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IBM 3820 MVS/JES2 Installation and Use Considerations

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Preface

Abstract

This document provides information about the IBM 3820 Page Printer installation process and its use in an MVS/JES2 environment. It also includes experiences gained in the 3820 Early Support Program as well as operational and application design guidance.

The intent of this document is to provide IBM systems engineers with information needed to provide assistance to their customer's installation planners, operations analysts, system output administrators, systems programmers, and application designers.

Introduction

This document provides information for the installation and use of the 3820 in an MVS/JES2 environment. The 3820 can also be used with VSE and PC local area networks but this document will not discuss those environments.

Much of the information presented in this document will be useful to those customers planning to install and use 3820s regardless of the software used to attach the device to the system. The information in this document is current for announcements made through September, 1985.

This document was formatted using Document Composition Facility Release 3 and the master copy was printed on a 3820 using the Advanced Function Printing software including typographic font products.

Acknowledgements

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Chapter 1. Introduction to the IBM 3820 Page Printer

The 3820 is a non-impact laser printer designed to provide page mode function in distributed locations at speeds of up to 20 impressions per minute.

To introduce the 3820 and its associated software in an MVS/JES2 environment a set of foils with accompanying text is provided in Appendix C, "Foils for Use in 3820 Introductory Presentations" on page C-1. For a general introduction to the 3820, read the text only. If you would like to give an introductory presentation yourself, you can use the foils and develop a script based on the text provided with each foil.

Other good introductory material can be found in *IBM 3820 Page Printer and Advanced Function Printing Software: Introduction and Planning Guide* GBOF-1189, and *IBM 3820 Page Printer Operator's Guide* G544-3080.

Chapter 2. Planning for a Successful 3820 Installation

The following guidelines are based on experience gained with the customers in the 3820 Early Support Program and information gathered from development, service planning, and market support in the WSC.

This is not intended to be a complete list of every possible detail to consider when installing a 3820; however, it should provide installation planners with the information they need to help make the first 3820 installation smooth.

Putting the right plans in place

The first step should be to order and review the following documentation:

1. *IBM 3820 Page Printer and Advanced Function Printing Software: Introduction and Planning Guide* GBOF-1189

This set of seven pamphlets will give the SE and the installer the basic information needed to plan for the installation of the 3820 in an MVS environment. There is information on planning for a data network, planning for the location, and ordering supplies. There is also introductory information on the page mode software, putting together a good plan, and even a glossary. If this set of pamphlets is ordered using the bill-of-form order number, it will come packaged in a high quality slip case.

2. *Print Services Facility System Programmer's Guide for MVS* SH35-0091

This document will provide the installer with information needed to define the 3820 to VTAM, NCP, JES, and Print Services Facility. It also describes the available exits for job separators, data record modification, and SMF record modification along with basic examples of their coding. There is also basic information on error diagnosis which is more fully discussed in a series of diagnosis guides (which the installer will receive when Print Services Facility is ordered.)

3. *Print Services Facility User's Programming Guide for MVS* S544-3084

This document will provide the application programmer with the detailed information needed to design applications for the 3820. It includes an introduction to page mode printing using Print Services Facility, information on JCL changes, and how to take advantage of special features of the 3820 such as duplexing and alternate paper selection. This document also contains the information needed when designing applications that insert page mode control records (structured fields) within line data to take advantage of special page mode features.

4. *IBM 3820 Page Printer Operator's Guide for MVS* S544-3080

Chapter one has an overview of 3820 hardware capabilities.

Educating the people responsible for the installation

The installation should consider sending at least one systems programmer and one systems output administrator to the Advanced Function Printing Implementation class (K2501) conducted by the Dallas Advanced Education Center The class contains information about the 3820 as well as the 3800-3. The NSD service representative will train the 3820 printer operator.

Helping people use the 3820

End users will also want some education on the 3820 hardware and its use. The system output administrator can assemble a training program by selecting from the following:

1. Introductory presentation. Foil masters for an introductory presentation can be found in Appendix C, "Foils for Use in 3820 Introductory Presentations" on page C-1.

2. Publication review as appropriate.

    * *A Guide to Using IBM Printers for Advanced Function Printing* S544-3095.
    * *Print Services Facility User's Programming Guide for MVS* S544-3084.
    * *Overlay Generation Language User's Guide and Reference* SH35-0079. Chapter 1 is an introduction to Overlay Generation Language, and chapter 2 is a step by step introduction to the functions and features of Overlay Generation Language through the use of an example overlay which can be built and printed by the user.
    * *Print Management Facility User's Guide and Reference* SH35-0059. This document will be valuable to systems programmers and systems output administrators using Print Management Facility. End users may use Print Services Access Facility more commonly than Print Management Facility.
    * *Print Services Access Facility for MVS: User's Guide and Reference* G544-3100. Chapter 1 is of special interest to a new user.

3. Document Composition Facility education.

    The current education available for Document Composition Facility is as follows:

    * DCF Self Study Course (SS091) -- SC20-1894-1 *DCF SCRIPT/VS Student Text*
    * SRA Self Study Course (I0161) -- SR20-7525 *DCF Release 3 for Document Administrators and Text Programmers*
    * SRA Self Study Course (32908) -- SR20-8486 *Using DCF with the 4250 Printer*
    * SRA Self Study Course (32291) *Using the Document Composition Facility*

    The *Catalog of IBM Education* G320-1244 can be reviewed for more details on these classes.

    Early Support Program experience has shown that trial-and-error can be used as an effective way to learn to use the new functions of Document Composition Facility for use with page mode printers. Depending on the importance of Document Composition Facility in the installation, a memo to end users detailing new functions could be distributed or a short presentation made.

4. Review of other documentation produced by the Washington Systems Center:

    a. *MVS Application Design Examples for the First-time 3820 User* GG66-0219.

Once end users are trained on the use of page mode features of the 3820, they will need help from time to time. The systems output administration staff or possibly a help desk should be considered to help answer these questions.

At the printer, the *IBM 3820 Page Printer Operator Summary* S544-3081 will help casual users interpret messages and do routine tasks such as load paper. A copy should be kept at the printer for reference.

Setting expectations

A key task in insuring that the 3820 installation is successful is to be sure to set the user's expectations before the machine is installed. Be sure that the user understands these things:

1. Printer throughput:

    The maximum throughput of the printer is set by the speed of the processing of the paper path: 20 impressions per minute. There are instances in which that maximum speed cannot be maintained. The observed printer throughput will be influenced by these factors:

    a. Fonts, overlays, and other objects are loaded at the start of the printing of job output.

    b. During the printing of a job, fonts or images may be dynamically loaded or deleted. All overlays and images are deleted at the end of each data set for security reasons and may have to be resent later.

    c. Loading and printing of images can take significant elapsed time due to the amount of data involved.

    d. Due to line speed, printer throughput is dependent on the number of characters per impression. (For example, a 9600 bps line can transmit approximately 1K data characters per second.) Remember that the number of characters per page must include all blank characters sent as well as control records supplied by Print Services Facility at print time. At higher speeds, throughput will improve, but only marginally.

    e. The use of imbedded page mode structured field control records could potentially slow throughput. Imbedded control records to place text on the page include data placement commands as well as the text itself. The 3820 microprocessor must act upon these commands and this can take time. This includes not only control records included in line data by users, but also DCF output, and overlays built by OGL.

    f. The way paper is handled during duplexing.

        For example, consider printing a six impression duplexed document. Impressions 2, 4 and 6 are printed; then, the paper is flipped over in the paper path to print impressions 1, 3, and 5 on the reverse sides of the paper. This paper handling accounts for a minor degradation (in the range of 15 to 25% reduction from the 20 page per minute maximum assuming that the same output would print at maximum speed in simplex.)

        In another case, short output in duplex can decrease printer throughput. Assume that only one duplexed page (two impressions) is printed. The sheet of paper is printed on one side; the paper then travels through the entire paper path, is flipped over, then the reverse is printed. This leads to printer throughput slowing.

g. Other factors external to the 3820 such as network contention, host performance, etc. can impact throughput.

2. Print quality:

- Although printing can be addressed right to the edge of the paper in a 3820, IBM cautions that print quality will be good when printing is no closer than 10 mm (slightly less than 1/2") from the edge of the page. Some users will find that printing will be acceptable to them closer to the edge than this suggested distance.

- Some shading used in electronic overlays or GDDM graphics in areas more than a few square inches in area may result in moire patterns. A moire pattern is slightly wood-grained in appearance. Experiment with various shading patterns until an acceptable level of shading is found.

Getting commitment on user responsibilities

A successful installation is dependent upon the user understanding his or her responsibilities:

- Identifying and ordering supplies such as toner, fuser oil, developer, paper, and cassettes.
- Assigning a 3820 printer operator and arranging for training with the NSD service representative.

The printer operator will be responsible for:

- Reporting monthly usage for billing purposes.
- Adding paper, toner, and fuser oil when needed.
- Installing microcode updates. The operator will be responsible for coordinating this change with the network control center and using the installation's change control system.
- Clearing paper jams.
- Performing the functional checkout with the NSD service representative at installation of the 3820.
- Performing the customization of the microcode using input from the systems programmer or system output administrator. (The NSD service representative will help the operator do this the first time.)
- Participating in problem determination by doing traces and diagnostics when required by the systems programmer or NSD service representative.
- Responding to error messages on the display if errors occur.
- Adjusting the print registration.
- Making a backup diskette and installing when needed.
- Setting up the cassette for the required paper size.

Printer operators must be aware of their role in the problem determination and resolution process. They should know that they are responsible for running traces, printing error logs and configuration listings, and for recording error indications on the printer console for use by the NSD service representative or systems programmer. These procedures are included in the hardware operator training conducted by the NSD representative and are documented in the *IBM 3820 Operator's Guide* S544-3080.

Choosing the right software

Basic software requirements and the considerations for their installation are found in *IBM 3820 Page Printer and Advanced Function Printing Software: Introduction and Planning Guide* GBOF-1189. Here is some additional information on the software choices available to you:

The purpose of this discussion is to briefly describe the products available to the user of page mode printing, their purpose and normal use, and in what situations each should be considered. This information is intended to enable users to make a more informed decision about which of these products should be used for various applications.

General recommendations

When deciding which Advanced Function Printing support software to install, keep the following considerations in mind:

1. Print Services Facility (PSF/MVS) is required for printing output on the 3820 or 3800-3 in page mode. A starter set of objects such as uniformly spaced fonts, PAGEDEFs and FORMDEFs is supplied with Print Services Facility that may be sufficient for some customers. Most users will find that this starter set will not fill all their needs.

2. All customers should strongly consider the use of Print Management Facility (PMF). It can be used to create detailed FORMDEFs and PAGEDEFs using menu-driven, interactive screens. In addition, it is the only product that provides

    *   Font building from source, and font rescaling,
    *   Page segment building from scanned images and 3800 logo character groups, and
    *   3800 object conversion services.

3. Print Services Access Facility (PSAF) and Page Printer Formatting Aid for MVS (PPFA/MVS) can be used by some end users in lieu of Print Management Facility.[1] These products used together can provide an interactive means to submit output for printing (using PSAF) along with a batch way to create customized FORMDEFs and PAGEDEFs (using PPFA). This combination of software does not replace all functions of Print Management Facility and so Print Management Facility may still be required. Specifically, Print Management Facility is required for designing and building fonts, building page segments from scanned images, and converting 3800 compatibility mode objects into page mode objects.

Products used to support page mode printing

The following is a brief description and discussion about each software product.

1. Page printer support

    *   Print Services Facility 5665-275

        Print Services Facility (PSF/MVS) provides device and resource management support for the 3820 and the 3800-3 in page mode. It is *required* on the host to which either of these devices is attached.

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[1]   Print Services Access Facility and Page Printer Formatting Aid for MVS do not have to be used together. Each package can be of value when used alone.

Print Services Facility is not required on the systems on which utilities such as Print Management Facility are run, but the objects created (fonts, PAGEDEFs, FORMDEFs, etc.) must be available to Print Services Facility at print time.

2. Advanced Function Printing support utilities

- Print Management Facility 5665-307

   Print Management Facility (PMF) is an optional interactive menu-driven program primarily designed to be a tool for systems programmer and system output administrators. It allows a user to take advantage of advanced features of page mode printing such as external data formatting as well as some maintenance tasks such as font editing and building, 3800 object conversion, and page segment building from scanned images. It is strongly recommended that all customers seriously consider installing and using Print Management Facility. Print Management Facility requires VSAPL release 4 or APL2 and GDDM release 3 or later.

- Print Services Access Facility 5665-340

   Print Services Access Facility (PSAF) is an optional end user facility that allows relatively unsophisticated users to print their output on a page mode printer. It is intended for users who are relatively new to page printing or do not wish to be concerned with system specifics and details or JCL, PAGEDEFs, or FORMDEFs. PSAF allows interactive submission of print JCL, interactive access of DCF release 3 and subsequent printing, and automatic creation of *simple* FORMDEFs and PAGEDEFs. More advanced features of FORMDEF and PAGEDEF specifications such as copy grouping, copy modification, and external data formatting are available with Print Management Facility or Page Printer Formatting Aid for MVS.

- Page Printer Formatting Aid for MVS 5665-351

   Page Printer Formatting Aid for MVS (PPFA/MVS) is an optional batch program that allows users to create more detailed PAGEDEFs and FORMDEFs. Page Printer Formatting Aid for MVS should be considered in those situations where users want to create more complex PAGEDEFs and FORMDEFs using a batch tool or when the system output administrator does not want to allow general use of Print Management Facility.

- Font Library Services Facility 5668-890

   Font Library Services Facility (FLSF) is an optional programming tool for use by systems programmers for managing the contents of font object libraries for the 4250 and 3820. It can run as a batch or interactive application. Fonts in these libraries can be listed, characters can be deleted or copied to other fonts, characters can be renamed, code pages altered, and individual character patterns modified. Font Library Services Facility allows the user to choose any editor (such as the ISPF editor or any VM CMS editor) to modify these font patterns. The font patterns are displayed as series of "X" characters on the screen.

- Overlay Generation Language 5665-308

   Overlay Generation Language (OGL) is an optional batch program that allows an end user to create electronic overlays using a simple English-like syntax. Text in a variety of fonts, placement, and orientations can be merged with lines, boxes and shading. Graphic images such as logos and signatures in the form of page segments can also be included.

3. Typographic fonts

a. Deciding which font packages to buy

Sonoran Serif (5771-ABA) and Sonoran Sans Serif (5771-ABB) provide the fonts for typographic proportionally-spaced printing. Sonoran Serif and Pi and Specials (5771-ABC) are used by DCF Release 3 as the default fonts for the 3800-3 in page mode and the 3820.

DATA1 (5771-ADA) fonts provide a set of 13.3 pitch uniformly-spaced fonts. These fonts are useful for printing output lines of data that are 132 characters wide rotated 90 degrees on an 8.5 by 11 inch page. Using these fonts, a user can print current "data processing" type output on an 8.5 by 11 inch page in a landscape orientation with a half inch border on the left and right.

APL2 (5771-ADB) fonts provide a number of fonts that can be used to print output with characters from the APL2 or VS/APL program products.

b. Deciding which font features to buy

All fonts listed above come in three forms:

1) Source format.

This format provides all the characters in the fonts in source form. The user can use Print Management Facility to build the fonts for use on either the 3800-3 or 3820 or both. (When building fonts for use on the 3820, Print Management Facility 1.1 is required.) The user can customize the fonts as he or she builds them.

2) Object format for the 3800-3.

The 3800-3 object format of the fonts provide object versions of code pages and character sets for all point size, weight and style combinations in the font family. Also included are coded fonts using DCF and international code pages (T1DCDCFS and T1GI0361.) The object versions of these fonts contain all the characters supplied in the source versions of the fonts including the foreign language characters[2]. For the 3800-3, these fonts are provided in the "ACROSS" and "DOWN" printing variations. This will allow you to print what you might call normal output, and 90 degree rotated output.

3) Object format for the 3820.

The 3820 object format of the fonts provides object versions of the code pages and character sets for all point size, weight and style combinations in the font family. Also included are coded fonts using DCF and international code pages (T1DCDCFS and T1GI0361.) The fonts contain all the characters supplied in the source versions of the fonts including the foreign language characters[2]. For the 3820, this single already-built version of the font provides all possible direction/rotation printing variations. This will allow you to print text in up to 16 different direction/rotation combinations.

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[2] The object format versions of the typographic fonts contain many international use characters that are not commonly used by domestic (US) customers. For the 3820 these characters can be deleted from the object format fonts using Font Library Services Facility. For the 3820 or the 3800-3, Print Management Facility can be used to rebuild the font from source excluding the three character groups that include the international use characters. This saves disk space to store the fonts, transmission time to send the fonts to the printer, and pattern storage within the printer.

You can order the object format of the fonts alone if you plan not to change the fonts. If you wish to modify 3800-3 fonts you must obtain the source format of the fonts and rebuild them using Print Management Facility. If you want to modify 3820 fonts, you can either obtain the source format of the fonts and rebuild them using Print Management Facility or order and use Font Library Services Facility (5668-890) to modify the already-built fonts.

4. Other packages

- Document Composition Facility Release 3 (DCF) 5748-XX9

  DCF Release 3 allows a user to compose documents for printing on page mode printers. In addition to the basic page composition functions, DCF Release 3 allows a user to take advantage of:

  - Expanded font support including the use of multiple typographic proportionally spaced fonts.
  - Fully proportional horizontal and vertical spacing.
  - The ability to position text anywhere on the printable area of the page.
  - Inclusion of page segments (logos, signatures, or graphic images) either at print time or in the formatted output file.
  - Intercharacter spacing control.
  - The use of vertical and horizontal rules or varying thickness.

- Graphical Data Display Manager (GDDM) 5748-XXH

  GDDM is a general purpose comprehensive set of graphics and device support subroutines including end user offerings such as the Interactive Chart Utility. GDDM Release 3 and later includes the ability to create page segments for use on the 3800-3 and 3820. GDDM should be considered in those cases where GDDM graphics will be printed on a 3820 or 3800-3 in page mode.

The following table summarizes the choices of Advanced Function Printing support utilities and in what situations each should be considered. In all cases PSF/MVS is required to drive the printer (3800-3 or 3820) in page mode. PSF/MVS is required *only* on the system on which the printer is attached but is not required on the system on which utilities such as PMF are run. *Please read the footnotes carefully.*

Function required	PMF	OGL	PSAF	PPFA	FLSF	DCF	FONTS
Line mode printing[3]	Optional[6]		Optional[6]	Optional[6]			
Conversion of 3800 compatibility mode objects to page mode objects[4]	Required						
Scanned image and logo character group conversion to page segments[5]	Required						
Overlays	Required[8]	Required	Required[8]	Required[8]			Optional
Multiple-up printing of line mode data	Optional[7]		Optional[7] [20]	Optional[7]			
Rotated printing of line mode data	Optional[7]		Optional[7] [20]	Optional[7]			
External data formatting	Optional[9]		Optional[7] [20]	Optional[9]			
Simple PAGEDEF and FORMDEF options[14]	Required[14]		Required[14]	Required[14]			
Advanced PAGEDEF options[11]	Required[12]		[20]	Required[12]			
Advanced FORMDEF options[13]	Required[12]		[20]	Required[12]			
Including graphics as part of an overlay	Optional[16]	Required	Optional[16]	Optional[16]			
DCF output formatting[17]	Optional[18]	Optional[18]	Optional[18]	Optional[18]		Required	Optional[15]
Including graphics as part of a DCF document[17]						Required	
Font manipulation	Required[10]				Required[10]		Optional[19]

Figure 2-1. AFP product selection matrix. Blanks mean "not available".

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3   The 3820 runs only in page mode under the control of PSF/MVS. However, line mode data can be formatted to print in page mode using specifications contained in objects known as PAGEDEFs. PAGEDEFs can be built to provide the functions of FCBs (forms control buffers) such as line spacing and carriage control specifications so that the output when printed in page mode has the same format that it would have had if it were printed on a line mode printer.

4   Compatibility mode specifications that can be converted into page mode objects using PMF include FCBs (which can be converted into PAGEDEFs), GRAPHMODs and LCSs (which can be converted into fonts), and logo character groups (which can be converted into page segments).

5   Scanned images such as logos or signatures can be converted into page segments using PMF. Logo character groups are a way that 3800-1 and 3800-3 compatibility users included small graphics in their output. With logo character groups, several characters when printed together form an image. Each character represents a piece of that image. When converted to a page segment using PMF, these images can then be included in overlays, DCF documents, or user line data applications.

6   A number of PAGEDEFs and FORMDEFs are supplied with PSF/MVS in object form for use at print time, and in source form with PMF. See *PSF User's Programming Guide for MVS* S544-3084 for a description of the supplied PAGEDEFs and FORMDEFs. Using PMF, the source of these PAGEDEFs and FORMDEFs can be modified to fit specific user requirements or new PAGEDEFs and FORMDEFs can be built. Some users will

find the PSF starter set of objects sufficient, but most users will want some modifications to these objects as supplied with PSF. For example, if there are any user-created FCBs, PMF or PPFA/MVS will be needed since PSAF will not allow the specification of channel codes or variable line spacing within a document. Users migrating line data applications to page mode can build the needed PAGEDEFs and FORMDEFs using PPFA/MVS alone. If other functions, such as font rescaling, are required, then the users will require PMF.

7   These packages are optional in the sense that some users may find the supplied multiple-up and rotated format PAGEDEFs sufficient. Many users will want different specifications from the starter set supplied by PSF and so will need either PMF or PPFA to create these PAGEDEFs. See *Print Services Facility User's Programming Guide for MVS* S544-3084 for a description of the IBM-supplied starter set of PAGEDEFs and FORMDEFs. *Print Management Facility User's Guide and Reference* SH35-0059 has pictorial representations of the PAGEDEFs which are easier to understand than the tabular descriptions in the PSF User's Programming Guide.

8   Either PMF, PSAF, or PPFA is required to build a FORMDEF that specifies what electronic overlays are to be used. For this purpose, there is no difference in the support given by these three packages except that PSAF will only allow one copy group specification. With FORMDEFs built by PSAF, the user will not be able to dynamically change overlays within an output data set.

9   Either PMF or PPFA can be used to build a PAGEDEF that specifies external data formatting. PMF uses interactive menus where PPFA gives the user a batch facility to build these PAGEDEFs.

10   PMF is required for editing font source and building this source into an object format for use at print. PMF is also required to rescale fonts from 3800-1 pel density to the pel density used on 3800-3s and 3820s. FLSF can be used to modify already built 3820 fonts by deleted unwanted characters, renaming characters, modifying code pages, and editing individual characters. FLSF cannot be used with the 3800-3 fonts.

11   PMF and PPFA can create more advanced PAGEDEFs than PSAF. Advanced PAGEDEF specifications include variable spacing, use of carriage control, specification of up to 128 fonts on a page, specification of font use and rotation on a field basis, external data formatting, and the placement of constant text as specified in the page format definition. PSAF can produce PAGEDEFs that allow one lines per inch spacing definition per output dataset and up to 16 fonts chosen by table reference character. If a PSAF user needs more advanced PAGEDEF specifications, he or she can use PSAF to submit print JCL that references a PAGEDEF previously built by PMF or PPFA.

12   Either PMF or PPFA is required. PSAF is not sufficient.

13   PMF and PPFA can create more advanced FORMDEFs than PSAF. More advanced FORMDEF options include multiple copy groups, text suppression, constant text, and different overlays for the front and back of a duplexed sheet on the 3820. Using PSAF, a user can specify one copy group including up to 8 overlays. If printing in duplex, the overlays printing on the front of the sheet are also printed on the reverse.

14   Simple PAGEDEFs and FORMDEFs can be created using PMF, PSAF, or PPFA. Simple FORMDEF specifications include one copy group which can consist of one set of specifications for duplexing, one set of overlays for the entire output dataset, the same overlay printed on the front and reverse of the sheet in duplexed printing, alternate paper usage, and offsetting. Simple PAGEDEFs include one set of line spacing per output data set and the use of up to 16 fonts called using TRC (table reference character) specifications in the application data.

15   DCF uses the Sonoran Serif and Pi and Specials fonts as a default when formatting output for a 3820 or 3800-3. However, the user profile can be changed if other fonts are desired, or if the typographic fonts are not installed on the system. Note that a copy of the object format fonts has to be on the system on which the output is formatted, and available to PSF/MVS on the system on which the output is printed.

16   Once the overlay including the graphic is built using OGL, either PMF, PSAF, or PPFA is needed to build the FORMDEF required to invoke the overlay at print time.

Customizing software / printer system attachment

Information for customizing JES2, VTAM, and NCP and setting up a Print Services Facility startup JCL procedure are included in *Print Services Facility System Programmer's Guide for MVS* SH35-0091. These specifications are detailed but have proven to be fairly straight forward for experienced JES2 and communications (NCP and VTAM) systems programmers.

Planning for the data network

See *Planning a Data Network for the IBM 3820 Page Printer* G544-3089 for details. An important consideration is the integration of the 3820 into normal network operations. See Chapter 7, "Operational and Management Considerations" on page 7-1 for guidance. That chapter also contains suggestions for planning for the operational control of large networks of 3820s.

Providing proper physical planning

See *Planning for the Location of the IBM 3820 Page Printer* G544-3090 for details.

Double check that the proper power circuit (20 amp) and receptacle are in place. Although the printer has a very common voltage (120 VAC), not all office environments have a 20 amp circuit installed.

The 3820 is a very quiet device and can be placed in an office setting. Quiet as it is, some people might find it annoying if it is placed too close to their work area. Place the first 3820 away from people's desks and judge for yourself how close to people the printer can be installed.

The printer can be installed as close as 6 inches from a wall, but must be moved forward by the user if service via the rear panel is required. If movement of the 3820 from the operating position to the service position is restricted by cable lengths, carpeting or for safety reasons, the 3820 must be installed in the service position. If movement of the 3820 to the service position is restricted it is the user's responsibility to move the machine to the service position when service is required.

Don't forget to plan for the communications line installation, the modem, and power for the modem.

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[17] In this context, DCF output means composed text formatted for printing on a 3800-3 in page mode (38PP device tokens) or the 3820 (3820A device tokens) using DCF release 3. Note that overlays can be merged with DCF output. In that case, OGL is required to build the overlay, and either PMF, PSAF, or PPFA is required to build a FORMDEF to invoke the overlay at print time. DCF does not support dynamically switching the overlay while printing a data set—one set of overlays will be used in the printing of the data set.

[18] Overlays can be merged with DCF output. Once the overlay is built using OGL, either PMF, PSAF, or PPFA is needed to build the FORMDEF required to invoke the overlay at print time.

[19] These fonts are available in three formats: source format, object format for the 3820, and object format for the 3800-3. PMF is used to modify the source format and build it for use with either the 3820 or the 3800-3. FLSF is used to modify object format fonts for the 3820. There is no tool for modifying the object format fonts for the 3800-3.

[20] PSAF can be used to submit print JCL that refers to PAGEDEFs and FORMDEFs that have previously been built using PMF or PPFA.

Installing the printer

The installation of the 3820 should be coordinated with the printer operator, the NSD service representatives and the systems programmer. When the printer is ready for attachment to the data network, host JES and network control operators will also have to be involved.

Unpacking instructions and moving instructions are clearly supplied and should be followed closely.

The operator then receives hardware training from the NSD service representative. Part of that training is on how to customize the microcode. The input data for this customization is supplied by the system programmer using worksheets found in *Preparing an Implementation Plan for the IBM 3820 Page Printer* G544-3093.

Planning for IBM service

All parties should understand the service procedures of the 3820.

1. Channel attached 3820s will generally be serviced by service personnel who have host systems experience. Remote 3820s will normally be serviced by CSRs.

2. The 3820 is planned for environments where products can be serviced by any trained NSD service representative (CSR or CE). Normally, the designated service representative is the CSR. This service plan optimizes both user satisfaction and cost considerations. Local service and marketing branch offices can mutually agree to changing this plan to fit a unique user environment.

3. Service will be provided under the terms defined in the IBM maintenance agreement. The Minimum Monthly Maintenance Charge (MMMC) provides for service availability 24 hours a day, 7 days a week.

4. NSD has a set of guidelines that state that response time for 80% of the emergency user calls will be 4 hours or less, with the average being 3 hours.

5. Preventive Maintenance strategy for the 3820 will be the monitor maintenance (MM) approach. MM service includes routine cleaning, adjustment, and parts replacement performed concurrent with a service call to reduce the number of unscheduled service calls.

6. Preventative maintenance will be performed in conjunction with service calls with specific parts replaced at intervals of 50K, 120K, 240K, 360K with some parts being replaced as seldom as every 1.2M impressions.

Setting up the right output administration management

As with the 3800-3 running in page mode with Print Services Facility there will be an increased need to manage printers. Many accounts will consider setting up a system output administration function or staff to control the new output printing environment and help users take advantage of new page mode printing features.

Putting the right systems management in place

The 3820 should be integrated into existing systems management procedures.

1. *Change Management.*

   Microcode ECs, if there is no hardware pre-requisite, will be installed by the user key operator. There is no capability for users to distribute microcode updates to a printer using their SNA network. The EC will be sent directly to the user site where the 3820 is installed. The operator is responsible for coordinating changes to the printer with the host site.

2. *Problem Management.*

   The printer operator, host operators and systems programmers will have to work together to resolve problems. A help desk will be valuable in those cases where 1) the printer operator is often away from the printer and 2) end users want to have some contact for those times when they are not receiving their output for some reason and can't locate the printer operator.

3. *Availability Management.*

   In those cases where availability of the 3820 is crucial, consider multiple printers and possibly multiple communications lines.

Summary

Planning for a successful installation of a 3820 printer is not a complicated task. If carefully planned, the hardware and software installation can be quite trouble-free. Support of the end user, management of the new page mode printing environment, and planning for operator control will warrant special attention in the planning process.

Chapter 3. Application Design Considerations for the 3820

This chapter will discuss the migration of current applications to the 3820 as well as some application design hints and guidance learned during the ESP and with other early customer installations.

Applications and sources of print data

Current applications can often be redirected to a 3820 and printed successfully with only changes to the print JCL. With some applications, there may be some modification to the application program required. Current applications may come from a variety of sources, each of which will be discussed separately.

1. Line data
2. PROFS, DISOSS, RMDS, etc.
3. IMS and CICS
4. Document Composition Facility (DCF)

New applications can be written to take advantage of new page mode printing functions and features. A brief discussion of each of these new application types follows the discussion of design considerations for current applications.

1. Electronic overlays
2. Multiple-up printing
3. Graphics
4. Scanned images (such as logos and signatures)
5. Duplexing
6. Alternate paper source usage
7. Data formatted external to application

Current applications

MVS Application Design Examples for the First-time 3820 User GG66-0219 contains step by step examples of the tasks needed to direct applications to print on the 3820. Special considerations for each application type are listed below:

1. Line data

   The 3820 is controlled by Print Services Facility and prints only in page mode. However, line mode data can be printed on a 3820 with little or no change to the application producing the output or the JCL used for printing. Data currently being printed on a variety of line mode printing devices (such as the 3211, 1403 or 3800-1) can be redirected to print on the 3820.

A special case would be those 3800-1 applications that take advantage of line merging. These applications may have to be changed. Migration from line mode devices including line merge application considerations is covered in Chapter 5, "Migrating Printed Output to the 3820" on page 5-1.

Users moving line mode print applications to the 3820 should be aware of "off the logical page" situations. This situation is discussed further under "Application Design Considerations" later in this chapter.

2. PROFS, DISOSS, RMDS, etc.

Output from other sources can be routed to print on a 3820. Many of these software packages share the ability to create output printable on a line mode printer such as the 1403, 3211, 3800-1, and so on. Examples of this type of software package include:

a. PROFS (Professional Office System -- 5664-176)

b. RMDS (Report Management and Distribution System -- 5665-310)

c. DISOSS (Distributed Office Support System -- 5665-290)

In each case, this line mode data must be transferred to the JES spool of an MVS system. The user will include JCL that will route the output to the 3820. Once on the JES spool, Print Services Facility can select the output and it can be printed.

Another point to bear in mind is that even though the output is printable on a 3820, these packages have not been updated to take advantage of page mode printing features. Some features such as inclusion of overlays can be accessed through FORMDEF specifications, and page formatting options can be used with PAGEDEF specifications. Some choices, such as the effective use of multiple fonts, are not possible when using products such as PROFS to create output for printing on the 3820.

3. IMS and CICS

IMS and CICS applications often produce printed output. In some cases, this output is directed to a printer controlled by IMS or CICS, and in other cases, the output is sent to JES for printing.

Since there is no direct attachment of the 3820 to either IMS or CICS, all data will have to be sent to JES for routing to the printer. An application will have to be written to create the output file with the proper JCL specifications to allow JES to route the output data set to the printer.

4. DCF

DCF release 3 can be used to format documents for printing on the 3820. DCF input data as keyed in by a user will have to be SCRIPTed using the new 3820 device tokens. These tokens include 3820A, 3820A90, and others. Already formatted SCRIPT files will not necessarily print correctly on the 3820. For example, data formatted for a 38PP device type may not print correctly since the .5 inch unprintable area on the 3800-3 in page mode is compensated for by DCF release 3. output formatted for use on a 3800-1 or 3800-3 in compatibility mode since "line merge" is used for printing on those devices. Line merge applications sometimes produce unexpected superimposed text and so have to be changed to print correctly on the 3820.

Differences between printing on the 3800-3 in page mode and the 3820 can be found in *DCF SCRIPT/VS Text Programmer's Guide* SH35-0069 in Chapter 2 under the heading "Migration and Conversion Considerations for Release 3."

New applications

Users coding new applications can take advantage of Advanced Function Printing features. For samples of the kinds of tasks needed, see *MVS Application Design Examples for the First-time 3820 User* GG66-0219.

1. Electronic overlays

   Using Overlay Generation Language, a user can create electronic overlays that can be merged with variable data at print time. Users of electronic overlays should keep these considerations in mind:

   - Shading, dotted and dashed lines, and included page segments are kept in pattern storage as images.

     Pattern storage is also needed to accommodate any fonts used in the overlay. Guidelines outlined in Chapter 6, "System Programming Topics" on page 6-1 will allow you to configure your 3820 to assure that enough pattern storage is available to accommodate all fonts and page segments needed in your output.

   - Although a number of overlays can be used in an output dataset, that number is not limitless.

     Up to 254 overlays can be used in any output dataset, and up to 8 can be used on any one page of an output dataset. The amount of control storage and pattern storage available and the complexity of the overlays used will limit the number of overlays that can actually be used. If your application has a large number of concurrently used overlays you might want to estimate the storage requirements by using the charts contained in Appendix B. "Storage Requirements" in *Advanced Function Printing Diagnosis Guide: IBM 3800 Printing Subsystem Models 3 and 8*. SY35-0074. Although the information is for the 3800-3, the information applies to the 3820 except in the case of fonts.

   - Complicated overlays can slow printer throughput.

     The 3820 microprocessor must act on each command included in an overlay for each page that has an overlay included. If you output contains very intricate overlays, including this overlay can cause the printer to pause from time to time as it merges the variable text with the constant data and graphics of the overlay.

   If a large number of overlays or very complex overlays are included in your output, you might want to run a test to see if the application meets your throughput requirements, and balance your application design with the printer throughput considerations.

2. Multiple-up printing

   Current line mode applications can be printed in multiple-up format on the 3820 with only changes to JCL. A variety of multiple-up PAGEDEFs are provided with Print Services Facility that will allow 2- and 4-up printing in both normal and 90 degree rotated orientations. See the *Print Management Facility User's Guide and Reference* SH35-0059 for illustrated descriptions of these supplied objects. Tabular descriptions can be found in *Print Services Facility User's Programming Guide for MVS* S544-3084 in Appendix F. Because of the amount of data typically present in multiple-up applications, you may not see printer throughput at the full speed of the 3820.

   Another hint gained from ESP experience is the use of an overlay to logically break up the data on the page to make it easier to read. One account built an overlay consisting of only one vertical rule and one horizontal rule to logically separate the four pages of data on a 4-up printed application.

3. Graphics

   See Chapter 4, "Printing Graphics on the 3820" on page 4-1.

4. Scanned images (such as logos and signatures)

   Some customers will want to include company logos or signatures in their output. To do this, a scanned image must be converted into a page segment printable by Print Services Facility on the 3820. Basically, this user must:

   a. Create a camera-ready drawing of the signature or logo.
   b. Use special scanning equipment to convert the artwork (signature or logo) into a scanned image in machine readable form. This scanning can be done by IBM, other vendors, or by using a customer-installed scanner. An example of the use of one such scanner, the IBM SCANMASTER I, is described in Chapter 4, "Printing Graphics on the 3820" on page 4-1.
   c. Convert the scanned image into a printable object called a page segment using Print Management Facility.

   See Chapter 4, "Printing Graphics on the 3820" on page 4-1 for a more detailed discussion.

5. Duplexing

   Use of duplexing in an application is specified in the copy group definitions in a FORMDEF. Simplex, normal duplexing, or tumble duplexing may be specified. With tumble duplexing the printing on the reverse of the page is upside down compared to the printing on the front of the page. This allows the output to be bound along the top of the page, and two pages of information viewed simultaneously by the user by flipping the pages up. This printing is common for printing legal documents such as financial or insurance policies, and tabular data for reference.

   Special considerations to keep in mind include:

   • All resources needed to print a duplexed page must be in the printer in order to print the page. All fonts, overlays, page segments, and variable data for both sides of the physical sheet of paper must be available at print time for the output to be printable.

   • All resources needed to print six duplexed impressions (three sheets of paper) must be available in the printer to maintain maximum printer throughput. The 3820 actually prints sides 2, 4, and 6, then flips the paper over to print sides 1, 3, and 5. If only enough data for two sides of printing are available, the output will be printable, but slowly since the paper will have to travel the length of the paper path to print side 2, then flipped over for side 1 to be printed.

   • Even with all resources available in the printer for six duplexed impressions, a minor slowing will be noted. There is a slight delay caused by the flipping over of the duplexed sheet of paper. This delays causes approximately a 15% to 25% reduction in throughput assuming that the output would have printed at the full 20 page a minute throughput if printed in simplex.

6. Alternate paper source usage

   Use of paper from the alternate paper source (cassette) is specified in the copy group definition of the FORMDEF. See the *Print Management Facility User's Guide and Reference* SH35-0059 for details.

The most common use of the alternate paper source will be to insert a special preprinted or colored form into the output at a place designated by the user in his or her application data. This is done by inserting a structured field named the invoke medium map (IMM) to change copy groups from a copy group that specifies alternate paper use to a group that doesn't. For detailed information on how to code these special structured fields, see Chapter 5 "Control Records with Line Data," in *Print Services Facility User Programmer's Guide for MVS* S544-3084.

Another popular use of alternate paper will be to use colored paper for job separator sheets. This will help printer operators to separate output for distribution to end users. This can be done by coding the FORMDEF used for job separator sheets be a FORMDEF that calls for alternate paper use. This specification is in the Print Services Facility startup JCL procedure.

7. Data formatted external to application

External data formatting can be used to avoid changes in the user application. Some applications have a varying format but data that does not change often. For example, a company might issue statements of earnings that has the same sorts of information each year (social security number, name and address, gross wages, etc.) but the format of W2 form changes quite often.

External data formatting is specified in the page format definitions of the PAGEDEF used by the application. For detailed examples of the kinds of specifications needed, see *MVS Application Design Examples for the First-Time 3820 User* GG66-0219. For more details on the specifications used see *Print Management Facility User's Guide and Reference* SH35-0059.

Application design guidance

1. Universal Product Codes (UPC) and bar codes

   The 3820 is capable of printing both UPC and bar codes. There are these considerations to keep in mind:

   a. The 3820 has a 240 by 240 pels per square inch density. Some bar code scanners may require higher resolution. The user should test the bar codes with his or her scanner to make sure that the successful read rate is acceptable.
   b. In the case of the UPC codes, some programming will be needed to properly format the output for printing. A special font consisting of bars for characters will have to be built using Print Management Facility.

2. Large amounts of data per page

   Using very small fonts, large amounts of data can be placed on the printed page. There is a finite limit of 32K characters of user data allowed per page. In practice, you will find that you will be able to print something less depending on your specific circumstances.

   The maximum number of characters that can be placed on the page is influenced by a number of factors, including the orientation of the printing, the E/C level of the microcode, whether the microcode is customized for double-byte fonts, and so on. Since these factors are largely out of the user's control, you be aware that there is a limit on the number of characters per page and plan to test these applications to make sure the output is printable before going into production.

3. Off the logical page errors

Sometimes, an application will try to place data outside the defined logical page. The user will either get 1) an indication that the printing has gone off the logical page or 2) the data that goes off the logical page will be lost. This will depend on whether the settings of the DATACK= parameter is BLOCK or UNBLOCK.

If data is going off the logical page, the user should, either:

a. Change the application to avoid placing data outside the logical page, or
b. Construct a PAGEDEF with a logical page larger than the physical page on which the application will be printed.

DCF R.3 will try to predict when formatted output will exceed the logical page boundaries and will give the user a diagnostic message at formatting time. Sometimes the output will print successfully even though this message is received.

4. Side and edge sensitive paper

Often, an application requires that side- or edge-sensitive paper be used. A form is side sensitive if there is something special about one side that differentiates it from the other side such as preprinting. Edge sensitive forms are those which have some feature such as hole punching that should always appear to the left or right of the printed page.

Side- and edge-sensitive paper should be loaded in the printer to insure that the output prints properly. See the *IBM 3820 Page Printer Operator's Guide* S544-3080 for paper loading directions.

The prime consideration to remember is that unacceptable results will be seen if the application uses structured fields to switch from simplex to duplex printing when using side- or edge-sensitive paper. Specifically, the preprinted forms will appear printed on the wrong sides, and the hole punches will appear on the wrong edge (left instead of right for example.)

5. Gummed labels

Some applications require printing on gummed labels. The announcement material of the 3820 mentions that gummed labels suitable for electro-photographic copiers will work with the 3820. Some labels will not work well with the 3820. These include labels made of mylar stock, metallic labels, fire-resistant labels, and many labels with a special finish.

6. Overlays printed on front and back

Some installations may choose to convert an application currently using a form preprinted on both sides with variable data only printed on the front of the form. Electronic overlays can be made to replace the preprinted information on both sides of the preprinted form.

With page mode printing software, every logical page must have some variable data in order to print any constant data such as an overlay. In this case, the programmer will have to alter his application program to print a few blank characters on the reverse of each page to cause the constant data (the overlay) to print.

7. Graphics

The 3820 can be used to print graphics and merge these graphics with text. A consideration to keep in mind when thinking of printing images on the 3820 is the printer throughput. More on this topic is

included in Chapter 8, "3820 Early Support Program Customer Experiences" on page 8-1, and Chapter 4, "Printing Graphics on the 3820" on page 4-1.

Choosing the right applications

The "right" application for the 3820 is the application that best fits the user's needs. For example, some installations will find that using the 3820 for printing graphics is desirable because of the ability to merge those graphics into documents or because of the quality of the output even though printing these graphics is not done at full rated speed of the device.

Experience has shown that the 3820 works well as a departmental convenience printer. Applications requiring high quality output and distributed printing of output will be quite appropriate for the 3820. Potential applications include distributed printing of legal documents, insurance policies, high quality foil masters for business presentations, and departmental reports.

During the ESP, DCF was used to format output for printing on the 3820. It was successfully used to produce departmental reports, business presentations, insurance policies, and text and image merge output. DCF output tends to fit well in the departmental convenience printer application area.

Summary

The output from a wide variety of applications can be migrated to the 3820 with minor change required to JCL. In some cases, fonts may have to be built, electronic overlays used, PAGEDEFs and FORMDEFs created and so on. In rare cases, application changes may have to be made. Investigate each application to be migrated to the 3820 to see what will have to be done to successfully print the output in production.

Chapter 4. Printing Graphics on the 3820

One of the most attractive features of Advanced Function Printing on the 3800-3 or the 3820 is the ability to print images, and to intermix those images with text. The following discussion outlines the sources of images, how they can be processed for use on the 3820, and other considerations to keep in mind when printing graphics.

Pel patterns--sources and formatting

There are only three sources of rastered images for printing on the 3820:

1. Manually coded pel patterns,
2. Machine-produced pel patterns using a scanner, or
3. Software-produced pel patterns using packages such as Print Management Facility, Overlay Generation Language, or Graphical Data Display Manager (GDDM).

Once an image is created as a pel pattern, there are different ways to properly format these graphics for printing on the 3820:

1. Manually code all the needed structured fields and place them around the pel pattern,
2. Use Print Management Facility to format, optionally alter, and store the pel pattern, or
3. Use GDDM to format and store the pel pattern.

The other option is to use the facilities of GDDM to produce the pel pattern, format the output, and store it as a page segment.

No matter how the pel pattern is produced, it should contain a multiple of 32 pels along an edge. This allows the printer to produce these images more efficiently. GDDM always builds images in multiples of 32 pels along an edge by rounding down to the nearest 32 pel boundary. (As will be touched upon later, Print Management Facility and Overlay Generation Language also do some pel pattern padding for efficiency.)

Manually preparing images for printing

A user could code all the proper structured fields and pel patterns to produce images printable on the 3820. He could store the images on disk as page segments and call them into his output using the Include Page Segment structured field or by using Document Composition Facility (DCF). He could also code these images as complete documents and send them directly to the printer via JES spool.

A user may want to do this coding even though it can be an enormous effort due to the number of control records that would have to be coded by hand. If that is the case, the information he will need to do this coding can be found in *Print Services Facility Data Stream Reference for MVS and VSE* SH35-0073.

Using Print Management Facility

Print Management Facility will provide these facilities for the user who wants to print images on the 3820:

1. Pel patterns produced in any way described above can be formatted by Print Management Facility and stored as page segments by using Page Segment Management Services. Certain operations can be performed on the image before the pel patterns are stored, such as editing, mirror image, reverse image, rotate, double dot format, or trimming.

2. An image pel pattern can be built as a logo using all the graphics features of the 3279 or other GDDM-supported graphics terminals as if the user were designing a very large character by using Font Management Services. The image can then be stored as a page segment as described in point 1 above.

For Print Management Facility to work with a pel pattern, it first must be in the form of a character group in a Print Management Facility user library.

A user can also optionally edit the pel pattern once it is stored as a character group. He may want to edit the pel pattern to clean up stray pels left by a scanner, thicken a line, or smooth a curve. To do this editing, the editing features of Font Management Services of Print Management Facility must be used. Several attempts at doing this proved this to be a time consuming task involving significant system overhead.

Regardless how the text page or overlay is rotated, the image will appear as it was stored since the image is not rotated by the 3820 hardware. In other words, if the image was stored at 0 degrees in relation to the movement of the paper through the printer, it will appear "on its side" if the text around it is rotated 90 degrees. Once the image is stored as a page segment, it cannot be rotated at print time.

Signatures and logos

If the user is building a pel pattern as a signature or logo, he should be aware that he actually keys in each pel. For this reason, making up graphics in this way should be limited to very small logos. It will prove to be an extremely tedious process. Unless you need a very small number of logos, it is recommended that the user consider scanning artist-drawn versions of the logo. Scanning (either by buying and using a scanning device or by contracting with IBM or a vendor to do the scanning) would probably be cost effective in the long run.

Another feature of Print Management Facility is the ability to convert logo character groups used on the 3800-1 and the 3800-3 in compatibility mode into page segments. With those line mode printers, logos were created as a series of adjacent characters. Using Print Management Facility, these characters can be converted into a page segment and optionally rescaled to a different size before the conversion.

Using Print Management Facility--recommendations

When dealing with graphics, Print Management Facility is the best tool available for easily and interactively taking rastered images and formatting them into printable page segments. It is quite easy to use for rotating the image, trimming the image to a desired size, and performing other functions such as mirror image processing.

Building images by hand, however, is a very tedious process. Each customer will have to decide if this is the most efficient way to build logos and signatures in his or her environment.

Using Overlay Generation Language

The user of Overlay Generation Language can do these things with graphics:

1. Include page segments in an overlay. These page segments must have previously been stored in a library accessible to Overlay Generation Language, and the library must be accessible to Print Services Facility at print time.

2. Manually code an image using "1" for an on pel, and "0" for an off pel.

3. Manually code an image using Overlay Generation Language's encoding scheme in which strings of on and off pels are encoded like this: (1 6 2). This is an an example of coding 1 off pel, 6 on pels, and 2 off pels.

Using Overlay Generation Language to produce graphics should be limited to small images that have a minimum number of curves since it can be difficult to encode curved images pel by pel.

Note that Overlay Generation Language will round the number of pels in the image up to the nearest eight pels (32 pels for shading patterns). This allows the image to be handled more efficiently by the printer.

Using Overlay Generation Language to include page segments is easy to understand. See the *Overlay Generation Language Users Guide,* SH35-0079.

Using Graphical Data Display Manager (GDDM)

The Graphical Data Display Manager (GDDM) is a general purpose program product used for a variety of device control and end user graphics support functions. Beginning with release 3, GDDM has been updated to include support for building page segments for high resolution page printers such as the 3820, the 3800-3 and the 4250.

There is no difference between graphics built for the 3800-3 and the 3820. Any graphic built for use on the 3800-3 will be printable on the 3820 and vice versa assuming that the graphic will fit on the printable area of the page.

Calling GDDM from within a user program

GDDM calls can be issued from within a high level language or assembler program. Through these calls, the user can produce graphics images, and can also control the devices on which they will be displayed or printed.

Although there are several GDDM calls that can be used with printer graphics, most of the new support is included in the DSOPEN call. In this call the user tells GDDM what type of device is being used and how to format the output. Formatting includes converting the GDDM vectors produced by graphic calls into rastered patterns at the proper pel density, performing cell compression, and placing structured fields around the data so that it can be stored in a page segment library and used later for page mode printing. This call is important enough to have a section in this chapter dedicated to its description.

The following discussion will be of value to those users who want to write their own program to format page segments for printing on the 3820. Most references are from *GDDM Base Programming Reference* SC33-0101. Summary information can be found in *GDDM Programming Reference Summary* SX33-6050. A

good generalized write-up of the use of high resolution graphics can be seen in *GDDM Application Programming Guide, SC33-0148* in the chapter entitled "Using Printers." This document (SC33-0148) references 4250 use only; *GDDM Installation and System Management* SC33-0152 contains more information. There is little difference between the currently documented support for the 4250 and that required for the 3800-3 and 3820.

GDDM calls used for page printing support

This is a list of the major calls used by a GDDM programmer writing a program to format a graphic for printing on the 3820 or 3800-3.

1. FSINIT:

This call initializes the use of GDDM in your program.

2. DSOPEN:

See the following section. This is the call that lets GDDM know the type of device for which you want the image built, and how the image should be formatted.

3. DSUSE:

Activates the use of a device. The trick here is to be sure you specify the device for "primary" usage.

4. FSPCRT:

Creates a workspace within which you build an image. This workspace is known as a GDDM 'page. FSPCRT is not needed if only one page is required.

5. FSPSEL:

Selects a workspace (GDDM 'page') in case more than one GDDM 'page' is in use. FSPSEL is not needed if only one page is required.

6. GSxxxx:

A family of calls used to actually build the image. These calls update the image within the currently active 'page.' For example, GSLINE produces a (surprise!) line.

7. GSFLW:

This call will allow the user to vary the default line width. GDDM release 3 uses a default line width of one pel which is difficult to see on the 3800-3, but acceptable on the 3820 due to differences in the technology the two printers. GDDM release 4 uses a default line width of three pels for the 3820 or 3800-3.

8. FSFRCE:

This call forces the current GDDM page to its output destination. See DSOPEN for a description of the output destination.

9. DSCLS:

Closes the use of the device. In our case, this means that the PDS member containing the page segment, or the SYSOUT file containing the output document is closed. The trick here is to specify that the file should be kept. DSCLS is not vital since the GDDM default is to keep the file.

DSOPEN--Details

The DSOPEN call will be detailed below. Refer to the *GDDM Base Programming Reference,* SC33-0101.

1. Device ID

This is some number by which you identify the output destination. If your application calls for building many graphs, you may have many DSOPENs, each with slightly differing parameters. Each will point to a different PDS member which will eventually contain each page segment, or to the SYSOUT files containing the output documents.

2. Family

High resolution printers are known as Family 4 devices to GDDM. Specify the number '4.'

3. Device token

GDDM release 3 will recognize two device tokens for use with the 3820 and 3800-3. They are:

   a. IMG240 which will format up to an 8.5 by 11 inch sized image in portrait orientation. Portrait orientation means that the image will be up to 8.5 inches horizontally by 11 inches vertically, and

   b. IMG240X which with GDDM release 3 will format up to a 20 by 20 inch image. IMG240X will not require more resources than IMG240 if used to produce the same image. In GDDM release 4 IMG240X limits the image size to no more than 14 x 12.5 inches.

GDDM release 4 will recognize additional tokens:

   a. IMG120--will format up to an 8.5 wide by 11 inch long image in double dot density.

   b. LETTER--which is the same as IMG240

   c. LEGAL--will format up to an 8.5 by 14 inch image.

   d. A4--will format up to an 8.3 by 11.8 inch image.

   e. EXECUTIV--will format up to an 7.5 by 10.5 inch image.

   f. FINE240--will format up to an 11.7 by 14 inch image with a default line width of 1 pel. Line width is normally 3 pels for the 3800-3 and 3820.

These tokens are documented in the *GDDM Release 4 Base Programming Reference* SC33-0101 in Appendix N.

A user can develop specialized device tokens. See *GDDM Installation and System Management* SC33-0152 under the heading "Creating your own device tokens."

4. Processing option count

This specifies how many full words of information follow this parameter in the processing option list.

5. Processing option list

Only a few of the groups should be specified since some only apply to terminals.

    a. Group 5 -- Composed text data stream type

The default of '0' specifies that a full document should be produced. It will include all the structured fields needed to have a one-page document with one image without a text block included. Specifying a '1' will cause a page segment to be built. The page segment will have to be called by an Include Page Segment structured field in some application output---Document Composition Facility output, for example. Since the output is fully composed text, no PAGEDEF will be required at print time.

    b. Group 6 -- High resolution image spill file option

A storage usage reduction option. The default will work. See group 7 for more insight about when this option might be needed.

    c. Group 7 -- High resolution image swathe option

A storage usage reduction option. The default will work.

The options which define the number of swathes and the spill file have less significance for the resolution of the 3800-3 and 3820 (240 pels per inch) than for the higher resolution of the 4250 (600 pels per inch) Nevertheless, for large complex images, you may have to make use of them to avoid ABENDs due to insufficient storage.

    d. Group 8 -- High resolution image paper size

This really means the area of the image rather than the actual paper size. This option specifies the width and depth of the image in either tenths of an inch or millimeters.

    e. Group 9 -- High resolution image format option

The default, '1', produces a formatted image. That is, the rastered pattern will be formatted with the proper structured fields to make the output an official page segment or document. Unformatted output, received by specifying a '0', will produce image data in the form of one bit for each pel, just as if it came off an image scanner without structured fields. You must also specify that the output is to be a page segment in processing option group 5.

6. Name count

This is a count of the number of items in the name list.

7. Name list

Since the 3800-3 in Advanced Function Printing (page) mode runs in an MVS/SP environment, we are interested in the MVS/TSO use of this list. Specifying an asterisk (*) will tell GDDM that you are pointing to a DD card with a label of ADMIMAGE. As it turns out, this DD card can point either to a sequential data set, a member in a PDS, or a spool (SYSOUT) file. When you are pointing to a JES spool file (using SYSOUT=) you must also code 'DCB=RECFM=VBM' or '=VBA' so that Print Services Facility will

know that the output contains structured fields. If your output has one exclamation point (!) and then a page of error messages, then your problem is probably that 'VBM' or 'VBA' has not been specified.

If you don't point at a DD card, you can specify up to a six level OS data set name. An example would be: 'SYS1.DATA.SET.NAME.REAL.LONG'.

```
/*****************************************************************/
/* PROCESSING OPTIONS FOR USE IN THE DSOPEN CALL                */
/*****************************************************************/

DCL PROCOPT(6) FIXED BIN(31);
    PROCOPT(1) = 5;                    /* DATA STREAM TYPE   */
    PROCOPT(2) = 1;                    /* SECONDARY: SEGMENT */
    PROCOPT(3) = 7;                    /* SWATHING OPTION    */
    PROCOPT(4) = 8;                    /* NUMBER OF SWATHES  */
    PROCOPT(5) = 8;                    /* PAGE SIZE          */
    PROCOPT(6) = 49;                   /*  4.9 INCHES (WIDE) */
    PROCOPT(7) = 75;                   /*  7.5 INCHES (HIGH) */
    PROCOPT(8) = 0;                    /*  TENTHS OF AN INCH */
DCL NAMELIST(1) CHAR(8);
    NAMELIST(1) = 'PSEGDD  ';          /* MVS DDNAME OR FILE */

/*****************************************************************/
/* EXAMPLE DSOPEN USING DEFINED PROCOPTS.                       */
/*****************************************************************/

        CALL DSOPEN(11,4,'IMG240X',6,PROCOPT,1,NAMELIST);
```

Figure 4-1. Example coding of a DSOPEN call in a user program. A user who would like to write a program to produce his own page segments will include this call such as this. The processing options have been coded to explicitly specify the various settings such as page segment size, data stream type, number of swathes, and to direct the output to a DD card in the user JCL named PSEGDD.

DSOPEN: Using nickname files to simplify programming

Using GDDM R.4, the more complex parameters of DSOPEN can be specified in nickname files rather than on the DSOPEN call. It is possible for an installation to set up system-wide nickname files containing standard device definitions. It is also possible for a user under CMS and TSO to set up his own.

See the *GDDM Release 4 Installation Reference* in Chapter 6, and the *GDDM Release 4 Application Programming Guide* in various places for more details.

```
This nickname definition is stored in a system library for use by any
programmer:

 ADMMNICK FAM=4,NAME=HRP3820,DEVTOK=IMG240X,
          PROCOPT=((CDPFTYPE,PRIM),
          (HRISPILL,YES),
          (HRISWATH,10),
          (HRIPSIZE,30,50,TENTHS),
          (HRIFORMT,CDPF))
```

Figure 4-2. An example nickname file specification. This nickname file specifies device token name, output format type, number of spill files and swathes to use, and the size of the final page segment in tenths of an inch.

```
This is an example of a simplified DSOPEN call in a user program using
the nickname facility:

/*****************************************************************/
/* PROCESSING OPTIONS DEFINITIONS                                */
/*****************************************************************/

DCL PROCOPT(1) FIXED BIN(31);    /* THIS IS IGNORED      */
DCL NAMELIST(1) CHAR(8);
    NAMELIST(1) = 'HRP3820 ';    /* NICKNAME             */

/*****************************************************************/
/* EXAMPLE DSOPEN USING THE NICKNAME HRP3820                     */
/*****************************************************************/

    CALL DSOPEN(11,4,'*',0,PROCOPT,1,NAMELIST);
```

Figure 4-3. Using a nickname file to simplify DSOPEN specifications. In this example, the nickname HRP3820 is used to simplify the specification of the DSOPEN call in the user program.

Using GDDM: Printing rotated graphics

Once an image is in the form of a page segment, the image cannot be rotated either by software or hardware at print time. If you plan to print the image in a logically rotated format, you must rotate the image *before* you store the image as a page segment.

If the image is in the form of a scanned image, Print Management Facility can be used to rotate the data as the page segment is being built. This image might have come from a scanner (either scanned in-house or by IBM or some other vendor) or from a GDDM program. Using DSOPEN, a value of "0" on processing option group "9" will produce a rastered image as if it were from a scanner. Note: the Interactive Chart Utility (ICU) will not allow you to format logically rotated images for use in a page segment.

Using GDDM: Processing very large graphics

It is possible to create images that are larger than can fit on one page of 3800-3 or 3820 output. For example, an image 100 inches by 4 inches could be created. (Users may want to print 'strips' of plots and then cut and paste these strips into much larger plots later.)

By choosing an arbitrarily large paper size in a new device token, the image size restriction in tokens IMG240 or IMG240X will be removed. To do this, the user must add a new device token to the set defined in a table set up for family 4 device tokens named ADMLSYS4. The tokens supplied with GDDM (such as IMG240X) are intended to be supplemented by whatever additional tokens the local system programmer might think are necessary. See Appendix C. in *GDDM Installation and System Management* SC33-0152.

The next restriction that you may encounter is the size of the image that may be created in a single swathe. A maximum of 4000 cells (each cell is 32 by 32 pels) can be processed in one swathe. The user can choose the size of the image to make sure the product of the number of cells in each direction does not exceed 4000. Thus an image of 20 cells by 200 cells processed within one swathe would be a possibility. If you exceed this value and only request one swathe, GDDM will increase the number of swathes for you, thus reducing the amount of storage required. The user specifies the number of swathes in the DSOPEN call.

The final restriction that may be relevant is the addressability limit for the graphics of 32K addressable points in each direction. Note that it is not 32K pels in each direction, but 32K addressable points. For example, the user may define a certain window of graphics to be 8 by 10 inches having 80 by 100 addressable points.

This allows the user to draw lines from point (0,0) to point (80,100) and have GDDM draw the line. Then the graphic will be translated to on and off pels in the proper resolution as specified in the device token of the DSOPEN call. This resolution would be 240 by 240 pels per square inch in the case of the 3800-3 and 3820.

Before issuing the calls designing the graphic, the user can issue GSWIN/GSCLP calls to limit the portion of the graphic to be rastered. After rasterization is completed, the graphic portion will be stored as a page segment or put to the spool for printing.

Making large graphs can be done, but the question would be: "is it being done efficiently?" In general, it is much more efficient to break large graphs into smaller portions to be rastered separately.

Using GDDM: Presentation Graphics Facility

The Presentation Graphics Facility (PGF) provides a high-level interface for users of GDDM who do not want to code programs in order to produce charts. The most common implementation of this feature is the Interactive Charting Utility (ICU), which is used to produce common business graphics such as pie charts and bar graphs.

If a user does choose to write his own program, he can use the PGF facilities by coding a program such as that found in *GDDM Application Programming Guide* SC33-0148 in the chapter entitled "Device Support."

The ICU is a little different. When using the ICU, a user may want to have his chart data separate from his chart format. In that way, he can update a monthly report just by adding new data. As a result, there is an option to store the information in two files, a data portion and a format portion. In MVS these would be two members in PDSs, and in VM, they would be two separate CMS files. There must be a bridge that brings these two pieces together before DSOPEN can be invoked to process the data.

The bridge is a program called ADMUCDSO. It brings the two files together as input, calls the charting utilities to produce the chart, calls DSOPEN to properly format the chart for printing on the 3800-3 or 3820, and then stores the chart in a destination file of your choice. Details can be found in *PGF Programming Reference* SC33-0102. To help you even further, GDDM has provided a VM EXEC (ADMUCIMV) and a TSO CLIST (ADMUCIMT) to call the ADMUCDSO program and pass all the proper parameters for you. You will find details of these aids in *GDDM Installation and System Management* SC33-0152.

Rotating ICU graphics

A number of users need to rotate their images prior to printing them. The ICU does not allow the creation of rotated graphics. This means that you cannot do it via interactive menu selection, nor can you do it via the supplied EXEC and CLIST (ADMUCIMV/ADMUCIMT) which execute the program ADMUCDSO to create a family 4 ADMIMAGE file (either page segment or document). Also, GDDM provides no calls to rotate an ADMIMAGE file, whether created as a segment or document.

User programming could be produced to rotate ADMGDF data prior to creating an ADMIMAGE file. While it is a reasonable user programming task to rotate a 'single-segment-ADMGDF' prior to building it as an ADMIMAGE, the ICU does not always create a 'single-segment-ADMGDF'. If a user does want to code his own program, he or she would use the GSSAGA call. The GSSAGA call will perform a number of transformations on a segment, one of which is rotation. Also, in the DSOPEN of your program which reads in the ADMGDF (via GSLOAD) and creates an ADMIMAGE file, spill file usage must not be specified since this action nullifies any transformations. With a multiple segmented ADMGDF you would have to rotate each segment separately.

A better option would be to purchase a product which can rotate images or ADMGDF files.

1. Composition Utility 2, 5798-RWL, allows a user to view an ADMGDF, rotate it, and save it as a page segment or document formatted for 3820, or the 3800-3.
2. Image View Facility, 5785-ECX, when used in a VM environment, allows a user to view an image file (various supported forms: compressed image, bit map, CDPF, or PSF) to rotate it (among other actions), and save it as one of a variety of output files (compressed image, decompressed image, bit map, CDPF, PSF, GDF, local printer).

Using GDDM: GDDM symbol sets

Users of GDDM Release 3 find that very small characters used for notation on graphs often look broken and incomplete when printed on the 3800-3 or 3820. It turns out that the default symbol set (ADMDVSS) does not work well with the pel density of the 3800-3 or 3820 when the characters are smaller than about 10 point type (about 1/10″ high).

With GDDM Release 3 the user should specify an alternate symbol set, or avoid using the default symbol set for very small characters. A good choice would be ADMUVSRP for normal text, and ADMUVDRP for bold text. With GDDM Release 4, ADMUVSRP is the default.

ADMDHIMJ (marker symbols) and ADMDHIVJ (vector symbols) are suitable for use on the 3800-3, 3820, or the 4250. These vectors are a combination of shaded and outline symbols. Shaded symbols appear more readable on high resolution printers. GDDM release 4 brings with it ADMDHIVM which consists of vector symbols built specifically for the 3800-3 and 3820.

Other symbol sets may or may not have an acceptable appearance based on the size of the symbols used. See Appendix L "Symbol Sets" in *GDDM Base Programming Reference* SC33-0101 for more details.

Using GDDM: GDF files

Graphics data is held internally within GDDM in what is termed Graphics Data Format (GDF). GDF consists of a set of graphics drawing orders, each order followed by data specific to that order. For example, an order may call for a line to be drawn (Line order); the data specifies the pair of X/Y coordinate points between which the line is to be drawn. This graphics data, which represents the total graphic image created, may be stored in external files for later use by the same or other processing programs.

It may be saved in two distinct formats; as a Graphics Data File (GDF), which is a user-written external file, or as an ADMGDF, which is a defined and formatted GDDM object data file. It is important to understand the differences between the two formats, as they are NOT the same and can cause a great deal of confusion if treated as identical.

```
USER PROGRAM                    USER PROGRAM
┌─────────────┐   ┌───────┐    ┌─────────────┐   ┌───────┐
│GSGET CALL   │   │       │    │FILE IS      │   │       │
│IS ISSUED    │   │ G D F │    │READ USING   │   │I MAGE │
│             │──▶│ FILE  │──▶ │SYSTEM       │──▶│ FILE  │
│(GDDM R.3    │   │       │    │SERVICES     │   │       │
│ or R.4)     │   │       │    │GSPUT CALL   │   │       │
│             │   │       │    │IS ISSUED    │   │       │
└─────────────┘   └───────┘    └─────────────┘   └───────┘


USER PROGRAM                    USER PROGRAM
┌─────────────┐   ┌───────┐    ┌─────────────┐   ┌───────┐
│GSSAVE CALL  │   │       │    │GSLOAD CALL  │   │       │
│IS ISSUED    │   │ADMGDF │    │IS ISSUED    │   │I MAGE │
│             │──▶│ FILE  │──▶ │             │──▶│ FILE  │
│(GDDM R.4)   │   │       │    │             │   │       │
│             │   │       │    │             │   │       │
└─────────────┘   └───────┘    └─────────────┘   └───────┘
```
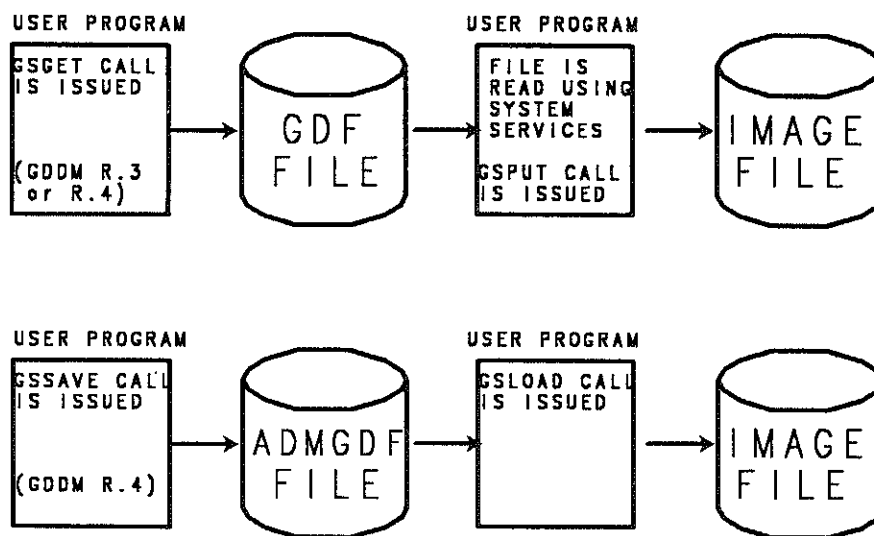
Figure 4-4. **GDF and ADMGDF file sources and usage.** This flow diagram describes the differences in the sources and handling of GDF and ADMGDF files. The final output image file can either be a page segment or a fully composed document consisting of one image that is ready to be printed.

GDF files are created in a multi-step process. First, the GDDM GSGET call is used to extract the raw GDF data and return it to the calling user program. This GDF data is then written to a CMS file or TSO data set using the subsystem data management facilities, typically as a 400 byte record to conform to GDDM data object record sizes. The GDF file is a true user file, with no GDDM restriction on the content. GDF data is restored to GDDM using the GSPUT call after the user program has read the GDF file from external storage, again using the subsystem data management facilities.

ADMGDF files are created and restored in a single step without user requirement to read or write the external data. ADMGDF files are created using the GSSAVE call, which extracts the GDF data and writes the formatted GDDM object file, containing GDDM's identifying and process specific data. ADMGDF files are read from external storage and the GDF data restored to GDDM using the GSLOAD call. In this case all ADMGDF files are identical in format and content.

Many programs written using the GDDM release 3 base used "GDF files" to store graphics pictures as the ADMGDF GDDM object was not available until GDDM release 4. Those products which have not been altered to take advantage of GDDM release 4 capability still produce GDF files, even if executed under GDDM release 4.

An example of such a program is GDQF. It produces GDF files, but not ADMGDF files. GDQF supplies a utility name EMGGDFB to convert ADMGDF files into GDF files and vice versa. Also, GDDM conversion utilities (ADMUPCV for CMS users and ADMUPCT for TSO users) are available to convert GDF files to ADMGDF objects. See the *GDDM Base Programming Reference* SC33-0101 in Appendix J and also under the heading "Saving GDF orders" in Appendix I of the same manual.

Formatting data from a SCANMASTER

The SCANMASTER (the IBM 8815) is an image processing device that will digitize a document, transmit the digitized document, and print a received digitized document. "Digitize" means to scan an image and store it as machine-readable data for later processing. See *SCANMASTER I Description* GA18-2094.

The main purpose of the device is to scan documents for transmission and central storage for later retrieval and printing on other SCANMASTERs. We are interested in an alternate use: Scanning documents or logos for use as page segments or images to be included in 3800-3 output.

How to get data from here (SCANMASTER) to there (3800-3 or 3820)

The best way to describe software and hardware needed to produce printed images on the 3800-3 or 3820 from a SCANMASTER is to take it step-by-step.

* Step One--Scan a document on the SCANMASTER

The document must be scanned on the SCANMASTER using fine scan (203 pels by 196 pels per square inch) as opposed to normal scan (203 pels by 98 pels per square inch). This is done by setting a switch on the SCANMASTER. See *SCANMASTER I Description* GA18-2094 on page 3-2.

* Step Two--Store the image in a DISOSS library on a host system

There are some prerequisite software packages that will be in place if you have a working SCANMASTER in front of you. The device will be attached by communication lines (this implies that you need network definitions of the device) to some host system. The customer must have CICS and DISOSS Version 3 (5665-290) installed. Using DISOSS, the customer will then store the image in a DISOSS-controlled library. The image will be in a highly compressed format.

* Step Three--store the image as a page segment

To store the image as a page segment, the customer will need Image View Facility (IVF) 1.2 (5785-ECX) installed. See G320-0331 for a description of this product. DISOSS Professional Services Program Offering (5696-PRH), GDDM Release 3, and PL/I libraries and compiler are prerequisites for running the Image View Facility (IVF). See *DISOSS/Professional Support User's Guide* GG24-1672 in Appendix C for valuable background information.

While viewing the image on a 3270 graphics terminal, the image can optionally be modified by using clipping, and reverse image facilities among others. Then the image can be stored as a page segment by IVF. See the IVF 1.2 program description and operations manual.

While being stored as a page segment, the image will be rescaled to close to the 240 by 240 pel density required by the 3820 or 3800-3. IVF's generalized scaling algorithms take into account the conversion of the SCANMASTER pel density (196 X 203) to the pel density (240 X 240) of the 3820 and 3800-3.

NOTE: As an alternative to doing image processing in a DISOSS environment, you can send an image from the DISOSS library to a CMS virtual machine and process them there using the CMS version of the Image View Facility program offering.

* Step Four--Print the image

The user can then print the image. He has the choice of coding his own structured field to call the page segment at print time, using the image as part of an electronic overlay, or by including the image in a DCF document.

SCANMASTER--summary

IVF 1.2 can be used to produce images from the SCANMASTER to be printed on the 3800-3. Potential users will consider the cost of SCANMASTER hardware, and the various software prerequisites when deciding if this method of scanning is right for them.

Formatting CAD/CAM output

IBM markets a collection of products for computer aided design and manufacturing (CAD/CAM) industry. CAD/CAM is a general industry name for this application area.

CADAM [1] is one of a family of engineering design products marketed by IBM. This family includes:

- CADAM --for two dimensional design.
- CATIA [2] --for three dimensional design.
- CBDS2--for electrical circuit design.
- CAEDS--for structural analysis.

The output of these programs is in one of these forms, although there might be others:

1. CADAM Geometry--this is internal format for use by other application (mathematical) programs. It is a FORTRAN callable interface.
2. APT Geometry--basically an X,Y,Z point file intended to drive milling machines after translation by an APT program product.
3. CAD/CAM Data Exchange--also known as the International Exchange Standard (IGES) format, which is also mathematical.
4. Plot

    a. GDF files--a standardized form of GDDM output.

    b. Industry Standard Plotting Commands (ISPC)--this is often referred to as CALCOMP [3] standard plot routines.

    c. Others may exist that are not relevant to this discussion.

If a user has either a 4250, a 3820, or a 3800-3 on which he would like to print CADAM type output, he has these two choices. First, he can code the conversion programs necessary to take the CADAM type output and convert it to proper GDDM calls, then let GDDM produce all the right structured fields.

---

[1]   CADAM is a registered trademark of CADAM, Inc.

[2]   CATIA is a registered trademark of Dassault Systemes.

[3]   CALCOMP is a registered trademark of Sanders Associates, Inc.

His other alternative is to use the GDQF program product (5668-905) to do this work for him after insuring that the CADAM output he is working with is something that GDQF can handle. GDQF Release 2 has been announced to work in an MVS/TSO or VM environment for the 3820 and 3800-3 in page mode in addition to the 4250 and other devices. GDQF Release 3 allows the use of a wider variety of terminals and provides a new feature called the Composed Document Viewing Utility. See *Graphical Display and Query Facility: General Information* GH20-6223 for more information.

Output originally destined for plotters

If the user has a plotter currently controlled by CAD/CAM or FORTRAN programs he has two choices. First, he can code the conversion programs necessary to take the output destined for the plotter and convert it to proper GDDM program calls, then issue all the right structured fields. His other alternative is to use GDQF to do this work for him.

A note is appropriate here. One very popular set of industry standard graphics vector calls is known as the CALCOMP standard. This is known more appropriately as the Industry Standard Plotting Commands (ISPC). These commands are calls to plotter routines (e.g. NEWPEN, POINT, etc.) GDQF provides sub-routines that respond to these calls by gathering the data and reformatting these calls for output to the 4250 and now also the 3820 and 3800-3. In this way, GDQF and the printer will work together as if they were a "software plotter."

Because of the amount of data that the 3820 must process when printing full page images, the printer's throughput will be less than 20 pages per minute.

Using DCF to print the images

DCF release 3 can be used to imbed images into text output using the ".si" control word.

At the time the document is 'SCRIPTed,' the page segment must be available for inspection by DCF. DCF will obtain the dimensions of the image and reserve that much white space. If the page segment library is not available, or the page segment is not built, white space can be reserved by using parameters on the ".si" (segment include) control word, and optionally specifying option NOSEGLIB on the DCF invocation. This will allow a user to SCRIPT a document before all the figures are created.

DCF will then place an Include Page Segment structured field into the scripted output rather than the entire page segment. At print time, the image is called by Print Services Facility and sent to the printer.

Using the "inline" option of the ".si" control word will allow including the image into the output file rather than merging the image into the text at print time. This will:

- Increase the size of the DCF output file
- Allow the user to put into one output file all the text and images needed to print a document
- Allow a user to insure the security of his images since the page segment does not have to reside in a system library
- Simplify the management of the page segment library since the users will control their own data

See *Document Composition Facility SCRIPT/VS Language Reference* SH35-0070 for more information on the ".si" control word.

Two of the best sources of information are the Independent Study courses:

* I0161 DCF Release 3 for Document Administrators and Text Programmers
* 32908 Using DCF with the 4250 Printer

Although the information in these independent study courses deal primarily with the use of the 4250, the information generally applies to using DCF with the 3800-3 running in page mode and the 3820 as well.

Summary

The ability to print graphics on the 3820 opens exciting possibilities for new applications such as CAD/CAM plotting, in-house publishing, printing of plotter output, and business graphics. Freed from the constraints of line mode printing, users will be able to print out complex rastered images without the need for expensive electrostatic plotters. Logos and GDDM-produced graphics can be easily called into documents and merged with text or included in an electronic overlay.

Clearly, the advantage of using Advanced Function Printing facilities to print graphics lies in the capability of merging these images into documents. Considerable cost and time savings can be realized by avoiding cut-and-paste and typesetting operations. This is especially true of documents that are revised quite often.

Building any of the graphics using manual pel-by-pel methods is tedious, but possible. Other methods of graphics development hold more promise. These methods include user-written programs with GDDM calls, using the Interactive Chart Utility of GDDM, and using Print Management Facility to format scanned images into page segments.

Each potential user will have to weigh the benefits and costs of each alternative and then test them to find the most effective way to develop and use graphics in based on his or her specific application requirements.

Chapter 5. Migrating Printed Output to the 3820

This chapter will discuss the migration of current applications from a variety of current printer types to the 3820. Observations will be discussed for the following devices:

1. Line printers (1403, 3211, etc.)
2. Remote Job Entry station printers (3777, etc.)
3. Displaywriter, PC, etc.
4. 6670
5. 4250
6. 3800-1
7. 3800-3 compatibility mode
8. 3800-3 page mode

For line printer devices and 3800s, examples of the kinds of changes that will be needed are in *MVS Application Design Examples for the First-time 3820 User* GG66-0219.

Line printers (1403, 3211, etc.)

The 3820 is capable of printing output originally created for printing on a line mode printer such as a 1403 or 3211. The user may have to make changes to the print JCL or build special PAGEDEFs to accommodate the page size differences between the line printers and the 3820, but most applications should not have to change.

See *Print Services Facility User's Programming Guide for MVS* S544-3084 in Chapter 6 for details on printing output originally created for a line printer on a 3820.

Remote Job Entry station printers (3777, etc.)

Output routed to Remote Job Entry (RJE) stations for printing is line data. Output for these devices can be routed to a 3820 and successfully printed, once JCL is changed and any needed PAGEDEFs and fonts are built.

Considerations for routing output to a 3820 originally created for a printer attached to an RJE device are the same as for a line printer discussed in the paragraphs above.

DisplayWriter, PC, etc.

Output originally created for workstation printers such as those attached to PCs and DisplayWriters often contain special formatting characters used for page composition on the workstation printer.

To print this sort of output on an MVS-attached 3820, the following must be done:

1. All special formatting characters must be removed from the output.

    The special formatting characters must be replaced with formatting methods such as channel codes, or imbedded blanks. In other words, the output will have to be converted into a format printable on the 3820.

2. The output must be translated into character representations recognized by the MVS system.

    If the output is in some format other than EBCDIC, it must be converted. An example of an alternate format is ASCII.

3. A font will have to be built if the output contains any special characters not already supplied by IBM.

4. The output will have to be submitted to a JES spool with all the appropriate JCL to cause the output to be routed to a 3820.

An example of such a program is the Host-DisplayWriter Document Interchange (HDDI 5799-BKE.) This program is used to take DisplayWriter output, send it to a VM system and convert it to DCF input statements. The DCF source can then be SCRIPTed for printing on a 3820. See *Introducing the Host-DisplayWriter Document Interchange* GC09-1037 for details.

6670

When considering whether to migrate applications from the 6670 to the 3820, several factors need to be taken into consideration. The following are valid reasons for replacing 6670s and their applications with 3820s and Advanced Function Printing software.

1. Throughput

    Since the 6670 has no graphics capabilities, this discussion will be for text only documents. The 3820 is capable of printing up to 20 pages per minute. The 6670, printing similar data generally achieves only an 8 to 12 page per minute rate. Variability in both data and external factors, such as line contention, can significantly affect performance of both devices. In both cases there is a certain amount of setup time involved. For the 3820 there is time to download the fonts required from the host. For the 6670 the setup involves writing the data to its diskette and loading fonts from its diskette prior to printing. For multiple copies of the same small document there may be cases in which the 6670 can print faster than the 3820.

2. Cost Savings

    The purchase price and the minimum monthly maintenance charges are less for the 3820 base machine. The monthly usage charge can be less depending on how many impressions a month you do. The exact cost saving is installation dependent.

3. Electronic forms

   The 3820 is supported by Overlay Generation Language for designing electronic overlays. This can represent a considerable savings as a replacement for pre-printed forms.

4. Fonts

   The 3820 has true typographic fonts for professional looking output and better readability. The 6670 uses mixed pitch fonts to approximate typographic output.

5. Text and Graphics Merged

   Other than signatures, logos, and custom character sets the 6670 does not support printing merged text and graphics. The 3820 supports merged text and graphics using GDDM and DCF, including signatures and logos.

6. DCF Support

   The support for the 6670 to print DCF output is through either the pre-processor or post-processor program offerings, 5798-DKB and 5798-DBR respectively. The 3820 is a DCF supported device and requires no program offerings.

7. Paper Sizes and Styles

   The following is a list of paper sizes that the 3820 supports that the 6670 does not.

   - 10.1 by 14.33 inches   257 mm by 363 mm
   - 7.17 by 10.12 inches   182 mm by 257 mm
   - 7.0 by 10.5 inches   178 mm by 267 mm
   - 7.25 by 10.5 inches   184 mm by 267 mm
   - 7.5 by 10.5 inches   190 mm by 267 mm

   Note: These represent paper sizes that are used more often in Europe than in the U.S.

Most, but not all, 6670 applications will be very easy to migrate to the 3820. In general, the applications that may be difficult to migrate will be the ones that have taken advantage of the 6670's capability to do formatting at the device level. Since the 3820 does not do any formatting at the device level, alternative solutions will need to be explored in these cases.

The following is a list of 6670 applications that may require significant effort to migrate.

1. Applications with imbedded OCL

   Applications that have made extensive use of imbedded OCL may be the hardest to migrate. OCL (operator control language) is a set of specifications that users of the 6670 can include in their application output to control the printing. One example of the 6670's use of imbedded OCL is changing fonts while printing. There are several possible ways to change the application to accomplish the same thing on the 3820, such as:

   - Using table reference characters,
   - Creation of a specialized PAGEDEF, or
   - Insertion of the proper text-control sequences (X'5A' control records) into the output data.

Each application in this category will need to be examined separately to determine the best way to implement a similar function for the 3820 and the scope of effort required.

2. Non-host attachments to the 6670

    Currently, some customers have attached their 6670s in a non-host environment, such as:

    *   6670 to 5520 attachment
    *   6670 to System 36 attachment
    *   6670 to OEM attachment

    In each of these cases, the application will need to be redeveloped in order to print on the 3820 in a host environment, unless you can take advantage of the PC-LAN attachment.

3. Constant text merged with variable data

    The 6670 allows you to send it a file of constant text, such as a form letter, along with a file of variable data, such as a name and address file, to be merged by the 6670 prior to printing. This application will have to be changed to do the merging at the host by some other means, such as Integrated Processing of Data and Text (IPDT) 5665-347.

4. 6670 Fonts, Logos, and Signatures

    Most fonts used on the 6670 have a 3820 counterpart which is very similar. The following list are the few fonts for which no 3820 similar font exists:

    *   Bookface
    *   Courier 10 pitch with underscore
    *   Benzene symbol
    *   Orator presenter
    *   Prestige elite with elongated overstrike
    *   CB12 rectilinear line art
    *   Graph241 rotated
    *   Graph242 rotated
    *   Arabic
    *   Cyrillic

    Note: This list may not be comprehensive. Also, RPQ fonts on the 6670 will not have a standard 3820 counterpart. These special fonts can be designed and built by the user with Print Management Facility. If a user has done his own font development, there is no bridge to take that font over for use on the 3820.

    If a user has created signatures for the 6670, they are not compatible or capable of being migrated; they must be re-scanned by IBM or another vendor and made into page segments using Print Management Facility.

5. Custom letters

    The 6670 allows you to do paper selection from alternate bins to create custom letters. For example, the first page of the letter may be taken from the bin that has letterhead while the following pages of the letter may be taken from the bin with bond paper only. The 3820 has the functional capability to do this but DCF does not support it. One alternative would be to turn the letterhead into a page segment which could be included on the first page of the document.

6. Magnetic Card Reader

Some customers currently use the 6670's magnetic card reader to either send operator commands to the host or to store output sent from the host. The 3820 has neither remote operator capability nor the ability to store output data. Even though the 3820 has no remote operator capability, RJE-type output can be routed to the 3820 and printed very easily.

Most of these incompatibilities can be overcome if the customer is willing to redevelop or modify their applications for the 3820 using Advanced Function Printing.

The following is a list of other considerations which need to be taken into account when migrating from a 6670 to a 3820.

1. Collating output

The 6670 has an optional hardware collator. The 3820 does its collation through software by multiple transmissions of the data and offsets paper in the output hopper on a job and data set basis.

2. Separator Pages

The Print Services Facility standard supplied job separator page exit may need to be modified to match the current JES2 job separator page.

3. Paper Sizes and Styles

The following is a list of paper sizes that the 6670 supports that the 3820 does not.

- 8.0 by 10 inches   203 mm by 254 mm
- 8.0 by 10.5 inches   203 mm by 267 mm
- 8.0 by 13 inches   203 mm by 330 mm
- 8.2 by 10.6 inches   210 mm by 270 mm
- 8.2 by 12.2 inches   210 mm by 310 mm
- 8.5 by 13 inches   216 mm by 330 mm

4. Host attachments

The 6670 can communicate with the host in either bisynch or SNA protocol and has no channel attachment capability. The 3820 communicates only in SNA protocol in an MVS environment. The 6670 can be attached natively over a bisynch line to a VM system. Currently, VM does not support the 3820 but there is a statement of direction that indicates that IBM will provide that support in the future.

5. Use as a copier

The 3820 cannot be used as a copier; the 6670 can.

The 3820 should be considered as a replacement for the 6670 only after performing a careful evaluation both of applications currently being run on the 6670 and of new applications that can use 3820 functions not available on the 6670.

4250

The IBM 4250 printer is a high-quality text and graphic printer to be used for printing text and image merge applications at a very high resolution. The printer can be used to create very high quality output, typeset in appearance, that can be used as masters for preparing offset printing plates. In order to achieve its 600 pel density, the 4250 uses an electro-erosion process to vaporize spots on the surface of special aluminized paper.

Due to the cost of the special paper and the relatively slow print speed of the device, many users would like to use the 3800-3 or 3820 to create "proof" copies of output before the final copies are printed on the 4250. The 3800-3 or 3820 can be used to create these "proofs," but the output will only be a rough approximation for the 4250 for several reasons.

The fonts used are different

There are 35 typographic font products available for the 4250. The Sonoran Serif font for use with the 3820 or 3800-3 is a functional equivalent of one of the 4250 fonts: 5771-AAR Monotype[1] Times New Roman (R)[1] but the Sonoran Sans Serif font does not have an exact 4250 counterpart. A number of sans serif fonts exist for the 4250 which could be used effectively. See the *IBM 4250 Printer Type Font Catalog* G520-0004 for samples of the available fonts for the 4250. If a typographic type style other than Monotype[1] Times New Roman[1] is being used, the type style of the 4250 output cannot be matched exactly on the 3800-3 or 3820.

Several things are implied by saying that two fonts are "functionally equivalent". The fonts will appear quite similar to most people but there are important differences from a document formatting point of view. Very slight visual differences may be seen due to differences in character design. These differences are due to the different pel densities of the two versions of the fonts. Although they are functionally equivalent, they are not interchangeable.

A more important difference is that there is a variance in the amount of space needed to print a given amount of text due to differences in character design and intercharacter spacing. The 4250 consistently requires less space to print the same line. As a result, formatting a document for the 4250 using either the 3800-3 or 3820 as a proofing device will yield slightly different text placement, hyphenations, and so on.

The 4250 fonts are distributed in a wide variety of point sizes ranging from 6 points to 72 points; a point is approximately 1/72 inch so 72 points would be approximately 1 inch height. The fonts distributed for the 3820 and 3800-3 come in 6 point to 36 point sizes; there is also one 4 point sized type available. Note that the 3820 is also capable of printing characters up to one inch (72 points) high; the 3800-3 can only print characters up to .5 inch (36 points) high. If the 4250 output contains any characters larger than 36 points, their placement on the page cannot be approximated on the 3800-3, but similar fonts could be built for printing on the 3820. Print Management Facility 1.1 would be required to build these fonts.

The 4250 has different paper size and edge limitations

The 3800-3 can not print within the top and bottom 1/2 inch of the physical form. The paper for the 4250 is on a roll without perforations and so you can format data to print much closer to the top of the page. The 3820 does not have the same sort of edge printing restriction. However, there is a caution against printing within 10 mm of the edge of the page since you might see print quality degradation.

The 4250, 3800-3, and 3820 all have different possible paper sizes. This difference can be masked by using DCF to format output for the same size page regardless of device type.

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[1]   A trademarks licensed to IBM by the Monotype Corporation Limited, Redhill, England.

The 4250 pel resolution and font differences

The 3800-3, 3820 and 4250 can be used to print images from scanners, GDDM, and CAD/CAM and plotter applications that have been updated for page printing. However, since the pel densities for the devices are different, a given image cannot print on both the 4250 which prints at 600 pel per inch density, and the 3820 or 3800-3 which print at a 240 pel per inch density. Two versions of a given page segment must be made--one for the 3800-3 or 3820 and one for the 4250--if the user wants to include the image in the "proof" 3800-3 or 3820 copy and also on the final 4250 version.

In addition, page segments created for the 4250 can include 4250 typographic fonts for annotation except on ICU (Interactive Chart Utility) graphics using GDDM release 4. Typographic fonts such as Sonoran Serif cannot be used on a GDDM graphic created for printing on the 3800-3 or the 3820.

The 3820 and 3800-3 as "proof" devices--summary

The 3800-3 and 3820 can be used as a low-cost way to speed up the process of designing output for printing on the 4250. It can be used by the document designer as a way to try many page layouts to see which one, in general, is most pleasing. In the preparation of early draft versions of 4250 destined output, the 3800-3 and 3820 can save time and expensive aluminized paper.

When the document designer gets to more detailed page layout decisions, the 3800-3 and 3820 become less useful as sample print devices. The differences in font style, character spacing, and page size will make the sample a less dependable predictor of the appearance of the final output. In the case of included page segments, duplicate work will be created as a version of each image must be created for both the sampling device and final printing device.

3800-1

The 3800-1 is very much like a line printer in terms of the kind of output that can be printed. The differences are that the 3800-1 will allow the selection of up to four character sets at a time, line merging of characters of various pitches, and COPYMOD processing.

The selection of multiple fonts using a table reference character (TRC) is a standard feature of page mode printing and no conversion will be required.

The 3800-1 will handle line merging differently than page mode printers (3800-3 in page mode and the 3820). If two or more data lines are merged on a 3800-1 line printer to make one print line, the lines are combined so that the printable characters in the last line in the sequence are printed. With a page printer, if two or more lines of data that contain printable characters are printed in the same line space, the printed line results in some printed characters being superimposed. See *Print Services Facility User's Programming Guide for MVS* S544-3084 in Chapter 4 "Line Data" for details. Applications using line merge on the 3800-1 may need to be changed before they can be successfully printed on the 3820.

Neither the 3820 nor the 3800-3 in page mode processes copy modification modules (COPYMOD). The MODIFY= parameter in user JCL is ignored. If the COPYMOD feature is being used, you will have to investigate page mode alternatives. For example, if you are using COPYMOD processing to insert constant data onto a page, consider using an electronic overly built by Overlay Generation Language instead.

See *Print Services Facility User's Programming Guide for MVS* S544-3084 in Chapter 6 for details on the considerations for printing output on a 3820 originally destined for a 3800-1.

3800-3 compatibility mode

The considerations for migrating output currently printing on a a 3800-3 in compatibility mode to a 3820 are the same as those for the 3800-1 listed above. See *Print Services Facility User's Programming Guide for MVS* S544-3084 in Chapter 6 for details on printing output originally created for a 3800-3 running in compatibility mode on a 3820.

3800-3 page mode

Many customers will be installing a combination of 3800-3s and 3820s to fulfill a variety of application needs. Some of these applications will be run on both types of printers. In other cases, one printer will be used as a backup device for the other. In still other cases, there might be a need to use one printer to produce 'rough draft' output for final printing on the other device.

Just as there were differences between the 3800-3 in page mode and previous line mode printers (3211, 3203, 6670, 3800-1, etc.) there are differences between these printers and the 3820. The application-related differences between the 3820 and previous line printers are the same as those for the 3800-3 in page mode and the previous printers except for those related to printable area on the page. Examples of these types of differences include a variation in the way 'line merge' is handled, and the use of table reference characters. See *Print Services Facility User's Programming Guide for MVS* S544-3084 in Chapter 6, "Compatibility and Conversion."

The following is a list of the differences of which an application designer should be aware when designing output to be printable on both the 3820 and the 3800-3 running in page mode. Operational and systems differences will not be discussed; the goal is to inform the application designer of the currently known differences between the two printers.

1. "Off the logical page" error handling

    *   The 3820 detects "off the logical page" errors before "off the physical page" errors. The 3800-3 detects "off the physical page" errors first. This will make some output that is unprintable on the 3800-3 printable on the 3820. The user will receive messages in either case, depending on the setting of the DATACK = parameter in the Print Services Facility startup procedure.

    *   When printing on the 3800-3 and an "off the logical page" error occurs, the messages produced by Print Services Facility include the 'X,Y' pel location of the error. With the 3820, the messages that the user receives do not include the location of the error.

    *   When printing on the 3800-3 and "off the logical page" errors occur, the messages produced by Print Services Facility indicate what type of printing (text, rules, or images) went off the page and in which direction (top, bottom, left or right) relative to the direction that the paper passes through the printer. With the 3820, you only get an indication that the error has occurred.

2. Graphics and image usage

Page segments built to print on the 3800-3 will be printable on the 3820 with few exceptions.

    *   Neither the 3800-3 nor the 3820 will dynamically rotate graphics. Once a page segment is built in a certain rotation, it will be printed in that particular rotation.

Users who want to print output in various rotations on both the 3800-3 and the 3820 will need to maintain multiple versions of the page segments. For example, some 3800-3 users may want to print in a 90 degree rotation (due to throughput improvements and usage charge savings) while 3820 users may want to print in a 0 degree rotation. In these cases, both a 0 degree rotated version and a 90 degree rotated version of the graphic must be available if printing on both printers is desired.

- Several restrictions apply to the 3820 on image size that do not apply to the 3800-3. See the documentation of the ICP and IID structured fields in Chapter 5 of *Print Services Facility Data Stream Reference for MVS and VSE* SH35-0073.

These restrictions affect users who wish to code their own page segments instead of using GDDM or Print Management Facility to build these objects. These differences are in the allowable size of image cells depending on the use of replication and the double dot resolution technique. See *Print Services Facility Data Stream Reference for MVS and VSE* SH35-0073 for specifics.

3. Paper sizes and printing origin differences

- The origins of the physical sheet of paper for the 3800-3 and the 3820 are different.

This difference is of special importance to designers of electronic overlays. Forms designers have to be aware of the placement of the overlay on the physical page relative to the hardware origin of the page.

The origin for the 3800-3 is the intersection of the perforation and .5 inch from the left edge of the paper as the paper feeds through the printer. The .5 inch accounts for the carrier strips. For the 3800-3 no printing will occur in the top and bottom .5 inch of the sheet of paper or in the carrier strips. The origin for 3820 is always the top left corner of the sheet of paper where the narrow side of the paper is always the top.

- There are no unprintable areas on the 3820 physical page.

The 3800-3 has a 1/2 inch unprintable area from the top and bottom of the physical page along the perforations; the 3820 does not. It is recommended that differences in paper size be taken into account when placing data on the page. See Appendix D of *Print Services Facility Data Stream Reference for MVS and VSE* SH35-0073 for more details on paper size differences.

- The 3800-3 and 3820 address pels differently.

Both the 3800-3 and the 3820 use coordinate pairs to address the placement of a pel on a page. The 3800-3 uses this coordinate to address the center of a pel; the 3820 uses the coordinate to address a point between pels. This difference has been seen in product testing most often when printing rules. See Appendix D of *Print Services Facility Data Stream Reference for MVS and VSE* SH35-0073 for details.

- The 3800-3 does not print in duplex.

A 3820 user can specify in the FORMDEF that he or she wants duplexing but send this output to be printed on a 3800-3 in page mode. The printed output received will be as one would expect: the first page output would have been the front of the duplexed page, and the second page of output would have been the reverse and so on.

The user might specify copy grouping so that they would get multiple copies of each page. The user might expect to have the sequence of printing would have been the front of the first sheet, then the back of the first sheet, the front of the second sheet, then the back of the second sheet, etc. Instead, the 3800-3 will print the front of copies one, two, etc., then the backs of the copies.

- The 3820 does not have horizontal adjustment

The 3800-3 allows horizontal adjustment of line data onto a preprinted form. Horizontal adjustment will be done on the 3820 using the page position specification in the FORMDEF or by specifying an indented margin in the PAGEDEF. See the *Print Services Facility User Programmer's Guide for MVS* S544-3084 for information on how to specify horizontal adjustment using PAGEDEF or FORMDEF features. See the *Print Services Facility Systems Programmer's Guide* SH35-0091 for information on the use of horizontal adjustment with the 3800-3.

- Printing near the edge of the page

There is a note in the *Introduction to the IBM 3820 Page Printer and Advanced Function Printing Software* S544-3088 that cautions the user from printing within 10 mm (about .4 inch) of the edge of the page on the 3820. In some cases, printing near the edge can cause print quality degradation; in many cases it will not. If an application currently running on the 3800-3 which will be migrated to the 3820 prints very near the edge of the page, check print samples of the output on the 3820 to be sure that the quality is acceptable.

4. Fonts and font usage

- For the 3800-3, a different font must exist in the font library for each direction/rotation of print of that font. For 3820, only one font needs to exist in the library for all directions/rotations of that font.

The source of these fonts used as input to Print Management Facility is identical for the two device types. Because of the difference in the fonts as they are built for the different device types, you must have available 3820 versions of your fonts for printing on the 3820, and a version of each rotation-orientation combination to be used on the 3800-3.

Remember that you must have a 3820 version and 3800-3 versions of any user-created fonts if you want to use those fonts on both devices.

- Printing in the 'BACK' direction is allowed on the 3820; it is not allowed on the 3800-3.

A user can place text on the page in any of 16 direction/orientation combinations on the 3820. Because of the 3800-3 restriction from printing in a BACK (180 degrees rotated) direction, some rotations of overlays and text are not possible.

- Retention of fonts in the printer is different.

A least recently used algorithm is used for retention of fonts. For the 3800-3, the 10 most recently used fonts are retained in printer storage at the end of printing an output data set. For the 3820, if the minimum amount of control storage (512K) is installed and the machine is configured for single byte fonts, the 6 most recently used fonts are retained at the end of printing each output data set. If either the additional control storage is installed (for a total of 640K) and/or the machine is configured for double byte fonts, the 24 most recently used fonts are retained in printer storage.

Remember that any one font on the 3820 will allow up to 16 different direction/orientation combinations. On the 3800-3 each variation is a separate font and only the normal printing and 90 degree rotated printing versions of the fonts are supplied in object format by IBM.

5. DCF usage of the two devices

The differences listed below are fully documented in the *Document Composition Facility SCRIPT/VS Text Programmer's Guide* SH35-0069 on pages 31 and 32.

- Different logical device types are used at formatting time

This is done to take advantage of different page sizes available on the two device types. As a result, documents must be formatted using one of the new 3820 device tokens when the output is to be printed on a 3820.

- The 1/2 inch unprintable area at the top and bottom of the physical form of the 3800-3 is compensated for by Document Composition Facility.

This will lead to slightly different page layouts if both the 3800-3 and 3820 output is formatted for 0 degree printing. If the output is rotated to print 90 degrees on the 3800-3 and 0 degrees on the 3820, the page layout will be identical.

- Document Composition Facility will allow formatting data for text that will be printed in the BACK direction for the 3820, but not for the 3800-3.

It will allow the use of all 16 variations of font placement for the 3820.

6. Overlay Generation Language usage of the two devices

- Shading on the 3820 will appear darker than shading on the 3800-3.

There will be slight differences in the appearance and darkness of shading patterns when printed on the 3820 compared to the 3800-3. Users who would like to have similar shading on both devices may choose to experiment with various shading levels. Samples of the output should be printed on both devices to insure that the appearance is acceptable.

7. Differences in the way Print Management Facility supports the two devices

- Addition of new support.

With Print Management Facility 1.1 new support for the 3820 is available. This new support allows building of PAGEDEFs, FORMDEFs, and fonts that take advantage of new 3820 features. Features that are specifically related to one printer are ignored for the other printer. For example, 3800-3 specifications such as rastered overlay and optical flash options are ignored for the 3820.

There are a couple of exceptions:

   a. Duplex specifications for the 3820 produce a slightly different collating sequence than the user might have expected if multiple copies in a copy group are specified when printing on the 3800-3. (See discussion above in the section entitled 'Paper sizes and printing origin differences.')

   b. PAGEDEFs specifying printing in the BACK direction on the 3820 will not be usable on the 3800-3.

8. Other differences

- Other differences between the two devices are due to differences in the structured fields used with the two printers. In some cases, previously reserved fields will now be used to specify something new for

the 3820. These differences are of interest only to users who wish to code their own fully composed output. There are no differences in the subset of structured fields that a user is allowed to place within line data applications. For details, refer to Chapter 5 of the *Print Services Facility Data Stream Reference for MVS and VSE* SH35-0073.

Summary

Output currently printing on a variety of devices can be successfully redirected to print on the 3820. Investigate the current application to determine what JCL changes need to be made, what fonts and PAGEDEFs need to be built, and what application changes may be needed.

Chapter 6. System Programming Topics

This chapter contains a collection of information that will be of value to systems programmers installing a 3820.

System resource requirements for the 3820

Keep these things in mind when planning for host system support of 3820 page printers:

1. CPU resource requirements

   No precise measurements are available. However, since the 3820 runs at a relatively slow speed, little CPU is required. For the majority of users, CPU requirements will not become a concern unless many devices are run at once. Of course, any user running in a CPU constrained environment should consider the impact of running Print Services Facility.

2. Real storage usage

   No precise measurements are available. Since the 3820 runs at a relatively slow speed, less real storage is required than the 3800-3.

3. Virtual storage requirements

   Running Print Services Facility with the 3820 requires no explicit common storage. The only SQA and CSA storage required is that required for the addition of any address space to the system: about 12K common virtual storage. All communications between Print Services Facility and JES2 are handled by cross memory services. JES3 uses staging areas to communicate with Print Services Facility.

4. Line utilization

   No precise figures are available. However, due to the fact that the 3820 requires large amounts of data, users should assume that the communications line will probably be heavily used from time to time. If the line is shared with other devices, NCP parameters can be used to pace the traffic on the line. Care should be taken when specifying pacing to avoid slowing the throughput of the 3820.

   Users have a choice of line speed up to 19.2K bps. At line speeds up to 9600 bps, the ability to deliver data to the printer sets the limit for printer throughput. At 19.2K line speeds, the ability of the printer to process that data and format it for printing becomes the limiting factor. Although users will see some improvements when running with the higher line speed, they will not see a doubling of the number of characters that can be printed as might be expected.

5. Print Services Facility resource library access

Print Services Facility driving the 3820 requires access to a number of libraries on the MVS system for objects needed at print time. These objects are overlays, FORMDEFs, PAGEDEFs, fonts, and page segments. When a number of 3820s are installed, contention for these libraries should be investigated if there are unexpected delays in font or page segment loading.

JES2 multiple printer support

The capability of running with more than one printer per Print Services Facility address space in JES2 environments is announced to be available in fourth quarter 1985.

Description

Print Services Facility runs in a functional subsystem (FSS) address space and communicates with JES using the functional subsystem interface (FSI). Print Services Facility when running in an FSS is known as a functional subsystem application (FSA). Currently, you are allowed one FSA per FSS with both JES2 and JES3. This means that you can attach one printer per copy of Print Services Facility running in your system. With multiple printer support, the printers attached can be any combination of 3800-3s and 3820s.

Note that regardless of the number of Print Services Facility address spaces running at once, you will only need *one license* of Print Services Facility

Software required

Multiple printer support will run on a JES2 1.3.4 system with Print Services Facility 1.1 with a PTF to Print Services Facility 1.1 to be made available in fourth quarter 1985. Since there may be co- and pre-requisite maintenance that must be applied, the support center must be consulted before you install the new support. This support is not announced for JES3.

Defining multiple printers per FSS address space

In the JES2 initialization statements, the FSSDEF and PRINTERnn statements are coded as before. See *Print Services Facility System Programming Guide for MVS* SH35-0091 as updated by technical news letter update S544-3509 for details. The only difference is that you can have a number of PRINTERnn statements that refer to one FSSDEF statement using the FSS= parameter.

The installation planner should note that when a printer is assigned to a certain FSS address space, it cannot be run with another FSS address space. For example, an account may have PRINTER1, PRINTER2 and PRINTER3 on one FSS and PRINTER4 assigned to a second FSS. When PRINTER1, then PRINTER4 are started, two FSS address spaces will be initialized.

The following illustrates the JES2 initialization statements required.

```
FSSDEF FSSNAME=FSS1,PROC=SAMPROC
PRINTER1 FSS=FSS1,UNIT=00E.......    (definition for a 3800-3)
PRINTER2 FSS=FSS1,....               (definition for a 3820)
PRINTER3 FSS=FSS1,....               (definition for a 3820)
PRINTER4 FSS=FSS1,....               (definition for a 3820)
FSSDEF FSSNAME=FSS2,PROC=SAMPROC
PRINTER5 FSS=FSS2,....               (definition for a 3820)
```

Figure 6-1. Sample JES2 initialization statements for FSS definitions. This sample shows initialization statements needed to define two functional subsystems, one with four printers defined, and the other with one printer defined. Note that 3800-3s and 3820s can be mixed in a given FSS address space. If PRINTER1 and PRINTER5 are started, two FSS address spaces will be initiated.

The following is a sample skeleton of a Print Services Facility startup procedure for a functional subsystem with multiple printers.

```
//SAMPPROC PROC
//STEPONE   EXEC PGM=APSPPIEP,REGION=6024 (maximum user region size)
//SEPOUT    OUTPUT PAGEDEF=...,FORMDEF=...(example output statements)
//...       OUTPUT ....
//FONT01    DD DSN=SYS1.FONTLIB,DISP=SHR..(example resource library)
//...       DD ...
//*
//PRINTER1 CNTL                            (first printer definition)
//PRINTER1 PRINTDEV
//         BUFNO=6,
//         ...
//PRINTER1 ENDCNTL
//*
//PRINTER2 CNTL                            (second printer definition)
//PRINTER2 PRINTDEV
//         APPLID=PSFFSA2,
//         ...
//PRINTER2 ENDCNTL
//*
//PRINTER3 CNTL                            (third printer definition)
//PRINTER3 PRINTDEV
//         APPLID=PSFFSA3,
//         ...
//PRINTER3 ENDCNTL
//*
//PRINTER4 CNTL                            (fourth printer definition)
//PRINTER4 PRINTDEV
//         APPLID=PSFFSA4,
//         ...
//PRINTER4 ENDCNTL
```

Figure 6-2. Sample Print Services Facility startup procedure for defining multiple printers

Host resource effects

The effects on host resource requirements when running multiple printers per address space are:

1. CPU resource requirements

   Each printer will require approximately the same amount of CPU resources whether running in one FSS address space or running singly in multiple address spaces. The fact that a set of printers (3820s, 3800-3s, or a combination of the two types of printers) are driven by one address space instead of several has little effect on CPU requirements.

2. Real storage usage

Less real storage will be required when running multiple printers per address space compared with running the same printers in multiple address spaces since some common storage areas and data blocks will be shared.

3. Virtual storage requirements

Less common virtual storage will be required when running multiple printers per address space compared to running printers singly in their own address space. Each FSS address space, whether running with one printer or multiple printers, will require about 12K of common storage. Installations with a virtual storage constraint problem can use multiple printer attachment to minimize the common storage requirements of running page mode printing.

Changing printer defaults

When multiple printers are running in one FSS, the PSF-defined printer settings cannot be changed via operator command. Any value coded on the PRINTDEV statement for any printer is set for the life of the entire PSF address space. (Settings that the installation may want to change include the default FORMDEF, the default PAGEDEF, the DATACK setting, and whether or not TRACE is on.)

As an example, an installation may be running with 10 printers in an FSS address space and want to turn the trace on for one of them. The following procedure can be followed:

1. Drain all printers running in the FSS using the $PPRTn command.

2. Modify the PSF startup JCL for the desired change. In this case, TRACE = OFF will be changed to TRACE = ON for one printer.

3. Purge the FSS address space using the MVS cancel command (C).

4. Start the printers using a series of $SPRTn commands.

Operational considerations

The only changes for operators will be as follows:

1. Operators will not see a new address space start for the second and subsequent printers that start in a given FSS address space. Currently, every time a printer is started, an FSS address space is started.

2. Messages will be seen, especially when Print Services Facility cannot get enough virtual storage for one of the printers. These are not new messages, but they were not commonly seen in the past since there is little chance of running out of virtual storage with only one printer attached.

How many printers can be attached?

The theoretical maximum number of printers (FSAs) that can be run in one address space (FSS) is set at 16, but the actual number that can be attached is dependent on the amount of virtual storage available in the private area.

As a rule of thumb, use this estimate to determine how many printers can be attached in your environment. For each FSS you will need 1 megabyte of virtual storage for Print Services Facility routines and other common control blocks and data areas. For each printer attached, you will need an additional .5 megabytes of virtual storage. For example, using this rule of thumb, if you might need a 3 megabyte private region to attach 4 printers.

Keep in mind that storage requirements in your environment will vary depending on the application data, the BUFNO= setting for 3800-3s, and the number of copy groups in FORMDEFs and page format definitions in PAGEDEFs used. These requirements change dynamically. If one of the FSAs cannot dynamically acquire needed virtual storage, that one printer will be drained and the operator will be notified with a message mentioning "GETMAIN failure." The other printers running in that address space will continue printing unless they cannot get needed virtual storage.

The planner should define the region size for this FSS address space to be as defined to be as large as possible to avoid these "GETMAIN failure" conditions.

3820 hardware storage feature choice

Planners will have to choose how much control storage and pattern storage is to be installed on the 3820.

Recommendation

Installing the extended control storage feature can significantly improve printer throughput. Customers should generally start with one megabyte of pattern storage and add more later if needed.

The third and fourth megabytes of pattern storage will be most valuable to users of a large number of very large fonts. This will be typical of users of Kanji fonts available in some world trade countries.

The customer can choose to order various amounts of pattern and control storage. See *Advanced Function Printing Diagnosis Guide for MVS: IBM 3820 Page Printer,* S544-3094, Appendix B for a detailed discussion of printer storage requirements. The following approach might be used to take the information presented in the diagnosis guide and translate it into the required hardware features.

Pattern Storage

Pattern storage is needed to accommodate all the raster patterns and images used in the pages which are printing in the paper path at any one time. For simplex printing, there are two or more pages in process at any one time, and for duplexing, there are six since the fronts and backs of three physical sheets are printed at once. If there is insufficient pattern storage to hold all the fonts and images needed on the most complex page, that page will be unprintable. Pattern storage should be chosen based on page complexity.

To determine the correct amount of pattern storage to order:

1. Investigate the applications targeted for the 3820.

2. Choose the most demanding application. Look for the application that uses the most and largest fonts and graphics.
3. Find the most demanding page of the most demanding application.
4. Order enough storage to accommodate all the fonts on that page. Duplex jobs will require that fonts used on both sides of the page are stored in the printer. In all cases, for best throughput, all fonts used in the data set should be accommodated in pattern storage. See the documentation for estimates of printer storage requirements for 3820 fonts in:
   - SH35-0059-1 *Print Management Facility User's Guide and Reference* Appendix A.
   - SH35-0082-0 *IBM 3800 Printing Subsystem Models 3 and 8: Preparing Fonts for Printing* Appendix A.
   Note: this appendix lists 3800 figures. The tables reflect that a 3820 font requires 80% of the storage needed for a 3800-3 font. These numbers are conservative; in fact, 3820 fonts require closer to 50% of the pattern storage required by the same fonts for 3800-3. See Figure 6-3 on page 6-6, Figure 6-4 on page 6-7, Figure 6-5 on page 6-7, and Figure 6-6 on page 6-7 for the storage requirements of some of the IBM supplied typographic fonts.
   Remember that a 3820 font can be printed in multiple rotations with just one version of the font. With the 3800-3, each rotation and direction combination is a separate font.
5. Add some amount of pattern storage for future applications.
6. Order enough storage to accommodate all the images on that page. Estimate the amount of pattern storage needed for graphics by adding 7.2K bytes of storage for each square inch of image (including white space.)

One or two megabytes of pattern storage will be sufficient for most domestic (US) customers. Printers with three and four megabytes of pattern storage will probably be required for printing with Kanji fonts. Most customers should start with one megabyte of pattern storage and order additional storage as needed.

Many characters in the typographic fonts (Sonoran Serif and Sonoran Sans Serif) are not commonly used by customers in the United States. With the typographic fonts, these characters are contained in the last three character groups. These characters can be deleted from the source form of the fonts using Print Management Facility or from the object form of the 3820 fonts using Font Library Services Facility to save pattern storage and DASD space.

Sonoran Serif: Point Size	Medium	Bold	Italic Medium	Italic Bold
6	6	6	6	6
7	8	8	8	8
8	10	10	10	10
9	12	12	12	12
10	14	14	14	16
11	16	18	18	18
12	20	20	20	22
14	24	24	24	24
16	30	30	32	32
18	36	38	38	40

Figure 6-3 (Part 1 of 2). Pattern storage requirements--3820 Sonoran Serif fonts in K bytes

Sonoran Serif: Point Size	Medium	Bold	Italic Medium	Italic Bold
20	46	46	48	50
24	66	66	68	72
30	104	104	108	112
36	126	128	130	136

Figure 6-3 (Part 2 of 2). Pattern storage requirements—3820 Sonoran Serif fonts in K bytes

Sonoran Sans Serif: Point Size	Medium	Bold	Italic Medium	Italic Bold
6	6	6	6	6
7	8	8	8	8
8	10	10	10	10
9	10	10	12	12
10	12	14	14	14
11	14	16	16	16
12	18	18	18	18
14	20	20	22	22
16	24	26	26	28
18	32	34	34	36
20	40	42	42	42
24	56	60	60	62
30	88	92	94	96
36	120	124	128	132

Figure 6-4. Pattern storage requirements—3820 Sans Serif fonts in K bytes

Sonoran Pi: Point Size	Serif Medium	Serif Bold	Sans Serif Medium	Sans Serif Bold
6	4	4	4	4
8	8	8	8	8
10	12	10	10	12
12	14	14	14	14

Figure 6-5. Pattern storage requirements—3820 Sonoran Pi fonts in K bytes

Font	Storage
Sonoran Petite 4 point	4
Sonoran Display 20 point	18
Sonoran Display 36 point	4

Figure 6-6. Pattern storage requirements—special 3820 fonts in K bytes

Control Storage

Control storage is needed to accommodate all the page buffers and the control information for fonts (in the form of tables and indexes.) The additional control storage feature (feature code #3035) provides 128K storage for both types of control data.

With the expanded control storage installed, more fonts can be loaded and used in one output data set, and more fonts can be retained in the printer between data sets assuming that sufficient raster storage is installed to accommodate the fonts. With base control storage, up to 10 fonts can be used, and the 6 most recently used are retained in the printer. With the expanded control storage, up to 32 fonts can be used in one print data set, and the 24 most recently used fonts are retained in the printer (assuming that there is enough pattern storage.) Since it can take around 20 to 30 seconds to load a typical uniformly spaced font, and more than a minute to load some of the larger typographic fonts, the ability to retain these fonts in the printer can be very beneficial.

System attachment

Planners will have to keep the following considerations in mind while planning for the installation of large numbers of 3820 or 3800-3 page mode printers using Print Services Facility/MVS.

JES2 attachment

There are three separate attachment considerations to keep in mind when planning for JES2 attachment of large numbers of page printers.

1. Print Services Facility will allow one printer per address space until multiple printer support is available as a PTF to Print Services Facility in the fourth quarter of 1985.

    Currently, JES2 and Print Services Facility will work together to allow one set of printer control blocks (functional subsystem application or 'FSA') per Print Services Facility address space (functional subsystem or 'FSS'). Multiple printer FSA per FSS address space support is announced for fourth quarter 1985 availability.

2. JES2 will allow ten FSS address spaces per JES2 subsystem.

    At any one time per JES2 system, ten FSS address spaces can be started. For each additional secondary JES2 subsystem, an additional ten FSS address spaces can be started.

3. JES2 will allow up to 99 printer definitions per JES2 subsystem.

    At any one time per JES2 system, up to 99 local printers of any type can be defined using the PRINTERnn initialization statement. Not all of these 99 definitions can be used for 3820s or 3800-3s in

page mode since most installations will use some for 1403s, 3211s, 3800-1s, and 3800-3s in compatibility mode. For each additional secondary JES2 subsystem started, an additional 99 PRINTERnn initialization statements can be specified.

Here are two other comments on system attachment of the 3820. First, the 3820 is is driven by Print Services Facility only. There is no compatibility mode attachment of the 3820 directly to JES. However, line mode data previously printed on line type printers can be printed on a 3820 using PAGEDEF specifications. See Chapter 3, "Application Design Considerations for the 3820" on page 3-1 for information on this subject.

Second, there is no direct attach capability with the 3820 as there is for the 3800-3. That is, an application cannot load Print Services Facility into its address space and allocate and control the printer directly.

JES3 attachment

JES3 attachment for the 3800-3 in page mode was made available with the first release of Print Services Facility

JES3 attachment of the 3820 has been announced to be made available in 1Q86 for use in an MVS/XA environment, and 2Q86 for use in an MVS/370 environment. When running with JES3, the 3820 will be controlled by Print Services Facility. There is no compatibility mode or direct attachment for the 3820.

In a JES3 environment, only one FSA (printer) per FSS (Print Services Facility address space) can be started, but there is no explicit limit on the number of FSS address spaces that can be used. The FSS (Print Services Facility) address space can be started on the JES3 global system, or on any local system controlled by the global processor.

JES3 3820 attachment and operational considerations are described in *JES3 Support for the IBM 3820* GG66-0231.

Output routing

In a JES2 environment, the installation has a number of ways to route output to a particular printer or group of printers. These options are discussed here.[1]

Note that in JES2, output is not really assigned to a particular printer until it is actually printing. Instead, the various JES2 and FSS (page mode) printers select output from the JES2 hardcopy queue according to the attributes assigned to the output by the user in his JCL or assigned by JES2 using defaults.

Users can route output to a 3820 using various JCL parameters including CLASS=, PRMODE=, and DEST= in a JES2 environment.

---

[1]

For a discussion of the ways that page mode output can be routed in a JES3 environment, see *MVS/SP JES3 1.3.4, MVS/SP JES3 2.1.2, JES3 Installation Consideration* LG22-9389, in chapter 3 "New Printer Support -- 3800-3." This document is available to any licensed user of MVS/SP JES3.

Using the CLASS = parameter

The easiest way to route output to a 3820 printer is to assign an output class to that device. For example, you might assign output class "K" to be used exclusively for 3820 printers, and users would specify CLASS = K on their //OUTPUT or //DD statements.

The advantages of using CLASS = as a routing method are that it is easy to understand and easy to use. This parameter has been used with line mode printers and any user familiar with JCL will understand its use.

The drawbacks of using this form of routing are:

1. Many customers have used all the 36 output classes and have none to spare. As the number of installed printers grows, CLASS = becomes less useful as a routing method.
2. When there are many printers and a shortage of output classes, the use of output class will not allow printing on a *specific* device.

Using the PRMODE = parameter

The PRMODE = (process mode) parameter can be used in user JCL on the //OUTPUT statement to route printing to a class of printers. Process mode is much like output class in that it is used as a routing device to direct certain kinds of output to groups of printers. For example, a user might code:

```
//OUT1    OUTPUT    PRMODE=PAGE
```

JES2 will assign an attribute of PRMODE = LINE as a default, and PRMODE = PAGE whenever it detects the presence of special page mode control records (structured fields with hexadecimal '5A' carriage control characters) in the output data. The user can specify a PRMODE setting of LINE, PAGE or one of six other installation defined settings which might include names such as GRAPHICS, PROD, TEST, PLOT, or SYSTEST. The meanings of the process modes are defined by the installation. An output data set can have the process mode of PAGE even though it contains no structured field control records. In this way, PRMODE = is just a routing mechanism.

With JES2 1.3.4 and JES2 2.1.2, an installation can specify up to eight PRMODE settings per multi-access spool complex, and a given printer can be assigned up to four PRMODE settings. Since the number of PRMODE settings is limited, it will probably be best to use this routing attribute to designate classes of output rather than to try to direct output to a specific printer.

Using the DEST = parameter

In JES2, the DEST = parameter can be in one of the following forms:

- LOCAL (for use with any local device, not just printers),

- Rnnn, RMnnn or RMTnnn (for use with remote devices),

- Unnn (for use with any local device). This is called "special local routing."

  Note that a specification in the form of **NnnnUnnn** *is not allowed, so it is not possible to use special local routing in an NJE environment.*

- Nnnn or NnnnRnnn (for sending output to another node or a remote device attached to another node)

- Any eight-character name defined by the installation through the DESTID initialization statement and equated to one of the generic forms listed above.

Installations can use either special local route codes, remote route codes (or a combination of both) to provide routing to a particular 3820 printer. See *MVS JCL* GC28-1350 (MVS/370) or GC28-1352 (MVS/XA) in the sections on the DEST= parameter under either the //DD statement, the //OUTPUT statement or the /*OUTPUT statement.

Using special local routing

The output destination can be defined using the DEST= parameter in user JCL on the //OUTPUT, //DD, and /*OUTPUT statements. This routing device can be used to route output to a specific printer or group of printers. In an NJE environment, special local route codes can not be used to route output to a printer on another node.

The JES2 systems programmer will want to assign certain printers to be certain DEST= destinations. See *System Programming Library: JES2 Initialization and Tuning* SC23-0046. This can be done in the following way:

1. On the PRINTERnn statement one or more routing codes can be specified using the ROUTECDE= parameter.

2. Using the DESTID statement, an eight-character name can be associated with a route code number. The name should not start with characters such as "RMT" or "R" that JES2 would confuse with remote RJE devices.

3. The route code number used can be one of the local printer specifications. For example, you could specify a DESTID statement such as:

```
DESTID NAME=WSC3,DEST=U128
```

4. A number of DESTID statements can be used to create a unique destination identifier for each printer. The local routing described in this discussion is limited to 255 routings per JES2 subsystem.

If the output is to be routed to another node for printing, this technique cannot be used. When transmitted to another node, local routing (DEST=Unnn and its derivative names as defined in DESTID statements) cannot be specified.

A JES2 operator can dynamically change the route codes assigned to a given printer using the $TPRT command.

```
In the JES2 initialization statements:

PRINTER3 CLASS=K,ROUTECD=128,PRMODE=....,FSS=........ (etc.)
DESTID NAME=WSC3,DEST=U128

In the user's JCL:

//JOBCARD   JOB ....
//OUT1      OUTPUT DEST=WSC3

--OR--

//JOBCARD   JOB ....
//LISTING   DD SYSOUT=K,DEST=WSC3
```

Figure   6-7.   Special local routing example.   This example shows how to use the ROUTECD parameter
and the DESTID statement in JCL to allow end users to route their output to a 3820 using
the DEST= parameter in their JCL.

Using remote printer routing

Instead of using local routings such as DEST = Unnn and its derivatives, a system programmer might want
to use remote routings. These route codes are used for RJE stations.

In the coding of the DESTID statement, the system programmer might do something like this:

DESTID NAME=DALLAS4,DEST=RMT1118

In this case, the DEST= parameter could be Rnnnn, RMnnnn, or RMTnnnn where nnnn is a number
from one to 4000. The JES2 systems programmer would want to be careful to choose a range of numbers
not already in use for RJE stations. The range of remote device identifiers is specified using the &NUMRJE
statement in the initialization deck. Be sure to increase this range as needed as you define the routing for
more printers using remote printer routing.

Since there really isn't a remote printer named RMT1118, the output will need to be rerouted to a local
printer. In this case, the "local" printer is a remotely attached 3820. This rerouting is done using the $T
command. This command can be placed in the JES2 initialization statements so it happens automatically, or
can be entered manually by the operator.

```
In the JES2 initialization statements:

&NUMRJE=1120
PRINTER3 CLASS=K,PRMODE=....,FSS=........ (etc.)
$TPRT3,R=R1118
DESTID NAME=DALLAS4,DEST=RMT1118

In the user's JCL:

//JOBCARD   JOB ....
//OUT1      OUTPUT DEST=DALLAS4

--OR--

//JOBCARD   JOB ....
//LISTING   DD SYSOUT=K,DEST=DALLAS4
```

Figure   6-8.   Remote routing example.   This example shows how to use a non-existing RJE station and the DESTID statement in JCL to allow end users to route their output to a 3820 using the DEST= parameter in their JCL.

Note that this technique will also work for routing 3820 output across JES2/NJE networks.   Users may create output at an NJE node remote to the node on which the printer is attached, and send it to another node for printing. The JES2 initialization statements at that node could contain this statement:

DESTID NAME=OUR3820,DESTID=N65R1118

Users could place specifications in their JCL that will route the output to the printer attached to the other node:

//OUTCARD OUTPUT DEST=OUR3820,

  --OR--

//DDCARD DD DEST=OUR3820,

When the output arrives at the NJE node on which the 3820 is attached, the $TPRT3 command will cause it to be directed to the 3820.

Another possibility

Some customers may want to print by selecting jobs on the basis of the FORMS= setting in the user JCL. The limitation of this method of routing would be that all output to be printed *must* have a FORMS= parameter specified. It is unlikely that many installations will choose this option due to the requirement to have each user code FORMS= on his or her JCL.

SMF information available for the 3820

The SMF type 6 record has been updated for use with page printers controlled by Print Services Facility such as the 3800-3 and 3820. Many new fields have been added to help track the use of the new features of page mode printing. See *OS/VS2 MVS System Programming Library: System Management Facilities (SMF)* GC28-1030.

Example uses of this information include the following:

- From SMF type 6 records, the system output administrator can determine the number of fonts used (from field SMF6FONT) versus the number of fonts loaded (SMF6LFNT). If fonts are not being retained in the printer and are being reloaded quite often, the installation planner might consider this when deciding if additional control storage is required on the printer.

- The number of overlays used (SMF6OVLY) and the number loaded (SMF6LOLY) are available, as are the number of page segments used and loaded (SMF6PGSG and SMF6LPSG), and the number of FORMDEFs (SMF6FMDF) and PAGEDEFs (SMF6PGDF) used. Perhaps an administrator wants to bill a user based on their usage of these resources.

- An exact number of the number of feet printed on the 3800-3 (SMF6FEET) and an exact count of the impressions printed on the 3820 (SMF6PGE) are available for billing purposes. In 3800-3 compatibility mode, this field was an approximation.

- Also available is an indication that the alternate paper source (SMF6BIN) or duplexing (SMF6PGOP) on the 3820 has been used during printing of the data set. In the case of duplexed output, the record indicates whether tumble duplex or normal duplex or both have been used.

Other hints and tips

The following is a collection of miscellaneous ideas and suggestions that might be of some value in your environment:

1. It might avoid some confusion if the PRINTERnn statement, the LUNAME= on the PRINTDEV statement, and the name on the LU macro in VTAM node definition for Print Services Facility were all the same. For example, if you were using PRINTER5 in the JES2 initialization deck, you might want to use "PRINTER5" as the name in the other two places. See the *Print Services Facility System Programmer's Guide for MVS* SH35-0091 for details on these specifications.

2. A handy way to keep a log of Print Services Facility error messages is to keep the JES2 job log for that started task. Generally, installations will discard this information. Although this is not a complete log of all Print Services Facility activities, it would hold all write to operator messages issued by Print Services Facility. To do this, specify a held message class setting for started tasks using the $STCMCLAS statement in the JES2 initialization deck. Be sure to remember to specify the LOG parameter on the $STC statement to make sure that this data is collected by JES2. This log could be viewed while Print Services Facility is running using a package such as Spool Display and Search Facility (SDSF).

3. The 3820 microcode customization is fairly straightforward. A couple of confusing specifications were items 410 (Network Addressable Unit Name) and 411 (Network Identification) which relate to the extended network architecture version of ACF/VTAM. These fields can be left blank.

Chapter 7. Operational and Management Considerations

The 3820 is designed to require little operational intervention in many of the operational environments in which it will be used. As installations consider applications that involve large numbers of these printers, they will weigh alternatives for controlling the printers and distributing the printers' output. *The purpose of this discussion is to outline the various operational environments in which the 3820 will be run, and to present the alternatives for controlling the printer in those environments.*

Operational control design of the 3820

Design features of the hardware and software work together to avoid operator intervention wherever possible.

The printer microcode has been written to resolve as many problems as possible within the printer. Timers can be set to allow the printer operator to clear a problem (such as an out-of-paper condition) before the situation is reported to host system software. Network control personnel can use NPDA and NCCF to act on network alerts issued by the printer without having to involve the JES operator. Finally, Print Services Facility software will act to resolve problems without involving the operator where possible.

There will be some JES operator intervention required. The goal of the installation will be to fit the 3820 into operations in the most effective way possible.

Options for operator control of the 3820

Many customers will choose to install large numbers of 3820s in order to satisfy the needs of information distribution and distributed applications. Although any given 3820 will require minimal intervention, the operator actions required for a large number of printers will justify investigating alternatives for management discussed below.

1. Interaction with host operator
2. Network operator control
3. Remote operator control
4. User help desk

Interaction with host operator

Some installations will choose to control their printers by having all operator intervention requests handled by the host JES operator. Obviously, the printer operator at the remote site would handle intervention such as clearing jams and adding paper and toner.

The JES operator and remote printer operator will have to be in contact to handle day to day operations of the printer. The JES operator will start, stop (drain), and reset the printer as needed. The JES operator will

also handle error conditions that can't be handled by the printer operator such as communication line problems. JES operators will also be informed when problems that are not handled before the timer allowing printer operator intervention expires. The JES operator will then have to act to restart the printer. The printer operator will call the JES operator when there is a problem that can't be resolved at the printer.

The JES operator will be responsible for reprioritizing jobs and will be the one to display the status of jobs on the queue to be printed.

This will work well for customers installing a relatively small number of 3820s, especially if those printers are to be used for departmental information distribution.

Network operator control

Network control operators can use SNA capabilities and tools to manage 3820s. Many customers have developed a network control function due to the size or complexity of their network. This group of operators serves as a buffer between the end users and the host system operators.

Specifically, these network control operators can use the functions of the Network Communications Control Facility (NCCF) and the Network Problem Determination Application (NPDA). NCCF Version 2 Release 2 can be ordered for use in MVS/XA or MVS/370 environments as 5668-947, and in MVS/XA only as 5665-316. NPDA Version 3 Release 2 is orderable for use in MVS/XA or MVS/370 environments as 5668-920, and in MVS/XA only as 5665-321. The MVS/XA only versions of these products take advantage of 31-bit virtual storage addressing.

These two products are used together as a way to provide the network controller with a facility for monitoring the status of communications devices, monitor and modify the status of devices and lines, and enter host commands. Host commands that can be entered include *network related* commands such as for VTAM and NCP, and *systems related* commands such as those for JES2 and MVS. In order to enter systems related commands with this set of network control software, the Operator Communication Control Facility (OCCF) 5665-288 is also required. See *MVS Operator Communications Control Facility -- General Information* GC24-5225.

For the 3820, NPDA and NCCF will work together to allow the network controller to monitor the printer's status by collecting and reporting device-generated network *alerts*. A network alert is generated by the 3820 for a variety of conditions after the timer for local printer operator intervention has expired without the operator tending to the problem. The description of these unsolicited alerts is not published in current standard documentation but is listed below.

The *Advanced Function Printing Diagnosis Guide for MVS: IBM 3820 Page Printer* S544-3094 has further information on the use of NPDA in Appendix E. Network operators can use Spool Display and Search Facility (SDSF 5798-DGN) as an alternative way to enter systems related commands.

Descriptions of unsolicited network alerts

The following are descriptions of the unsolicited alerts generated by the 3820 and their probable causes. The text of the alerts generated by NPDA V3R2 based on information received from the 3820 are listed in Figure 7-1 on page 7-3.

```
ALERT DESCRIPTION                 PROBABLE CAUSE
=============================     ====================================

SNA negative response received    Printer
Paper jam                         Printer (operator at 3820**)
SNA inactivity                    Host program/printer
Printer error                     Printer
Printer out of supplies           Printer (operator at 3820**)
Intervention required             Printer (operator at 3820**)
Operator took device offline      Printer (operator at 3820)
Invalid response                  Host application program (PSF)
SNA error detected                Host program (PSF)

** Operator did not respond before the intervention timer expired.
```

Figure 7-1. Unsolicited network alerts issued by the 3820. The intervention timer is set in the customization of the 3820 microcode and can be set so that it never expires if desired.

Remote operator control

Another alternative for controlling the printer would be to allow the printer operator to monitor system messages and enter JES commands as appropriate from the remote site. One option for doing this would be to use SDSF (Spool Display and Search Facility program offering 5798-DGN) and allow the remote printer operators to use its operator control functions.

Many installations will choose this option because it allows the remote operator to control normal operations of the 3820 with little involvement by the host JES2 operator. The remote printer operator can start, stop, and reset the printer, reprioritize output in the job queue, and see all error messages and displays.

Other installations will evaluate this option a little more closely for the following reasons:

- First, if the remote user does not currently have TSO access and a terminal, this system access and equipment must be provided. If the operator is new to TSO usage, training may have to be provided.

  A specialized terminal control program is supplied with SDSF. It allows the installation to give only SDSF to a TSO user if that is desired. Using this feature, an installation can limit the SDSF user to SDSF use only, and no special TSO usage training would be required.

  Another benefit of using this supplied terminal monitor program is that it requires less system resources when compared to a similar TSO user because it is so specialized.

- Second, the remote operator cannot be limited to entering commands just for his printer or group of printers. Customers will want to make sure that the proper training is done to make sure that SDSF operators do not enter commands that don't relate to their printer.

- Third, the remote operator cannot be limited as to the type of command he can enter. If the operator has sufficient authority to start and stop the printer, he will also have authority to enter any other JES commands.

Note: The remote operator can be limited to issuing just JES2 display commands to monitor the status of the 3820. In this case, he will not be able to enter commands to *change* the status of the device. An installation can code user exits to limit the remote SDSF user's capabilities. See the *SDSF Program Description and Operations Manual* SB21-2866.

User help desk

In many installations, the end users will have little or no experience with data processing operations. This will be particularly true of 3820s that are installed to fulfill special application needs such as distributed printing of insurance policies in remote sales offices.

In these situations, a *user help desk* will be valuable. The availability of the printer will be key since the output will be part of the day to day business operation of the remote site. Users will want a phone number they can call whenever there is a problem.

The operator at the user help desk can use a variety of tools to help him do his job. He may have:

- a JES2 console for monitoring error messages and entering printer-related JES2 commands.
- a TSO terminal with the use of SDSF to monitor error messages and enter JES2 commands.
- a network control console (using NCCF and NPDA) to monitor the device and enter network control and JES commands as appropriate.
- a direct phone line to network and JES operators at the host and the authority to ask them to enter commands on his behalf.

Choosing the right option for operator control

The best option will depend on the operational environment in which the 3820 is placed. If the device is used to print applications that require minimal intervention, any of the options will suffice. As the 3820 is placed in environments that generate more intervention, the operational control of the device will have to be more carefully planned.

Where possible, a network control or user help desk solution, or some combination of the two will allow the best operational control and support of problem resolution. Obviously, an account may want to work 3820 operations into existing network operations and help desk support.

In cases where network control or user help desks cannot be put in place, the installation must choose between some combination of remote operator control using SDSF and direct telephone communications with a host JES2 operator for both status monitoring and problem resolution.

Operational environments of the 3820

For the purposes of this discussion, there are three general kinds of operational environments in which the 3820 will be placed. Comments and observations are based on experiences in early installations.

1. Departmental convenience printer
2. Distributed application-oriented printer
3. System printer

Departmental convenience printer

The 3820 can be used as a convenience printer. It can be installed near the end user so that he can pick up his own output. The advantage of this sort of remote output printing is avoiding the time and expense of distributing output from a central site.

In general, people working in a remote department tend to print fairly uniform output requiring little intervention. Generally, the output is all printed in one output class, there is little need to change the order in which the jobs print, and there is little or no forms changing required. There is almost no need to forward-and back-space the printer since the output will generally be just a few pages long or easily resubmitted.

However, there may be need for operator intervention since there may be some need for forms changing, high priority rush jobs, and so on.

Many RJE devices such as 3777s, remotely attached impact printers, and 6670 information distributors have been installed to run in this environment with little need for operator intervention. Early account experience shows that the 3820 needs minimal intervention when used as a department remote information distribution device.

Distributed application-oriented printer

In this context, an application-oriented' printer is an output device placed in a distributed location to fulfill some application need. For example,

● An insurance agency may have a printer in each remote office to print policies,

● A bank may have printers distributed in regional centers to print 'past due' form letters, or

● A manufacturer might place printers on the factory floor to print bills-of-material complete with graphics for assembly line use.

When used for one major application such as those listed above, there is little need for operator intervention since there is little need for forms changing, 'rush' jobs, and so on.

End users in these environments will rely on the 3820 for running their day-to-day business. As such, there must be clear procedures for how the interaction with the network help desk or system operators will be done, and how problems will be resolved. It will also be key that someone in the remote site is assigned responsibility for the reliability of the output.

Depending on how critical the availability of the printer is to the installation's business, providing multiple printers to serve as a backup might be considered.

System printer

Some installation will choose to install 3820s to supplement the capacity of system printers such as 1403s, 3211s, and 3800s or to serve as backup for them.

The operator intervention required on a 3820 will probably be similar to that of the devices which it is intended to replace. The operator intervention will be due to the nature of the applications and the changing requirements of the job load.

System software attachment of the 3820

The 3820 is very well suited to printing output currently printing on an RJE device (such as a 3777), but it is controlled operationally as if it were a local printer attached remotely. The 3820 is not controlled as an RJE device.

The 3820, although attached remotely, is defined to the host operating system software as if it were a local printer. In JES2, all operator commands are issued as for locally attached devices as they are for the 3800-3 in page mode. In the JES2 initialization statements, the printer is defined using a PRINTERnn statement, denoting local control. The 3820 is not an RJE device, and as such is not defined using the JES2 RMTnnnn statement.

That is not to say that the 3820 cannot print output currently printing on an RJE device such as the 3777. This is merely to say that the 3820 is not *controlled* as if it were an RJE device.

The operator control panel on the 3820 is used for communicating with the 3820 printer operator for local printer control tasks. Generally, the console displays information about the status of the printer (READY, RECEIVING, LINE CONNECTED), information about the status of the paper path (ADD PAPER, ADD TONER, JAM AT 2), information for the NSD service representative in case of an error requiring a service call, and as a display for the output of traces and microcode configuration.

The console cannot be used to perform host JES control functions such as:

- Starting or stopping the printer ($S, $P),
- Displaying printer or system status ($D),
- Changing printer settings such as page limit or job output class to be selected for printing ($T),
- Dealing with job output. ($DJ, $TOJ, $AJ, etc.)

There is one exception: The CANCEL button on the operator control panel can be used to stop the currently printing output. (The full procedure is to press the HOLD button, then the CANCEL button when the HOLD function is complete.) Print Services Facility will then cause JES2 to purge the output from the spool. Only the current print data set is purged. Subsequent data sets including those that are in the printer's buffer will print.

Setting up operator procedures

Systems programmers and operations analysts should keep the following considerations in mind while planning to fit 3820s into normal customer operations. This information will also be important as operator procedures are documented.

Host operator (at the JES2 console) considerations

The 3820 will be controlled in the same way as the 3800-3 in page mode with some exceptions:

1. JES2 command differences.

   a. Resetting the printer to JES mode.

   The $TPRTn,MODE=JES command can't be used to reset the 3820 to compatibility mode since the 3820 can only be run in page mode.

b. JES2 setup message while starting the printer.

   For local printers including the 3820 since it is defined as a local printers, JES2 will allow the operator a chance to check to make sure the device has the correct form, print train, or optical flash frame loaded. After the operator has checked the device, he will issue a second $SPRTn command for the device.

c. Effects of stopping (draining) the printer.

   With Print Services Facility 1.0, the ten most recently used FORMDEFs and PAGEDEFs are retained in the Print Services Facility address space. In addition, the 10 most recently used fonts are retained in the 3800-3. When the printer is drained ($P in JES2) the address space retains the FORMDEFs and PAGEDEFs and the printer retained the fonts. In order to clear these objects from PSF and the printer, the address space had to be purged from MVS using either the OS cancel command (C) or by resetting the printer to JES mode ($TPRTn,MODE=JES). If not, changes made to FORMDEFs, PAGEDEFs and fonts would not be seen since the objects would not be reloaded.

   With Print Services Facility 1.1, FORMDEFs and PAGEDEFs are deleted from the Print Services Facility address space and fonts are deleted from the printer when the printer is drained using the $P command.

   To maintain throughput, the 10 most recently used PAGEDEFs and FORMDEFs are retained in the Print Services Facility address space. At the end of printing of each print data set, the ten most recently used fonts are retained in the 3800-3 from data set to data set and the 6 or 24 most recently used fonts are retained in the 3820 depending on whether or not the additional control storage is installed. All other fonts, PAGEDEFs and FORMDEFs used in printing that data set are deleted.

   With Print Services Facility 1.0, the Print Services Facility address space had to be purged from MVS in order to reload changed objects. Once you have Print Services Facility 1.1 installed, testing new objects will be easier. If you make a change to a PAGEDEF or FORMDEF just drain the printer to insure that the latest version is loaded and used. This is true for fonts as well.

   One caution: Deleting the fonts will mean that all the fonts will have to be reloaded when they are next used. For the 3800-3, this is not a concern because of the short time needed to load fonts. For the 3820, there can be long delays as the fonts are loaded. As a result of these delays, you should avoid unnecessary draining of the 3820.

2. New Print Services Facility messages will be seen. These messages will involve the communications attachment of the 3820 and will be in addition to the messages now being seen with Print Services Facility 1.0 for the 3800-3 in page mode.

   A few new messages and a variety of new Print Services Facility ABEND reason codes may be seen by the JES operators. These messages and codes are documented in *Print Services Facility Messages for MVS and VSE* SH35-0060. A copy of this manual should be available to the JES operator for reference.

   Information on the routing and descriptor codes of Print Services Facility messages will be published in a future revision of *OS/VS Message Library: VS2 Routing and Descriptor Codes* GC38-1102. In summary, the information to be added will be:

- Print Services Facility action messages use descriptor code 2, route code 1 which means "Immediate action required; master console action message."

- All Print Services Facility informational messages use descriptor code 7, route code 2 which means "Master console information" and route code 7 which means "Unit record pool." *OS/VS Message Library: VS2 Routing and Descriptor Codes* GC38-1102 contains descriptions of the meaning of the routing and descriptor codes.

The 3820 is remotely attached via SNA network communications and operators will see communications-oriented messages. The host operator (alone or in cooperation with an SNA network control operator) will be responsible for line and session starting, monitoring and stopping as well as JES2 printer control. See the section "Network operator control" in this chapter for comments on the use of NCCF and NPDA to help make this task easier.

Printer operator (at the 3820) considerations

1. Operator documentation

   The 3820 printer operator will be trained by the NSD service representative. The training, which takes about two hours is basically hardware oriented. This operator training is important for insuring smooth printer operations.

   Documented operator procedures are in *IBM 3820 Page Printer Operator's Guide* S544-3080. This document should be available at the printer for use by the operator.

2. Loading and changing paper including cassette usage.

   Loading paper and changing the alternate paper cassette are straight-forward tasks. The installation should plan to provide procedures to inform the operator when forms will be changed or the cassette will need to be replaced.

   Information on how to load paper that is side or edge sensitive is found in the *IBM 3820 Page Printer Operator's Guide* S544-3080. Side or edge sensitive paper is paper that has to be loaded in a certain way because of hole punches or pre-printing. If the paper is improperly loaded, the holes may end up on the wrong side of the output, or the text on the page may be printed upside down relative to the letterhead.

   There is no message on the 3820 panel that tells the operator to load a certain preprinted form or a certain alternate paper cassette. The installation will need to develop procedures in which different job classes or processing modes (PRMODE= settings) are used to allow the user to differentiate their output. The printer operator will have to coordinate the draining of the printer for one class of output and resetting the printer with the actual changing of the cassette or form. In these cases, either phone contact with host operators or remote control using SDSF will be needed.

3. Printer operator responsibilities

   In addition to the operational control tasks outlined above, the 3820 printer operator will be responsible for several tasks:

   - Adding paper, toner, and fuser oil when needed.
   - Installing microcode updates. The operator will be responsible for coordinating this change with the network control center or operators using the customer's change control system.
   - Clearing paper jams.

- Performing the functional checkout with the NSD service representative at the installation of the 3820.
- Performing the customization of the microcode.
- Participating in problem determination by doing traces and diagnostics when asked by the systems programmer or NSD service representative.
- Responding to error messages on the display when errors occur.
- Adjusting the print registration.
- Creating a backup diskette and installing it when needed.
- Setting up the cassette for the required paper size.

Operators should be aware of their role in the problem determination and resolution process. They should know that they are responsible for running traces, printing error logs and configuration listings, and for recording error indications on the printer console for use by the CSR or systems programmer. These procedures are documented in the *IBM 3820 Operator's Guide* S544-3080.

Casual end user access to the printer

Casual users may be allowed to pick up their own output. It might be wise to document and post the rules to which they will be expected to adhere. This should include information about who to call in case there is a problem.

Output distribution

A key advantage of the 3820 is that the device can be installed very near the end user of the output. This will save the turnaround delays often experienced by a remote user when output must be printed locally.

One suggestion might be to provide wall-mounted hanging files or plastic trays for output. In this way, output can be separated and placed in slots for easy access by the end user. If something like this isn't done, a casual end user may go through output in the hopper looking for his job; this can cause the output to get out of sequence.

Chapter 8. 3820 Early Support Program Customer Experiences

An Early Support Program (ESP) for the 3820 hardware was conducted from February through August 1985. An ESP is an IBM product introduction program in which selected customer accounts install hardware and software early in order to test the installability and usability of new products and for IBM to gain early experiences in customer environments.

Overview of ESP accounts and applications

The 3820 ESP consisted of four accounts in three industries running a wide variety of applications. The Washington Systems Center installed a 3820 as well for ESP support. Two accounts ran with multiple 3820s, two accounts were new users to Advanced Function Printing, and by the end of the ESP, all four accounts were running with both the 3820 and 3800-3 in page mode.

All four accounts used DCF release 3 for printing output on the 3820 and most accounts printed some line mode data as well. Text was merged with images using electronic overlays, DCF release 3 segment include (.si) control words, and structured fields placed within line data. Full page graphics output from CAD/CAM applications was processed by the Graphical Display and Query Facility (GDQF 5668-905) and subsequently printed on the 3820.

The 3820 was attached on both 9600 bps lines and 19.2K lines as well as via modem eliminator. Three accounts ran Print Services Facility 1.1 with JES2 in an MVS/XA environment; one account and the Washington Systems Center ran the 3820 in an MVS/370 environment.

Applications included:

- Distributed line mode printing--to provide departmental information distribution.
- Presentation graphics--including business graphics and charts, and foil masters.
- In-house publishing--primarily for technical publications such as this document.
- Insurance policy printing--using DCF release 3 formatting and typographic fonts including a signature.
- Pre-printed forms replacement--using Overlay Generation Language and two page segments (a signature and a logo.)

Installation experiences--hardware

Installation of the 3820 hardware went smoothly for all ESP accounts. No problems were seen as the result of rough handling by shippers or improper installation procedures.

A few considerations were highlighted by ESP experiences.

- The installation of the hardware must be coordinated with the NSD (National Service Division) service representative. The 3820 is not a customer setup device.

- The customer will be responsible for ordering supplies (paper toner, fuser oil, developer and paper cassettes) giving some lead time in advance of the hardware installation. Although the device comes with a starter set of these supply items (except paper) it will not be long before more supplies are needed. Toner will run out first since there is enough supplied with the hardware for only about 20K impressions.

- The unpacking and shipping instructions are clear and should be followed closely. The NSD hardware service representative can get more information on this topic in recent technical service letters.

- Double check power installation. Although the voltage of the 3820 is common (120 VAC), the connector and amperage of the circuit (20 AMP) may not be installed in many office environments. See *Planning for the Location of the IBM 3820 Page Printer* G544-3090 for details. Insure that the physical planning staff supplies the proper power.

- Leave enough service clearance. Although the 3820 can be installed as close as 6 inches from a wall, you must leave space in front of the device so that the customer can move the 3820 forward in case service access is needed via the rear panel of the printer. Need for this sort of access will be limited.

- Once a printer is installed, the customer may wish to move it to another location, or another floor in the same building. This was successfully done several times during the ESP. NSD participation in these moves is required.

Installation experiences--software

The SMP (or SMP/E) installations of Print Services Facility 1.1, Print Management Facility 1.1, the typographic fonts and Overlay Generation Language were straightforward. The update PTFs to Overlay Generation Language and DCF for 3820 support were available from the IBM support center and were installed separately. All accounts were installed with the prerequisite levels of MVS/SP (MVS/370 or MVS/XA environments), DFP, JES2, ACF/NCP, and ACF/VTAM before the ESP began.

These observations are drawn from ESP experiences.

- The DCF maintenance update for the 3820 is in a number of separate PTFs. These PTFs have a DCF level set as prerequisite. Before your installation tries to install the update PTFs, make sure that the software installation buckets are reviewed with special attention paid to the section on DCF updates.

- There are a number of prerequisite and corequisite JES2 PTFs required for running Print Services Facility 1.0 or 1.1. The customer should review the software installation buckets for the current recommendation for JES maintenance levels needed.

Defining the printer to JES2, VTAM, and NCP is a detailed, but generally straightforward task. Details are found in the *Print Services Facility Systems Programming Guide for MVS* SH35-0091.

Determining the specifications for the microcode customization also did not pose a problem. Worksheets and most explanation is found in *Preparing an Implementation Plan for the IBM 3820 Page Printer* G544-3093, and some more detail can be found in the *IBM 3820 Page Printer Operator's Guide* G544-3080.

Problems found and their resolution

Few software, hardware or microcode problems were found during the 3820 ESP. Those software errors that were found during the ESP were corrected by maintenance available at or shortly after general availability of the 3820. Likewise, the level of microcode shipped with 3820s to the field after the ESP contained fixes and enhancements made as a result of the ESP.

Print Services Facility 1.1 proved to be stable when driving the 3820 and the 3800-3. A number of Print Services Facility 1.0 PTFs were incorporated into Print Services Facility 1.1, and some Print Services Facility 1.0 PTFs had to be reworked for the 1.1 level and have to be installed separately. Check with the support center for the latest recommendations. It is recommended that customers considering the installation of a 3820, but currently running with Print Services Facility 1.0, migrate to 1.1 ahead of the hardware installation.

During the ESP, the 3820 hardware proved to be reliable when running in customer environments in terms of numbers of paper jams and hardware problems that required a service call.

Product usage experiences

The 3820 was used for a variety of end user applications.

Applications and end user experiences

- Distributed line mode printing

  Customers that chose to move line mode printing to the 3820 were able to do so by changing JCL specifications and building page mode versions of compatibility mode objects only. That is, they were able to print current output on the new printer without changing the applications that generated the data. Line mode printing includes that output currently printing on a 3211, 1403, 3800-1, 3800-3 in compatibility mode, or remote printers for RJE stations such as that attached to the 3777 RJE station.

  Careful selection of Print Services Facility default PAGEDEFs limited the number of JCL changes needed in some cases, but JCL changes were needed in many cases. One case that requires more planning is the printing of output with 132-character lines in landscape (90 degree rotated) orientation on the 8 1/2″ by 11″ page with 12 pitch fonts such as GT12. Some accounts switched to a smaller 15 pitch font (GT15), and one account decided to use DATA1 fonts (5771-ADA) because they judged the 15 pitch characters to be too small. DATA1 fonts are uniformly-spaced 13.3 pitch characters designed expressly for this purpose.

- Document Composition Facility

  All four accounts and the Washington Systems Center found using Document Composition Facility R.3 to be an easy, effective way to quickly take advantage of the new functions of page mode printing on the

3820. All sites had people familiar with the use of Document Composition Facility to compose documents, and some had previously used this product on the 3800-3 in page mode and the 4250. The customers without previous experience with page mode printers also effectively used Document Composition Facility R.3 for in-house document composition.

- Graphics

Graphics from CAD/CAM applications, business graphics, and digitized logos and signatures were created and printed on the 3820 during the ESP.

Customers were pleased with the output, but commented that building the graphics into a printable page segment required many steps and sometimes several separate pieces of software. No customer decided to try to scan their own logos and signatures during the ESP.

The major comment heard about graphics printing was the impact on printer throughput. With full page GDDM-created graphics, it wasn't unusual to see 5 minutes required to print each page. However, the inclusion of a logo or signature in the output, especially if those signatures or logos are retained in the 3820 as part of an overlay, was not seen as a problem. Of course, printer throughput depends on many factors and will vary from installation to installation.

Another comment concerned moire patterns on the 3820 seen with certain levels of shading. As with any photographic process, certain levels of shading will appear to have a slight wood grained appearance. Customers who did not care for the appearance of these patterns varied the shading level.

- Preprinted forms replacement

One account had an application running on a 3800-3 that used a form that was preprinted on both sides. Variable data (name, address, etc.) was only printed on the front of the form. Electronic overlays were made to replace the preprinted information on both sides of the preprinted form. The account planned to print duplexed output with an overlay and variable data on the front of the sheet, and just an overlay on the reverse.

One facet of page mode printing architecture is that every logical page must have some variable data in order to print any constant data such as an overlay. In this case, the customer had to alter his application program to print a few blank characters on the reverse of each page to cause the constant data (the overlay) to print.

Management of the page mode environment

Page mode printing offers the ability to run new applications. ESP customers noted that this increased function brings with it more complexity than the line mode printing environment. ESP customers strongly considered the possibility of setting up a systems output administration function in those cases where one did not already exist.

This output management function would be responsible for: 1) end user and application design support 2) Print Services Facility resource library management, and in some cases, 3) problem debugging and problem source identification. This function might be part time effort for one person, the full time assignment for one person, or the assigned task of a staff of people.

Other customers decided to divide these tasks between several workers.

Operational experiences

During the ESP, customers had few problems controlling the limited number of printers installed. All accounts expressed concern about the need to carefully plan and staff for the control of large numbers of 3820 printers. See Chapter 7, "Operational and Management Considerations" on page 7-1 for guidance on this topic.

ESP customers also noted that having a printer operator assigned was an important part of a successful installation. ESP customers emphasized that this operator should have a feeling of responsibility for the availability of the 3820 to his end users. This feeling of responsibility will lead this operator to be more effective in dealing with the network control or host operators and the end users.

Recommendations based on ESP experiences

ESP customers made many comments and suggested product improvements during the program. General recommendations that can be drawn from their experiences are:

1. DCF output and line mode printing can easily be routed to the 3820.

2. Customers should work with NSD closely to insure a smooth installation and continued satisfactory support.

3. The software installation process is clean, but special care should be paid to DCF and JES2 maintenance. The software and hardware installation buckets should be reviewed.

4. Customers should understand that large scale graphics can take a considerable amount of time to print. However, imbedded signatures and logos cause little slowing, especially when they are retained in the printer as part of an overlay.

5. Some person or group should be assigned the task of managing the page mode printing environment. Operators should be assigned and should clearly understand their responsibilities.

6. Control of large networks of 3820s should be carefully planned.

Appendix A. Installation Planning Checklist

The following is a sample list of the kinds of tasks associated with the installation and use of a 3820 page printer. Each installation will have unique requirements so the list may not be complete for your situation. Also, there may be tasks that don't apply in your environment.

Use this sample as a base on which to build your own plan. Be sure to consult *IBM 3820 Page Printer and Advanced Function Printing Software: Introduction and Planning Guide for MVS* GBOF-1189.

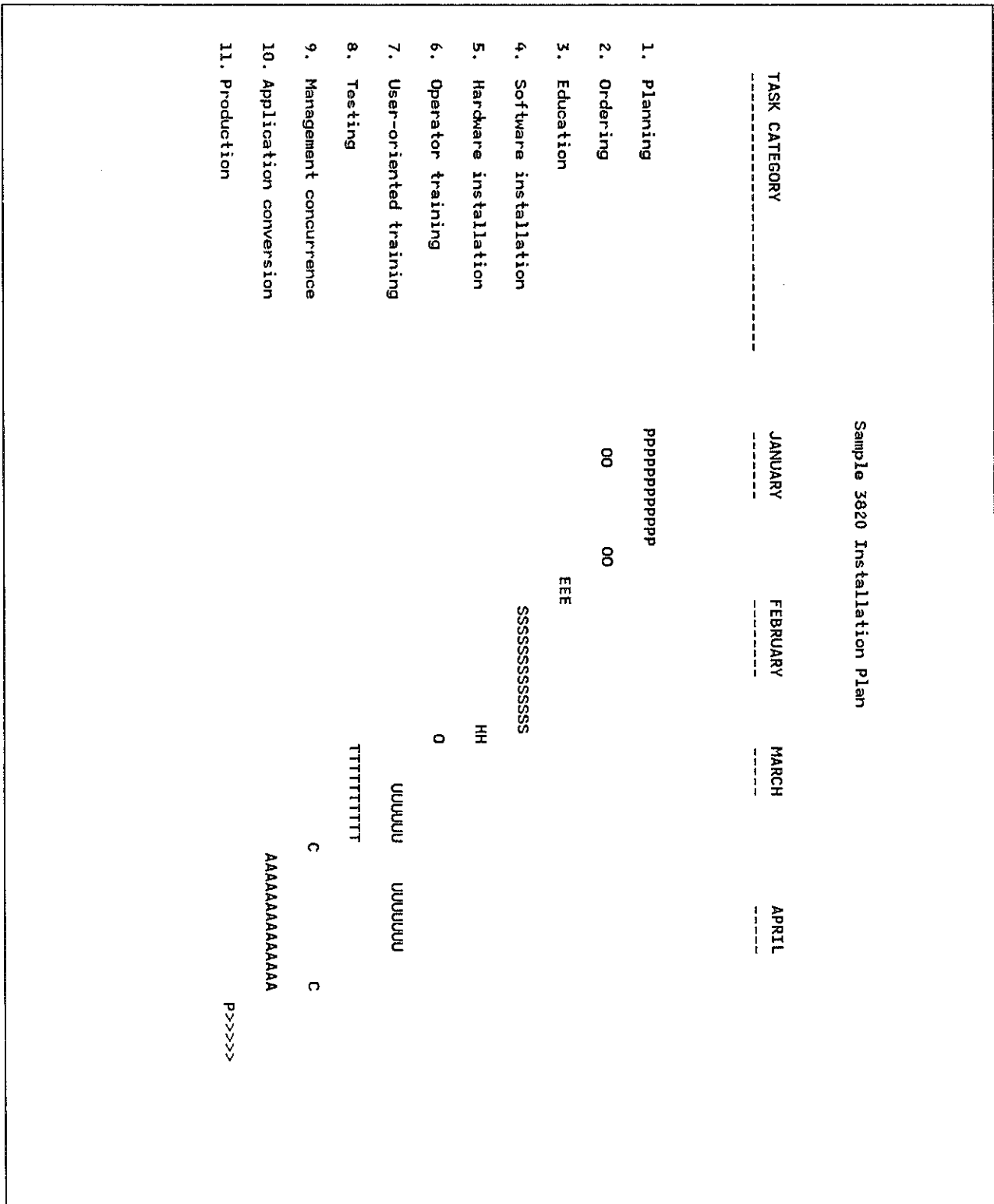Following the task checklist is a sample high-level plan depicted as a time line chart.

Task Checklist

___ 1. Planning
    ___ a. Document an installation plan including tasks, completion targets, and responsibilities
        1) Document software and hardware installation plans including physically planning for the install site
        2) Document a test plan
            a) Functional test plan
            b) Printer throughput test plan
            c) Stress test plan
            d) JCL conversion test plan
            e) Regression testing (Will current line mode printing function and will current 3800-3 page mode applications sent to the 3820 print?)
        3) Document a conversion plan
            a) Line printing (conversion of current applications)
                i. User-created GRAPHMODs
                ii. User-modified character sets
                iii. FCBs to PAGEDEFs
                iv. COPYMODs to page mode functions
            b) Electronic overlays
                i. Replacement of preprinted forms
                ii. Replacement of optical overlays (3800 applications)
                iii. New overlay applications
            c) Investigate new application possibilities
    ___ b. Determine hardware requirements
        1) Control storage (128K) additional
        2) Pattern storage options
    ___ c. Update systems management procedures
        1) Change management (change control submission)
        2) Network management (help desk)
        3) Problem management
        4) Availability management (CFIA and system outage analysis)
        5) Performance management (Does printer throughput need to be tracked?)

     ___ d. Check and update SLSS for proper manuals

     ___ e. Investigate operations environment for needed changes

          1) Update billing procedures for change from "line" to "page" SMF accounting

          2) Determine whether to assign an output specialist

          3) Decide how to control the use of Advanced Function Printing utilities such as Overlay Generation Language and Print Management Facility, and Print Services Facility resources such as FONTLIB

     ___ f. Conduct systems assurance for Print Services Facility (preferably with customers)

     ___ g. Service planning

          1) Assign and train service personnel

          2) Inform project participants of the product support structure

          3) Define problem escalation procedure

          4) Stock appropriate spare parts

___ 2. Ordering

     ___ a. Order all needed software

     ___ b. Order all needed supplies such as toner, developer, fuser oil, and paper

     ___ c. Order alternate paper cassette if needed

     ___ d. Order all needed hardware and appropriate features

     ___ e. Order communications lines

___ 3. Education

     ___ a. AFP Implementation (K2501 held in Dallas)

___ 4. Software installation (sequence can vary)

     ___ a. MVS prerequisite (MVS/SP 1.3.3 or MVS/SP 2.1.2 or later releases with selected additional maintenance)

     ___ b. DFP prerequisite (DFP/370 1.1 or DFP/XA 1.2 or later releases)

     ___ c. JES prerequisite (JES at 1.3.4, 2.1.2 level or later)

          1) Update INIT deck for FSSDEF statement in JES initialization parameters

          2) Update PRINTERnn statements in JES initialization parameters

     ___ d. VTAM prerequisite (ACF/VTAM Version 2 Release 1 or later)

          1) Update VTAMLST specifications for printer and Print Services Facility specifications

     ___ e. NCP prerequisite (ACF/NCP Version 2)

          1) Perform NCP gen to specify lines and printer

     ___ f. Print Services Facility 1.1

          1) Customize Print Services Facility startup proc

          2) Code Print Services Facility exits as needed (especially job separator page exits)

     ___ g. Overlay Generation Language

     ___ h. Print Management Facility

          1) APL2 or VS/APL release 4 for use with Print Management Facility 1.1

            • If running with VS/APL release 4 GDDM release 2 or higher is required

            • If running with APL2 GDDM release 3 or higher is required

            • When running with GDDM release 3 or higher, install maintenance mentioned in information APAR II01573

            • Insure high maintenance level

          2) Customize Print Management Facility startup CLIST

     ___ i. Typographic fonts (required for use of starter set of Document Composition Facility release 3)

     ___ j. Document Composition Facility release 3 plus update maintenance

     ___ k. GDDM release 3 or higher for writing programs to produce printable images

     ___ l. EREP release 2.3 or higher (EREP 3.1 or later recommended)

___ 5. Hardware installation

     ___ a. Prepare physical site (insure that a 20 amp circuit is in place)

     ___ b. Install communications lines and modems

     ___ c. Arrange with NSD and customer to install the hardware

    __ d. Prepare microcode customization worksheets for use by the operator

    __ e. Have printer operator customize microcode

    __ f. Have printer operator set paper cassettes for required paper sizes

__ 6. Operator training

    __ a. JES operator

    __ b. Network operator

    __ c. Printer operator training done by NSD rep

    __ d. Update operator documentation

__ 7. Application and user-oriented training

    __ a. Use of new features of Document Composition Facility (text and image merge)

    __ b. Creation of images using GDDM release 3 for printing on the 3800

    __ c. Design and coding of Overlay Generation Language overlays (chapter 1 of manual)

__ 8. Testing

    __ a. Execute test plan

__ 9. Management concurrence

    __ a. Selection of printer(s) to use in AFP mode

    __ b. Approval of migration plan

    __ c. Approval of fallback plan and criteria for fallback

    __ d. Go ahead decision on conversion

    __ e. Fallback decision if required

__ 10. Conversion

    __ a. Execute conversion plan

__ 11. Production

    __ a. Execute data migration plan

    __ b. Monitor performance

    __ c. Conduct a post-install review

The following chart illustrates the kind of plan you might want to document for the installation of a 3820. Obviously, the amount of time needed to complete each task will vary for each installation; use your judgement when determining the duration of each task. For example, the software installation time may vary since many customers already have some of the system prerequisites in place; installing the AFP software alone takes little time compared to installing the prerequisite levels of software and maintenance.

```
Sample 3820 Installation Plan

TASK CATEGORY           JANUARY    FEBRUARY   MARCH      APRIL
-------------           -------    --------   -----      -----

1.  Planning            PPPPPPPPPPPP
2.  Ordering            OO         OO
3.  Education                      EEE
4.  Software installation          SSSSSSSSSSSSS
5.  Hardware installation                     HH
6.  Operator training                         O
7.  User-oriented training                               UUUUUU  UUUUUU
8.  Testing                                   TTTTTTTTTT
9.  Management concurrence                     C          C
10. Application conversion                               AAAAAAAAAAAAA
11. Production                                            P>>>>>>
```

Appendix B. Advanced Function Printing Publications for the 3820

The documentation listed here contains information on the use of the 3820 and related AFP software. It is not an exhaustive list of all the documentation available for AFP.

- 3820 Publications:

  - GBOF-1189   IBM 3820 Page Printer and AFP Software: Introduction and Planning Guide for MVS (This bill-of-forms consists of the following manuals:)

    1. G544-3088   Introduction to the IBM 3820 Page Printer and AFP Software
    2. G544-3091   Planning for AFP Software for MVS
    3. G544-3093   Preparing an Implementation Plan for the IBM 3820 Page Printer
    4. G544-3089   Planning a Data Network for the IBM 3820 Page Printer
    5. G544-3090   Planning for the Location of the IBM 3820 Page Printer
    6. G544-3092   Ordering Supplies for the IBM 3820 Page Printer
    7. G544-3082   IBM 3820 Page Printer Glossary

  - S544-3095   A Guide to Using IBM Printer for AFP
  - S544-3080   IBM 3820 Page Printer Operator's Guide
  - S544-3081   IBM 3820 Page Printer Operator Summary
  - S544-3094   AFP Diagnosis Guide for MVS: IBM 3820 Page Printer

- Print Services Facility/MVS Publications:

  - GH35-0055   PSF/MVS Licensed Program Specifications
  - S544-3095   A Guide to Using IBM Printers for Advanced Function Printing
  - S544-3084   PSF User's Programming Guide for MVS
  - SH35-0091   PSF System Programmer's Guide for MVS
  - SY35-0063   PSF/MVS Diagnosis Guide and Reference
  - SH35-0060   PSF Messages for MVS and VSE
  - SH35-0073   PSF Data Stream Reference for MVS and VSE

- Print Management Facility Publications:

  - GH35-0056   PMF Licensed Program Specifications
  - SH35-0059   PMF User's Guide and Reference
  - SX35-5033   PMF Quick Reference
  - SY35-0065   PMF Diagnosis Guide and Reference

- Print Services Access Facility Publications:

  - G544-3099   PSAF for MVS: General Information Manual
  - S544-3100   PSAF for MVS: User's Guide and Reference

- Page Printer Formatting Aid for MVS Publications:

  - G544-3344   PPFA for MVS: General Information Manual
  - G544-3181   PPFA for MVS: User's Guide and Reference
  - L544-3185   PPFA/MVS Diagnosis Guide and Reference

- Font Library Services Facility Publications:

  - GC33-6165   FLSF Summary
  - SC33-6166   FLSF Installation and Operation

- Overlay Generation Language Publications:

  - GH35-0080   Licensed Program Specifications
  - SH35-0079   OGL User's Guide and Reference
  - SX35-5032   OGL Quick Reference
  - SY35-0057   OGL Diagnosis Guide and Reference
  - SX35-5038   Orientation Wheel for the IBM 3820 Page Printer

- Document Composition Facility Publications:

  - SH35-0070   SCRIPT/VS Language Reference
  - SH35-0069   SCRIPT/VS Text Programmer's Guide

- Fonts Publications:

  - GH35-0081   Licensed Program Specifications for typographic fonts
  - SH35-0082   Preparing Fonts for Printing
  - SH35-0053   IBM 3800 Printing Subsystem Model 3 Font Catalog

Appendix C. Foils for Use in 3820 Introductory Presentations

These foils can be used as a base for a presentation introducing the 3820 and Advanced Function Printing software. More information on the software can be found in Chapter 2, "Planning for a Successful 3820 Installation" on page 2-1.

IBM 3820 Page Printer
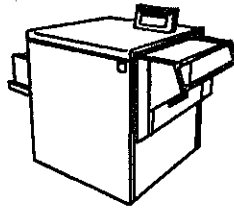
INTRODUCTION

*This presentation was formatted using Document Composition Facility
and printed on the IBM 3820 using the functions of the
Advanced Function Printing software.*

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IBM 3820 Page Printer
INTRODUCTION

The IBM 3820 provides Advanced Function Printing features in a distributed environment at speeds of up to 20 pages per minute. It can print on a variety of cut sheet paper sizes in simplex or two kinds of duplexing.

The purpose of this presentation is to acquaint new users with the features of the 3820 and briefly describe the software that can be used with this device. The text with each foil can be read as an introduction to the device, or can be used as a base for a script to use when giving a presentation using the provided foils.

The master copies of these foils were formatted using DCF release 3 and were printed on the 3820 using typographic fonts and the Advanced Function Printing software.

This presentation deals only with an MVS environment although other attachments such as VSE, PC-LAN, and VM are available or planned for future availability (VM).

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TOPICS

- Introduction

  Why consider page mode printing on the 3820?

- IBM 3820 page printer features

- IBM 3820 page printer innovations

- AFP Software overview

- How to use the 3820 in our installation

  (Optional topic.....)

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TOPICS

The topics to be covered will be:

- Why consider page mode printing on the 3820?

  There are a number of advantages in printing output using the new Advanced Function Printing features. A sampling of the kinds of new features that can be incorporated in the 3820 output will be discussed.

- IBM 3820 page printer features

  A general description of the 3820 hardware features will be covered.

- IBM 3820 page printer innovations

  Many innovations have been included in the design of the 3820. Particularly important are those dealing with paper handling and font processing.

- AFP Software overview

  The various software products that are used in support of the 3820 will be discussed.

- How to use the 3820 in our installation (Optional topic.....)

  Presenters note: This presentation can be extended to include specific details on the use of the 3820 in your environment. For example, you might want to include examples of JCL changes needed to direct output to the 3820, which support packages (such as Overlay Generation Language and DCF) are available for use, and which typographic fonts are available.

WHY CONSIDER PAGE MODE PRINTING

- Improve existing applications

  - Use of aesthetically pleasing fonts
  - Inclusion of overlays, logos, and signatures
  - Rotation of output
  - Multiple-up printing

- New applications

  - In-house publishing
  - Output formatting separate from application
  - Graphics and CAD/CAM output printing

- End user satisfaction is the result

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WHY CONSIDER PAGE MODE PRINTING

The 3820 can be used to improve existing applications or to print output for new applications that were not possible without the features of Advanced Function Printing.

Existing applications--Existing applications can be enhanced in many ways. For example, a wide variety of font size and styles can be chosen to improve the appearance of printed output. Electronic overlays can be added to replace preprinted forms. (Electronic overlays are a collection of constant data such as text, rules, shading, and logos that are merged with variable data at print time.) Current output can be rotated on the page or printed with more than one logical page of data on the physical page to save paper.

New applications--Advanced Function Printing features can be used to allow the development of new applications such as in-house publishing and graphics printing. Using the text and image merge capabilities of the new support, technical manuals, reports, insurance policies, and other documents could be composed and printed without the need for a professional typesetter.

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IBM 3820 PAGE PRINTER
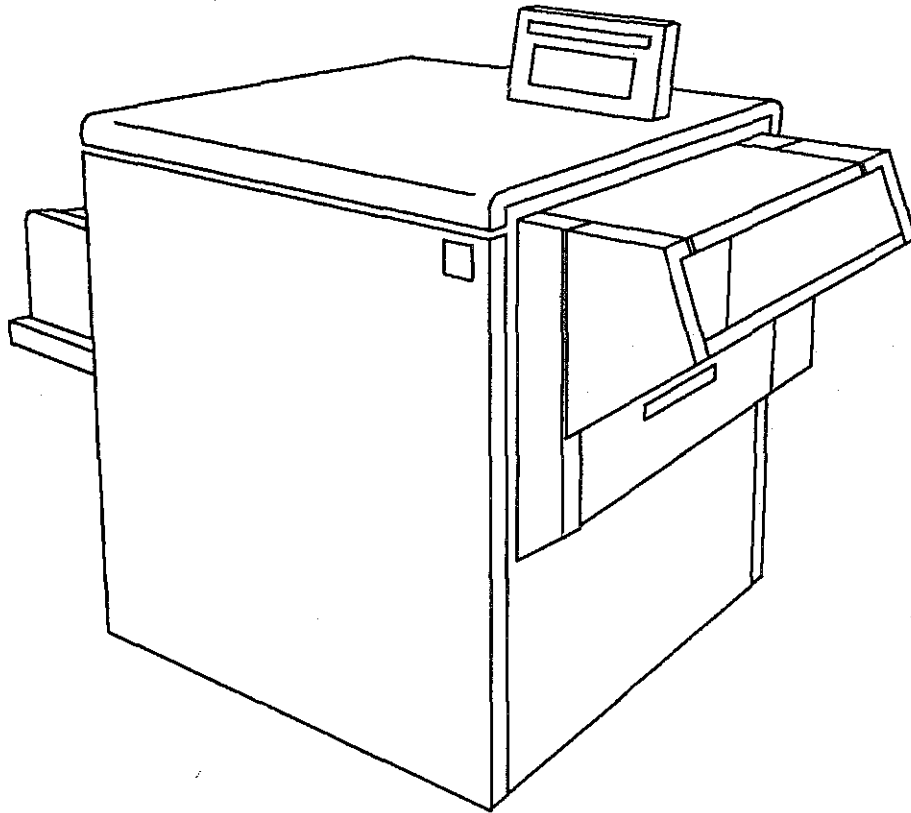
- Page printer – full AFP capabilities
- Non-impact laser printing – quiet operations
- Enhanced print quality
- High quality print – 240 pels per inch
- Speeds up to 20 impressions per minute
- Compact size – about 1/2 of 6670
- Supported by updated AFP software

IBM

IBM 3820 PAGE PRINTER

The 3820 runs in page mode and gives the user full access to Advanced Function Printing capabilities. The use of non-impact laser print technology allows all points addressability and high print quality. The 3820 uses the same pel density as the 3800-3 in page mode--240 by 240 pels per square inch. The term "pel" is a shorthand way of referring to Picture ELements which are addressable dots on the printed page.

The non-impact laser technology also helped designers produce a very quiet running machine. Many users will find the noise level low enough to allow installation of 3820s in office environments.

In spite of its compact size (about 1/2 the space needed for an IBM 6670) the 3820 is capable of printing at speeds of up to 20 impressions per minute. Complex applications and output with a large number of characters per impression may lead to less than 20 impression per minute throughput. An impression is the printing on one side of a physical sheet of paper.

The 3820 is supported by updated versions of the Advanced Function Printing software originally announced to support the 3800-3 in page mode.

IBM 3820 PAGE PRINTER
INNOVATIONS

- Network attachment

    - Designed for unattended operations
    - Office environment installation
    - SNA attach — line speeds up to 19.2K

- Expanded paper capability

    - Printing closer to edge of page
    - Cut sheet paper in several sizes
    - Duplex printing (normal and tumble)
    - Alternate paper selection (cassette)
    - Input — 1100 sheets plus 250 alternate
    - Output — 1250 sheets
    - Offset stacking of output

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IBM 3820 PAGE PRINTER
INNOVATIONS

The 3820 has been designed to include a number of innovations in several areas:

Network attachment-- The 3820 can be attached by SNA network communications lines remote from the central data processing installation at line speeds of up to 19.2K. End users can now get high quality page mode output very near their office.

Expanded paper capability-- Users can format data to print to the edge of the paper on the 3820; On the 3800-3, there are .5 inch unprintable along each perforation. As with any cut sheet printer, some partial characters may be seen at the edge of the page, so it is wise to leave a margin. The 3820 can use a variety of sizes of cut sheet paper including letter size, legal size, a number of smaller executive size papers, and European sized paper stocks including A4 and B5.

Duplex printing can be done if desired in either normal or tumble modes. Normal duplexing is where the text on the front and the reverse of the sheet of paper are printed with the top of the page of text being the same for both sides of the paper. Tumble duplexing is where the text on the reverse of the page is upside down relative to the text printed on the front of the page. If tumble duplexed output pages are bound across the top, a reader could view two pages of data at once. This is commonly used in legal documents such as insurance policies and tabular reference data.

Paper can be selected from the main input bin or from an alternate paper source which is a removable cassette. The main input bin can hold up to 1100 sheets of letter size or A4 paper.

The alternate paper cassette can be used for any of the paper sizes allowed on the 3820. Additional cassettes can be purchased from IBM to allow an end user to easily switch from one size or type of paper to the next without having to unload and reset the cassette for the next type of paper. For example, a variety of pre-printed letterheads may be used at a location, and a separate cassette could be used for each.
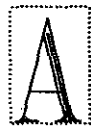
A very large (1250 sheet) output bin is provided, and each print job and copy of a document within a print job is offset from the previous output by .5 inch to allow easy separation. The resulting stack of paper consists of individual stacks of paper each one shifted to the right or left of the previous stack.

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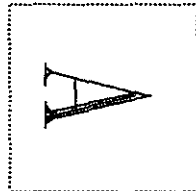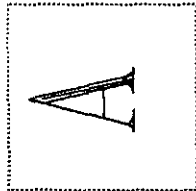
A ← Font Index
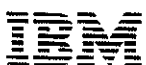
3800-3 Fonts   3820 Fonts

- Improved font capability

  - More efficient use of resources
  - Printing in the 'back' direction

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A major innovation included in the 3820 is the way fonts are handled. With 3800-3 fonts each font has one character cell size regardless of the size of the characters. In addition, each rotation and direction variation of the fonts is represented as a separate font. For example, if a user would like to print across, down, and up on a page using the exact same typeface, three separate fonts are loaded. Due to the way fonts are used and loaded by the microcode of the channel-attached 3800-3, this is an efficient way to handle fonts on this printer.

The 3820 requires a method to send less data to the printer due to the relatively slow speeds of the communications lines to which these printers are attached. To meet this need, a new format of the fonts is introduced with the 3820.

With the 3820, only one version of the font is loaded along with detailed information about each character contained in a font index. The 3820 can use that information to rotate the individual characters and place them on the page at print time. With a 3820, a user can print in any of 16 direction/rotation combinations with only one font loaded into the printer. This flexibility also allows printing in the "back" direction on the 3820 which is not allowed on the 3800-3.
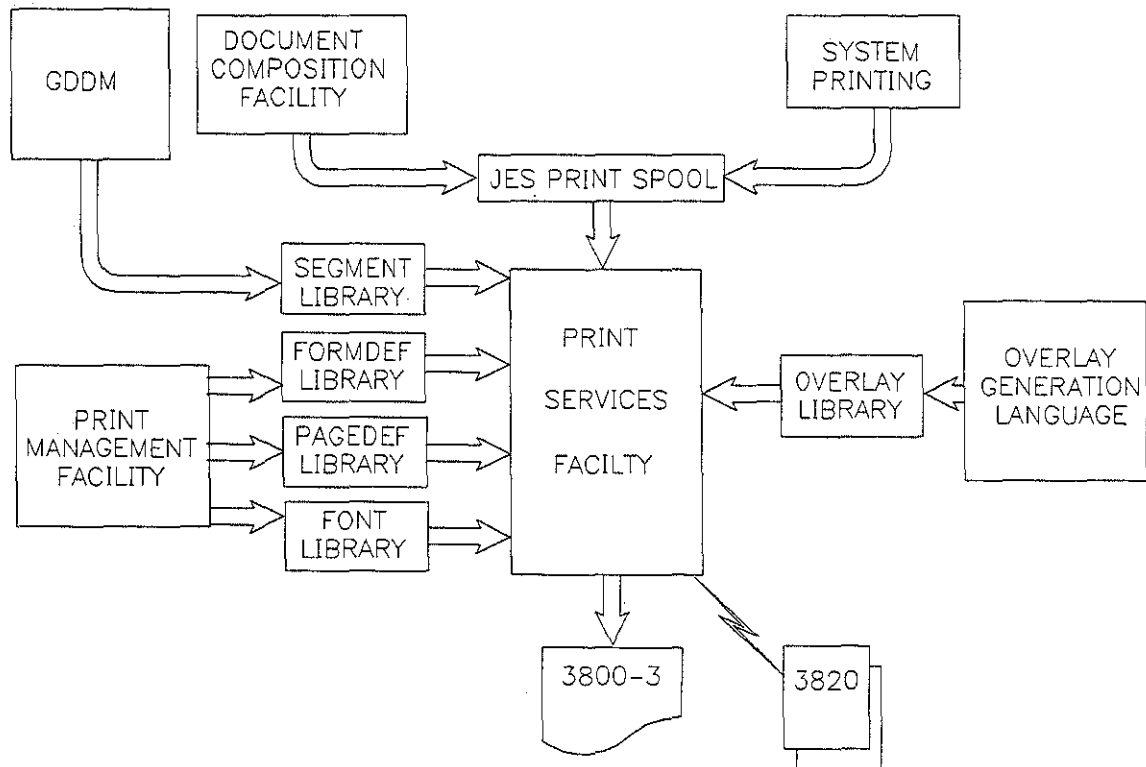
Due to this creative way of handling fonts, the installation will see savings in:

- Disk space to store the fonts. (This is especially true since only one version of the fonts is needed.)
- CPU resources to load the fonts.
- Time for the fonts to be sent to the printer over the communications line, and
- Pattern storage requirements.

Since the character cells are customized for each character, less storage is needed for any given font. With the 3800-3, as many pels are sent to the printer for a capital "M" as there are for a period or lower case "i". As a result, 3820 fonts require 50% to 80% of the space of their 3800-3 counterparts.

ADVANCED FUNCTION PRINTING
SOFTWARE SUPPORT

```
┌──────────┐   ┌─────────────┐                          ┌──────────┐
│          │   │ DOCUMENT    │                          │ SYSTEM   │
│  GDDM    │   │ COMPOSITION │                          │ PRINTING │
│          │   │ FACILITY    │                          │          │
└──────────┘   └─────────────┘                          └──────────┘
                        └────────┐   ┌──────────────────┐   │
                                 └──>│ JES PRINT SPOOL  │<──┘
                                     └──────────────────┘
                  ┌──────────┐              │
              ┌──>│ SEGMENT  │──>    ┌───────────────┐
              │   │ LIBRARY  │       │               │
              │   └──────────┘       │   PRINT       │        ┌──────────┐   ┌────────────┐
              │   ┌──────────┐       │               │        │ OVERLAY  │   │ OVERLAY    │
 ┌──────────┐ ├──>│ FORMDEF  │──>    │   SERVICES    │<───────│ LIBRARY  │<──│ GENERATION │
 │ PRINT    │ │   │ LIBRARY  │       │               │        │          │   │ LANGUAGE   │
 │ MANAGE-  │─┤   └──────────┘       │   FACILTY     │        └──────────┘   └────────────┘
 │ MENT     │ ├──>│ PAGEDEF  │──>    │               │
 │ FACILITY │ │   │ LIBRARY  │       │               │
 └──────────┘ │   └──────────┘       └───────────────┘
              └──>│ FONT     │──>         │        │
                  │ LIBRARY  │          3800-3    3820
                  └──────────┘
```

- ● Provide device support for the hardware
- ● Provide access to page mode features of hardware
- ● Allow migration of current line mode applications

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ADVANCED FUNCTION PRINTING
SOFTWARE SUPPORT

A variety of software program products are provided to allow users to take advantage of page mode printing features of the 3800-3 and 3820.

Data for printing on a 3820 or 3800-3 can come from current line mode user applications, line mode applications with special imbedded control information (structured fields), or fully composed printing applications such as DCF. This data is passed through JES spool to Print Services Facility. Print Services Facility will then merge all needed objects at print time. These object include electronic overlays, images in the form of page segments, fonts, and special formatting instructions contained in objects known as FORMDEFs and PAGEDEFs.

FORMDEFs provide specifications that have to do with the forms on which the text is printed. These specifications include choices of overlay, duplexing, alternate paper selection, text suppressions by copy, constant data, and the positioning of data on the page.

PAGEDEFs provide specifications that have to do with the layout of data on the page. These specifications include text rotation, multiple-up printing, font choice, and data formatting external to the application. Using PAGEDEFs, data can be placed on the page field by field and the placement and fonts used can be changed without altering the application program.

All of the objects are produced by a variety of programs and are placed in the libraries accessible to Print Services Facility prior to printing. For example, Overlay Generation Language is used to create electronic overlays and store them in the overlay library. GDDM or products that use GDDM can be used to create page segment that can be stored in the page segment library for merging with text at print time. Fonts are designed and built using Print Management Facility. Once built, these fonts can be modified using Font Library Services Facility PAGEDEFs and FORMDEFs can be built by Print Management Facility, Page Printer Formatting Aid for MVS, or Print Services Access Facility. See Chapter 2, "Planning for a Successful 3820 Installation" on page 2-1 for guidance on choosing which utilities are needed in your environment.

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ADVANCED FUNCTION PRINTING
SOFTWARE SUPPORT

- Print Services Facility

- Print Management Facility

- Overlay Generation Language

- Print Services Access Facility

- Page Printer Formatting Aid for MVS

- Typographic Font Products

- Font Library Services Facility

- Other products contain support

  - DCF Release 3, GDQF, GDDM, etc.
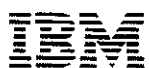
ADVANCED FUNCTION PRINTING
SOFTWARE SUPPORT

Note to the presenter: You might like to take this opportunity to let your users know which of these program products are installed in your installation. See Chapter 2, "Planning for a Successful 3820 Installation" on page 2-1 for more background on these products.

- Print Services Facility/MVS (5665-275)

  Print Services Facility manages and, as requested, combines the data from the spooling subsystem and the resource library to be sent to the printer. This program product is used to control the printer and handle any error conditions. Print Services Facility is required to print on a 3820 or 3800-3 in page mode.

- Print Management Facility (5665-307)

  Print Management Facility is an interactive menu-driven program that allows:

  1. Font design and creation.
  2. PAGEDEF creation
  3. FORMDEF creation
  4. Page segment services (conversion of scanned images into page segments)
  5. 3800 conversion services (conversion of FCBs, character sets, and logo character groups into page mode objects)
  6. Library services (including importing objects such as PAGEDEFs and FORMDEFs from other sources, and
  7. On-line help screens.

- Overlay Generation Language/MVS (5665-308)

  Overlay Generation Language allows the user to create electronic overlays in batch using an English like syntax.

- Print Services Access Facility (5665-340)

  Print Services Access Facility is an interactive user oriented program that allows a user to access page mode printing without extensive knowledge of Advanced Function Printing concepts. Using ISPF screens, a user can either invoke DCF release 3 to format data for page printers or send a print file directly to PSF to be printed.

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- Page Printer Formatting Aid/MVS (5665-351)

  Page Printer Formatting Aid allows a user a batch way to produce complex PAGEDEFs and FORMDEFs.

- Typographic Font Products

  A variety of typographic fonts products are available for use with the 3820 and 3800-3. These fonts include Sonoran Serif (5771-ABA), Sonoran Sans Serif (5771-ABB), and the Pi and Specials (5771-ABC) fonts which are all proportionally spaced. The uniformly spaced APL2 fonts (5771-ADB) and DATA1 fonts (5771-ADA) are also available.

- Font Library Services Facility (5668-890)

  Font Library Services Facility provides a system programmer a way to modify fonts for the 3820 and 4250 after they have been built. This program can run either interactively or in batch. This package cannot be used with 3800-3 format fonts.

- Other products contain support

DCF Release 3, GDQF, GDDM, etc.

DCF release 3 (5748-XX9) can be used to produce fully composed documents including text and image merging, use of multiple typographic fonts, and the rotation of fields of data or entire documents. GDDM (5748-XXH) can be used to create graphics in the form of page segments. These page segments can be merged with text. GDQF (5668-905) can be used to produce page segments from a variety of forms of CAD/CAM data. See Chapter 4, "Printing Graphics on the 3820" on page 4-1 for more discussion of GDQF.

PLANNED USE OF THE 3820
IN OUR INSTALLATION

- Software products installed

- Typographic fonts available

- JCL changes needed

- Support staff assignments

- Projected applications

  - —
  - —
  - —
  - —

PLANNED USE OF THE 3820
IN OUR INSTALLATION

Note to the presenter: This foil can be used to discuss how page mode printing will be used in your installation.

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IBM 3820 MVS/JES2 Installation and Use Considerations
Washington Systems Center
Technical Bulletin GG66-0215-00

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                      Gaithersburg, Md. 20879

Reader's Comment Form

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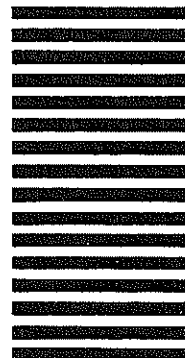
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