide	S544-3677
Print Services Facility/VM: System Programming Guide	S544-3680

Table 17. Print Services Facility/VSE publications	
Title	**Order Number**
Print Services Facility/VSE: Application Programming Guide	S544-3666
Print Services Facility/VSE: System Programming Guide	S544-3665

Table 18. Print Services Facility/2 publications	
Title	**Order Number**
Print Services Facility/2: Distributed Print Function Network Configuration Guide for System/370	S544-3809
Print Services Facility/2: Distributed Print Function Network Configuration Guide for AS/400	G544-3823
Print Services Facility/2: Getting Started	G544-3767

Table 19. Remote PrintManager Version 2.0 publication	
Title	**Order Number**
Remote PrintManager: User's Guide and Installation Guide	S544-3439

Table 20. Other publications	
Title	**Order Number**
Graphical Data Display Manager: General Information	GC33-0100
Introducing DisplayWrite/370	GH12-5170
Getting Started with DisplayWrite/370	SH12-5171
Using DisplayWrite/370	SH12-5172
MARKUP Quick Reference	S544-3351
MARKUP User's Guide and Tutorial	S544-3350
IBM BookMaster User's Guide, Release 4.0	SC34-5009

Glossary

Source Identifiers

This publication includes terms and definitions from the *IBM Dictionary of Computing,* SC20-1699.

Definitions reprinted from the *American National Dictionary for Information Processing Systems* are identified by the symbol (A) following the definition.

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Definitions that are specific to IBM products are so labeled, for example, “In SNA,” or “In the 3820.”

References

The following cross-references are used in this glossary:

Contrast with. This refers to a term that has an opposite or substantively different meaning.

See. This refers the reader to multiple-word terms in which this term appears.

See also. This refers the reader to terms that have related, but not synonymous, meanings.

Synonym for. This appears in the commentary of a less desirable or less specific term and identifies the preferred term that has the same meaning.

Synonymous with. This appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.

A

ACIF. AFP Conversion and Indexing Facility

addressable point. Any point in a presentation surface that can be identified by a coordinate from the coordinate system of the presentation medium. See also pel.

Advanced Function Presentation (AFP). A set of licensed programs that use the all-points-addressable concept to print data on a wide variety of printers or display data on a variety of display devices. AFP also includes creating, formatting, archiving, viewing, retrieving, and distributing information.

Advanced Function Presentation Application Programming Interface. An AFP program shipped with PSF/MVS 2.1.1 and PSF/VM 2.1.1 that creates the AFP data stream from the COBOL and PL/1 high-level programming languages.

Advanced Function Presentation data stream. A presentation data stream that is processed in the AFP environment. MO:DCA-P is the strategic AFP interchange data stream. IPDS is the strategic AFP printer data stream.

Advanced Function Printing Utilities/400 (AFP Utilities). An IBM licensed program that includes a group of utilities that work together to provide Advanced Function Printing on the AS/400.

AFP. Advanced Function Presentation.

AFP API. Advanced Function Presentation Application Programming Interface

AFP Conversion and Indexing Facility. An AFP program you can use to convert a print file into a MO:DCA-P document, to retrieve resources used by the document, and to index the file for later retrieval and viewing.

AFPDS. A term formerly used to identify the composed page, MO:DCA-P-based data stream interchanged in AFP environments.

AFP Utilities/400 (AFP Utilities). Advanced Function Printing Utilities/400 (AFP Utilities)

AFP Workbench for Windows. A platform for the integration of AFP enabling applications and services. The Viewer application is a Workbench application that runs under WIN-OS/2 or Microsoft Windows.

all-points addressable (APA). The capability to address, reference, and position text, overlays, and images at any defined point (pel) on the printable area of the paper. See page mode.

American National Standard Code for Information Interchange. A standard code, using a coded character set consisting of 7-bit coded characters (8-bits, including the parity check), that is used for information interchange among data processing systems, data communication systems, and their associated equipment. The ASCII set consists of control characters and graphic characters.

APA. All points addressable.

APA printers. Devices that are all points addressable; in other words, devices that print with picture elements on the printing medium at any valid location on a sheet of paper.

application program. A program written for or by a user that applies to the user's work, such as a program that does inventory control or payroll.

application programmer. A programmer who is responsible for writing programs for specific applications. The application programmer takes application data and writes programs to print it on line and AFP printers.

Application System/400. The hardware on which the OS/400 operating system runs.

architecture. The set of rules and conventions that govern the creation and control of data types such as text, image, graphics, font, fax, color, audio, bar code, and multimedia.

ASCII. American National Standard Code for Information Interchange

AS/400. Application System/400.

B

bar code. A code representing characters by sets of parallel bars of varying thickness and separation that are read optically by transverse scanning. (I)

baseline. In a font, the imaginary line on which successive characters are aligned in the inline direction.

batch. (1) A group of records or data processing jobs brought together for processing or transmission. (2) Pertaining to activity involving little or no user action. Contrast with interactive.

batch environment. The environment in which noninteractive programs are executed. The environment schedules their execution independently of their submitter. Contrast with interactive environment.

boilerplate. In word processing and desktop publishing, text that is stored for repeated use in various documents; for example, the wording of an edition notice.

BookMaster. A powerful text-processing program that uses DCF's Generalized Markup Language (GML) tags, the SCRIPT/VS text formatter, plus additional tags, attributes, and predesigned style files, all designed to create complex documents.

burst. To separate continuous-form paper into separate sheets.

C

CAD/CAM. Computer-aided design/computer-aided manufacturing.

camera-ready master. Text and graphics merged on a page, ready for printing.

character. (1) A symbol used in printing. For example, a letter of the alphabet, a numeral, a punctuation mark or any other symbol that represents information. (2) A byte of data.

character graphic. The visual representation of a character, defined by toned or untoned picture elements (pels). **Note:** An untoned pel (a reverse character) is visually represented by the toned pels around it.

character increment. The distance the current print position is increased by printing the current character graphic.

character rotation. The alignment of a character relative to the baseline, measured in degrees in a clockwise direction. Examples are 0°, 90°, 180°, and 270°.

code page. A font component that associates code points and character identifiers. A code page also identifies how undefined code points are handled.

code point. A 1-byte code representing one of 256 potential characters.

collate. To alter the arrangement of a set of items from two or more ordered subsets to one or more other subsets, each containing a number of items (commonly one) from each of the original subsets in a specified order that is not necessarily the order of any of the original subsets. (I) (A)

command. A request from a terminal or a specification in a batch processing job for the performance of an operation or the execution of a particular program.

composition. The act or result of formatting a document.

computer-aided design/computer-aided manufacturing (CAD/CAM). An application in which devices such as personal computers can be used to design and develop products such as circuit boards, machine hardware, and other mechanical and electrical parts.

conditional processing. A page definition function that allows input data records to partially control their own formatting.

constant data. (1) Data with a value that does not change. (2) Data that has an unchanging, predefined value to be used in processing. A constant does not change during execution of a program, but the contents of a field or variable can. Contrast with variable data.

continuous-forms paper. A series of connected forms that feed continuously through a printer. The connection between the sheets is perforated to allow the user to tear them apart. Before printing, the sheets are folded in a stacked arrangement, with the folds along the perforations. (Note that some continuous forms are in rolls and are not folded.) Contrast with cut-sheet paper.

copy group. One or more copies of a sheet of paper. Each copy can have modifications such as text suppression, forms flash, and overlays.

cut-sheet paper. Paper that is cut into separate sheets before being printed on. Contrast with continuous-forms paper.

D

data base. A set of data, part or the whole of another set of data that consists of at least one file, and that is sufficient for a given purpose or for a given data-processing system. (I) (A)

data processing. The systematic performance of operations upon data; for example, handling, merging, sorting, and computing. (I) (A)

data set. Synonym for file.

data stream. (1) All data transmitted through a data channel in a single read or write operation. (2) A continuous stream of data elements being transmitted, or intended for transmission, in character or binary-digit form, using a defined format. (3) Records sent to PSF from the print files and the resource libraries.

DCF. Document Composition Facility

direction. The print position of data on a logical page, line, or field. The ultimate reference point for all direction controls on a page is the hardware origin. Secondary and tertiary reference points are possible as well, allowing more than one print direction on a page.

DisplayWrite/370. An IBM licensed program that provides word-processing capabilities for a number of printers.

ditroff. A file format consisting of device-independent data produced by the troff utility. See troff.

document. (1) A publication or other written material pertaining to a specific subject or related subjects. (2) In word processing, a collection of one or more lines of text that can be named and stored as a separate entity.

Document Composition Facility (DCF). An IBM licensed program used to prepare printed documents.

duplex printing. Pertaining to printing on both sides of a sheet of paper. Contrast with simplex printing.

DW/370. DisplayWrite/370.

E

edge marking. The function that allows the continuous-forms output pages to be marked for easy separation of the print jobs.

edit. To create or modify the contents of a document or file; for example, to insert, delete, change, rearrange, or copy lines.

electronic overlay. Synonym for overlay.

end user. (1) A person, device, program, or computer system that uses a computer network for the purpose of data processing and information exchange. (T) (2) A person who writes and creates documents. The end user has little or no programming training but knows how to use a terminal for text processing. Examples of end users include secretaries, writers, and engineers.

external formatting. Controls for the placement of data on the page that are imbedded outside the actual application program.

F

field. In a record, a specified area used for a particular class of data; for example, a group of character positions used to enter or display wage rates on a screen. (T)

file. (1) A named set of records stored or processed as a unit. (T) (2) The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the operating system has access.

font. A family or assortment of characters of a given size and style; for example, 9-point Sonoran Serif roman medium. (A)

font administrator. A person who is responsible for installing and maintaining the fonts stored in computer resource libraries.

font metrics. Measurement information that defines individual character values such as height, width, and space as well as overall font values such as the average and maximum heights and widths of characters. Font metrics can be expressed in specified fixed units, such as pels, or in relative units that are independent of both the resolution and size of the font.

form. (1) The paper on which output data is printed by a line printer or a page printer. (2) A physical sheet of paper. See preprinted form.

form definition. A resource that defines the characteristics of the form which include overlays to be used (if any), text suppression, the position of page data on the form, and the number and modifications of a page. Contrast with page definition.

format. (1) A specified arrangement of such things as characters, fields, and lines, usually used for displays, printouts, or files. (2) To arrange such things as characters, fields, and lines. (3) (v.) To prepare a document for printing in a specified format.

formatter. A computer program that prepares a source document for printing.

forms designer. A person who is responsible for designing electronic or preprinted forms that are readable, usable, and attractive. The forms designer usually has training in graphics design and in the presentation of information.

forms flash. On the IBM 3800 Printing Subsystem, a means of printing an overlay using a negative plate flashed onto the form.

G

GDDM. Graphical Data Display Manager.

Generalized Markup Language (GML). An IBM licensed program that identifies the parts of a source document without respect to a particular processing system.

GML. Generalized Markup Language.

graphic. Image, text, or a combination of both that can be placed on the printed page.

Graphical Data Display Manager (GDDM). An IBM licensed program containing utilities for creating, saving, editing, and displaying visual data such as page segments, charts, images, vector graphics, composites (of text, graphics, and images), and scanned data.

graphics designer. A person who is responsible for the design and appearance of graphics used in a company's documents. The graphics designer has experience in graphics design as well as in using computers to create graphics.

H

hardware. Physical equipment as opposed to programs, procedures, rules, and associated documentation. (I) (A) Contrast with software.

host-based computer. (1) In a computer network, a computer that provides end users with services such as computation and data bases and that usually performs network control functions. (T) (2) The primary or controlling computer in a multiple-computer installation.

I

image. A pattern of toned and untoned pels that form a picture.

impact printer. A device in which printing results from mechanical impacts. (I) (A) Contrast with nonimpact printer.

index. (1) A process of segmenting a print file into uniquely identifiable groups of pages (a named collection of sequential pages) for later retrieval. (2) A process of matching reference points within a file and creating structured field tags within the MO:DCA-P document and the separate index object file.

index object file. An index-information file created by Advanced Function Presentation Conversion and Indexing Facility that contains Index Element (IEL) structured fields, which identify the location of the

tagged groups in the AFP file. The indexing tags are contained in the Tagged Logical Element (TLE) structured fields.

interactive. Pertaining to an application in which entries call forth a response from a system or program, as in an inquiry system. An interactive system might also be conversational, implying a continuous dialog between the user and the system. Interactive systems are usually communicated with through terminals, and respond immediately to commands.

interactive environment. An environment in which a terminal user interacts with the system. Contrast with batch environment.

J

JCL. Job control language.

JES. Job Entry Subsystem.

job control language (JCL). A language of control statements used to identify a computer job or describe its requirements to the operating system.

Job Entry Subsystem (JES). An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system.

L

LAN. Local area network

LAN administrator. A person responsible for installing, configuring, and maintaining Local Area Networks on which are installed workstations and printers.

library. A file or a set of related files; for example, a page definition library containing one or more page definition files. A library often exists as a partitioned data set in MVS and as a minidisk in VM.

licensed program. A utility that performs a function for the user and usually interacts with and relies upon system control programming or some other IBM-provided control program. A licensed program contains logic related to the user's data and is usable or adaptable to meet specific requirements.

line. Synonym for rule.

line data. Data prepared for printing on a line printer such as an IBM 3800 Model 1 Printing Subsystem. Line data is usually characterized by carriage-control characters and table reference characters. Contrast with MO:DCA-P data.

line-data print file. A file that consists of line data, optionally supplemented by a limited set of structured fields.

line printer. A device that prints a line of characters as a unit. (I) (A) Contrast with page printer.

lines per inch (lpi). (1) A unit of measurement for the specification of baseline placement. (2) A measure of the number of lines per vertical inch of paper.

local area network. A data network located on the user's premises in which serial transmission is used for direct data communication among data stations. (T)

logical page. A presentation space. One or more object areas or data blocks can be mapped to a logical page. A logical page has specifiable characteristics, such as size, shape, orientation, and offset and is rectangular in shape. Orientation and offset are specified relative to a medium coordinate system.

lowercase. Pertaining to small letters, as distinguished from capitals; for example, a, b, g, rather than A, B, G.

lpi. Lines per inch.

M

magnetic ink character recognition (MICR). Recognition of characters printed with ink that contains particles of a magnetic material.

metafile format. OS/2 graphics data produced by Presentation Manager applications such as IBM CAD, CorelDRAW, or Aldus Pagemaker.

MICR. Magnetic ink character recognition.

Mixed Object Document Content Architecture. A strategic, architected, device-independent data stream for interchanging documents.

mixed-pitch font. A font that simulates a proportionally spaced font. The characters are in a limited set of pitches (for example, 10 pitch, 12 pitch, and 15 pitch).

MO:DCA-P. Mixed Object Document Content Architecture

monospaced font. A font in which the graphic characters have a uniform character increment. Synonymous with uniformly spaced font. Contrast with proportionally spaced font.

multiple-up printing. The printing of more than one page on a single surface of a sheet of paper.

Multiple Virtual Storage (MVS). An IBM operating system that supports multiprogramming with a variable number of tasks.

MVS. Multiple Virtual Storage.

N

Network File System (NFS). A protocol developed by SUN Microsystems that uses Internet Protocol to allow a set of cooperating computers to access each other's file system as if they were local.

NFS. Network File System

nonimpact printer. A device in which printing is not the result of mechanical impacts; for example, thermal printers, electrostatic printers, photographic printers. (I) (A) Contrast with impact printer.

O

object format. The format of AFP resources required for use by PSF. Contrast with source format.

offset stacking. A function that allows the printed output pages to be offset for easy separation of the print jobs.

OGL/370. Overlay Generation Language/370.

Operating System/2 (OS/2). An IBM licensed program that can be used as the operating system for the PS/2 processor series.

Operating System/400 (OS/400). An IBM licensed program that can be used as the operating system for the AS/400 processor series.

orientation. (1) The angle between the top or bottom edge of the page and the baselines within a column, measured in a clockwise direction. (2) The rotation of an element relative to a fixed reference.

OS/2. Operating System/2.

OS/400. Operating System/400.

outline font. A font whose graphic character shapes are defined mathematically rather than by raster patterns.

output device. A machine used to print, display, or store the result of data processing.

overlay. A resource that can contain text, image, graphics, and bar code data. An overlay is electronically created in the host processor, stored in a library, and can be merged electronically with variable data on a sheet during printing. See also preprinted form and forms flash.

Overlay Generation Language/370 (OGL/370). An IBM licensed program used to create overlays.

P

page. A collection of data that can be printed on a physical sheet of paper.

page definition. A resource containing a set of formatting controls for printing logical pages of data. Includes controls for number of lines per printed sheet, font selection, print direction, and mapping individual fields in the data to positions on the printed sheets.

page format. A subset of a page definition, containing controls governing the arrangement of text on a page.

page mode. The mode of operation in which the printer can accept a page of data at a time from a host processor to be printed on an all-points addressable output device. Data may consist of pages composed of text, images, overlays, or page segments.

page printer. Any of a class of printers that accepts MO:DCA-P pages, constructed of composed text and images, among other things. Contrast with line printer.

Page Printer Formatting Aid/370 (PPFA/370). An IBM licensed program that you can use to create and store form definitions and page definitions.

Page Printer Migration Programs. An optional feature of the Print Services Facility/MVS licensed program that you can used to convert Xerox Laser Printer System print files for printing on AFP printers.

page segment. A resource containing composed text and images, prepared before formatting and included during printing.

pel. The smallest area that can be individually toned on a printing medium or on a display surface.

pel density. The number of pels per unit of linear measurement.

personal computer. A desk-top, floor-standing, or portable microcomputer that usually consists of a system unit, a display monitor, a keyboard, one or more diskette drives, internal fixed-disk storage, and an optional printer. Personal computers are designed primarily to give independent computing power to a single user or small businesses. **Note:** Personal computers are designed primarily for stand-alone operation but can be connected to mainframes or networks.

phototypesetting. The process of producing high quality text by means of a photographic process.

physical page. The side of a sheet of paper that is to be printed on.

pica. A unit of about 1/6 inch used in measuring typographical material.

picture element. An element of a raster pattern about which a toned area on the photoconductor might appear. See also raster pattern. Synonym for pel.

pitch. A unit of measurement for the width of a printed character, reflecting the number of times a graphic character can be set in 1 linear inch; for example, 10-pitch has 10 graphic characters per inch. Uniformly spaced fonts are measured in pitch. Contrast with point.

plotter. An output unit that presents data in the form of a two-dimensional graphic representation. (I) (A)

point. In printing, a unit of about 1/72 of an inch used in measuring typographical material. Each pica contains 12 points.

point size. The height of a font in points.

postprocessing option. A hardware device that attaches to the output side of a printer; for example, an envelope stuffer, binder, or stapler.

PostScript. A page description language with interactive graphics capabilities that was developed by Adobe Systems, Incorporated.

PPFA/370. Page Printer Formatting Aid/370.

preprinted form. A sheet of paper containing a preprinted design of constant data. Variable data can be merged on such a form.

preprocessing option. A hardware device that attaches to the input side of a printer; for example, a paper-roll feed or multiple input bins.

print data set. Synonym for print file.

print file. A file created by an application program that contains the actual information to be printed and some of the data that controls the format of the printing. Print files can contain MO:DCA-P data, line data, or a combination of MO:DCA-P and line data.

print job. The data to be printed that is submitted to Print Services Facility by the user.

Print Services Facility (PSF). An IBM licensed program that produces printer commands from the data sent to it.

printer driver. A program that passes commands and resources with a data stream from the system spool to tell the printer how to print the page.

proportionally spaced font. A font in which the characters have different character increments. Graphic character widths vary with the size of each graphic character. This allows for even spacing between printed characters and eliminates excess space around narrow characters, such as the letter i. Contract with uniformly spaced font.

PSF. Print Services Facility.

R

raster font. (1) A font created by a series of pels (picture elements) arranged in scan lines to form an image. (2) A font in which the characters are defined directly by the raster bit map.

raster graphics. Computer graphics in which a display image is composed of an array of picture elements (pels) arranged in rows and columns. (I) (A) Contrast with vector graphics.

raster pattern. A series of picture elements (pels) in scan lines to form an image. See also page segment.

record. A collection of related data or words, treated as a unit; for example, in stock control, each invoice could constitute one record.

remote printer. A device that prints in a location away from the centralized data processing center.

Remote Spooling Communication Subsystem (RSCS). The licensed program that transfers spool files, commands, and messages between VM users, remote stations, and remote and local batch systems through HASP-compatible telecommunication facilities.

resource. A collection of printing instructions and sometimes data to be printed consisting entirely of structured fields. A resource can be stored as a member of a library and can be called for by Print Services Facility when needed. Coded fonts, font character sets, code pages, page segments, overlays, form definitions, and page definitions are all resources.

resource library. (1) A collection of related files. (2) A place to store resources such as form definitions, page definitions, page segments, fonts, and overlays.

rotation. The number of degrees a character is rotated relative to the print direction. One of four directions that define the orientation of text relative to a sheet, page, overlay, text block, or page segment.

RSCS. Remote Spooling Communication Subsystem.

rule. A solid or patterned line of any line width, extending horizontally across or vertically along a page.

S

scanner. A device that examines a spatial pattern one part after another and generates analog or digital signals corresponding to the pattern. Scanners are often used in mark sensing, pattern recognition, or character recognition. (I) (A)

SCRIPT. A formatting program used by Document Composition Facility for processing text.

SCS. See SNA character string (SCS)

segment. See page segment.

simplex printing. Printing on only one side of the paper. Contrast with duplex printing.

SNA. Systems Network Architecture (SNA)

SNA character string (SCS). In SNA, a data stream composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit.

software. Programs, procedures, rules, and any associated documentation pertaining to the operation of a system. (T) (A) Contrast with hardware.

source format. The format of an AFP resource, other than fonts, used by AFP resource management programs. Contrast with object format.

spooling (simultaneous peripheral operation online). (1) The use of auxiliary storage as a buffer storage to reduce processing delays when transferring data between peripheral equipment and the processors of a computer. (I) (A) (2) The reading of input data streams and the writing of output data streams on auxiliary storage devices, concurrently with job execution, in a format convenient for later processing or output operations.

spot carbon. Paper from which carbon is omitted in certain areas to suppress printing of data on specified copies.

structured field. A self-identifying, variable-length record, which can have a content portion that provides control information, data, or both.

suppression. The electronic equivalent of the spot carbon, which prevents selected data from being printed on certain copies.

syntax. The rules and keywords that govern the use of a programming language.

system printer. The printer used for any printed output that is not specifically directed to another printer.

system programmer. A programmer who is responsible for writing programs for the functions of the computer operating system and who has a thorough knowledge of the operating system. The system programmer installs and maintains AFP software in the System/390 environment.

Systems Network Architecture (SNA). In IBM networks, the description of the layered logical structure, formats, protocols, and operational sequences that are used for transmitting information units through networks, as well as controlling the configuration and operation of networks.

T

tag. A type of structured field used for indexing in an AFP document. Tags associate an index attribute-value pair with a specific page or group of pages in a document.

TCP/IP. Transmission Control Protocol/Internet Protocol

terminal. A device, usually equipped with a keyboard and some kind of display, capable of sending and receiving information over a communication channel.

text. A graphic representation of information on an output medium. Text consists of alphanumeric characters and symbols arranged in paragraphs, tables, columns, or other shapes.

text-formatting program. A program that determines the manner in which data will be placed on a page.

text orientation. A description of the appearance of text as a combination of inline and baseline directions and character rotation.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of communications protocols that support peer-to-peer connectivity functions for both local and wide area networks.

troff. A phototypesetting utility originally designed to support a Graphics Systems phototypesetting machine but that is now capable of supporting a variety of phototypesetters. The utility produces data in a format called ditroff.

type family. A collection of fonts of a common typeface that vary in size and style.

type font. Type of a given size and style; for example, 10-point Sonoran Serif roman medium. (A)

typeface. A collection of fonts all having the same style, weight, and width; each font differs from the others by point size or type family.

typeset. (1) To arrange the type on a page for printing. (2) Pertaining to material that has been set in type.

typographic font. A typeface originally designed for typesetting systems. Contrast with mixed-pitch font, uniformly spaced font. Synonym for proportionally spaced font.

U

underscore. A line printed under a character. To underline.

uniformly spaced font. A font in which the characters have the same character increment. Synonymous with monospaced fonts. Contrast with proportionally spaced font and typographic font.

uppercase. Pertaining to capital letters, as distinguished from small letters; for example, A, B, G, rather than a, b, g.

V

variable data. (1) In programming languages, a language object that may take different values, one at a time. The values of a variable are usually restricted to a certain data type. (I) (2) A quantity that can assume any of a given set of values. (A) (3) Used to represent a data item whose value can be changed while the program is running. Contrast with constant data.

vector. In computer graphics, a directed line segment.

vector graphics. Computer graphics in which display images are generated from display commands and coordinate data. (I) (A) Contrast with raster graphics.

Virtual Machine. A functional simulation of a computer and its associated devices.

Virtual Storage Extended. The notion of storage space that can be regarded as addressable main storage by the user of the computer system in which addresses are mapped to real addresses.

VM. Virtual Machine.

VSE. Virtual Storage Extended.

W

word processing. The entry, modification, formatting, display, and printing of text on personal computers, microprocessors, and stand-alone word processors.

WordPerfect. A WYSIWIG text-processing program

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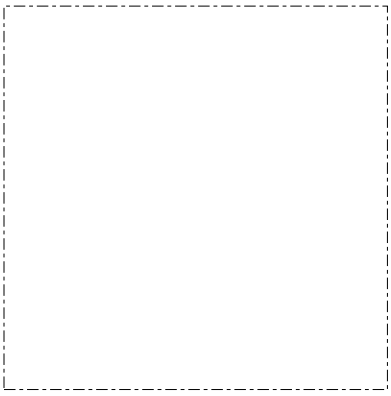

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