

FORMagic/400

**Forms Overlay Manager
for the IBM
iSeries and AS/400**

**User's Guide
and
Reference Manual**

Version 4.11



Keowee Systems, Inc.

418 East Waterside Drive
Seneca, SC 29672
(864) 885-0094
sales@keoform.com
www.keoform.com

Copyright Notice:

Copyright 2008, Keowee Systems, Inc., All rights reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form, by any means, without the express written permission of Keowee Systems, Inc.

Copying, Distribution, Trademark Acknowledgments, Installation, and Fair Usage Policy:

Please see the Installation Guide for complete details applicable to this product.

Major Changes in V4:

- Full support is provided for OS/400 V6.
- Automated installation and update are enabled through the integration of FORMagic/400 into the Keowee Product Suite.
- Administration of FORMagic/400 PDF forms is now integrated into the same process used for FORMagic/400 PCL forms via quick selection of form type (PDF or PCL).
- Evaluation mode expiration reminder message FMA1030 can now be suppressed.
- Activation keys provide a new benefit for customers participating in our Annual Support program. If you purchase FORMagic/400 or FORMagic/400 PDF, but not both, the other product will now be activated with a one form usage limit. This form can be used for evaluation or for permanent production usage.

Table of Contents

1.0 - Introduction and Installation:	
1.1 Welcome	4
1.2 About This Manual	4
1.3 Obtaining FORMagic/400.....	4
1.4 Copying and Distributing FORMagic/400	5
1.5 Installation, Updates, and Technical Support.....	5
1.6 Compatibility Testing	5
2.0 - Basic Features And Startup:	
2.1 Benefits	7
2.2 Features.....	7
2.3 Forms Application Overview	8
2.4 Getting Started with FORMagic/400	8
2.5 Creating Electronic Forms	10
3.0 - Using the FORMagic/400 Client:	
3.1 Overview.....	13
3.2 Forms Administration	13
3.3 New Overlays.....	14
3.4 Regenerate Overlays	14
3.5 Delete Overlays.....	15
3.6 Test Overlays	15
3.7 Download Overlays.....	16
3.8 Remove Overlays.....	16
3.9 Upload Overlays	16
3.10 Register/Upgrade	17
4.0 - Using Host Menus and Commands:	
4.1 Starting the Main Menu	18
4.2 Activation Keys.....	19
4.3 Working With Overlays	20
4.4 CL Commands	21
5.0 - Using PCL Commands in Host Applications:	
5.1 Command Notation	25
5.2 Overlay Merge Commands	25
5.3 Constructing Commands for Host Programs.....	26
5.4 Placing Commands in Host Programs.....	27
5.5 Other Useful Commands.....	28
5.6 Sample Programs	29
5.7 ASCII Hex Value Table.....	29
6.0 - Technical Considerations:	
6.1 Printers and Emulators	30
6.2 Merge Failures	32
6.3 Form Content Issues.....	33
6.4 Other Information	35
7.0 - Optional FORMagic/400 Environments and Features:	
7.1 Overview.....	37
7.2 Using the Documentation.....	38
7.3 AutoMerge	38
7.4 FORMagic/400 PDF	43
7.5 FlashMagic Non-volatile Memory Manager	54
7.6 Host Developer Kit	54

1.0 - Introduction and Installation

1.1 Welcome

Thank you for choosing FORMagic/400 for your electronic forms applications! FORMagic/400 is initially provided without charge as the Evaluation Version. This version can be temporarily used for evaluation purposes and even production applications. Except for the limited number of forms allowed during the evaluation period, all features are fully functional and no Activation Key is required! **Note:** The evaluation version sends an expiration reminder to QSYSOPR whenever most FORMagic/400 functions are used. This reminder can be suppressed; use command WRKMSGD FMA1030 FMAGIC/UMSG to change the severity to 00.

FORMagic/400 makes it quick, easy, and cost effective to add electronic forms to iSeries and AS/400 reports and documents. Now, you can eliminate custom pre-printed forms and enhance plain-paper reports with lines, boxes, legends, shading, logos, signatures, and other techniques to make your documents more attractive and appealing.

You don't risk anything except your time when you try any of our products. We can't guarantee success for every installation; but if you encounter any difficulties, we will make every reasonable attempt to resolve them.

1.2 About This Manual

This User's Guide and Reference Manual introduces you to FORMagic/400 and its powerful capabilities for customizing your documents. It provides complete information for using functions on both the host and PC client systems. Information is provided in these general categories:

- General introduction, installation, and startup - Chapters 1 and 2
- Using the client functions - Chapter 3
- Using the host functions - Chapters 4 and 5
- Additional technical information - Chapter 6
- Optional environments and features - Chapter 7

You should begin with Chapters 1 and 2 to familiarize yourself with FORMagic/400 background and concepts, to install the system and perform compatibility testing, to make forms, and to get started with forms applications. Use Chapter 3 to generate and upload forms from the PC client to the host. Use Chapters 4 and 5 to implement forms in your host applications. Chapter 6 provides additional technical and reference information which is helpful in situations not seen in most environments. Chapter 7 is relevant only if you need an optional product or feature, such as FORMagic/Windows; the Host Developer Kit for implementing forms on hosts other than AS/400, DOS, or Windows; AS/400 AutoMerge; or FORMagic/400 PDF.

Additional detailed technical information, not covered in this User's Guide, is available from both the client and host menu systems. The client also includes a README file with important startup information and Technical Notes with hints, tips, new features, and error corrections not yet incorporated into this Guide.

1.3 Obtaining FORMagic/400

FORMagic/400 is **always** distributed as a component of the Keowee Product Suite. This Suite contains the complete host and client systems and all documentation for multiple products. Please see the Installation Guide for more information about the available products, their system requirements, and their installation.

FORMagic/400 will operate initially as a fully-functional evaluation version. If you decide to purchase a Permanent Activation Key, additional forms, and/or optional features, just call us with instructions for billing via invoice or credit card. We can quickly provide a temporary Activation Key for the additional forms and/or features, and we will provide a Permanent Activation Key soon after receiving payment. Installation of keys is very simple; and you do **not** have to re-install the software.

1.4 Copying and Distributing FORMagic/400

FORMagic/400 is a copyrighted program. You may freely make backup and archival copies for use with the system(s) for which you have purchased permanent activation keys. You can also freely copy and distribute the installed host system library, FMAGIC, including any installed keys. When installed on another host system, FORMagic/400 will simply revert to the Evaluation Version. All forms are retained and usable after copying; but, if the number of forms exceeds the evaluation form limit, forms cannot be added or changed until sufficient forms are deleted to meet the limit or an enhanced key is obtained and installed. Please see the Installation guide for information concerning copying and/or distribution for any other purpose.

1.5 Installation, Updates, and Technical Support

Please refer to the Installation Guide for instructions regarding installation and updates for FORMagic/400 and for obtaining technical support.

1.6 Compatibility Testing

Once installation has been completed, you should perform several tests to insure your environment is compatible with FORMagic/400. Complete all tests described below; execute them in the sequence listed as they represent an increasing level of difficulty and thoroughness.

Several of these tests will require you to use functions in the host component. Instructions for starting the Main Menu are provided in section 4.1. Generally, you will need to perform these tests on one printer (outq) only. However, you should perform the entire series on any other printers where problems are later encountered or suspected.

If you can complete all tests successfully, your printer environment **is compatible**. If any of the tests does not appear to print correctly, try to resolve the problem and re-run the test. Chapter 6 provides a variety of information that might be helpful in your situation. If you cannot complete all tests satisfactorily, call Keowee Systems for assistance. We want FORMagic/400 to support the broadest possible variety of printers and printer emulators, so we will attempt to help you identify the cause of any problems.

After you have confirmed compatibility, you are ready to begin creating and using forms overlays. Chapter 2 provides an overview; Chapters 3, 4, and 5 provide complete details. Chapter 6 provides information which may be helpful in many less common situations.

Test 1 - Initial compatibility test:

Use section 4.1 to run Main Menu option 5, **Printer Test/Demonstration**. This is a large file that may print slowly. Don't be concerned about the print time. This test will confirm that your printer emulation system is at least partially compatible with FORMagic/400 and working correctly. The test will prompt you for the outq used by the printer and will print three pages: a plain paper invoice, a blank invoice form, and the invoice and form merged together on one page. Note: An identical test is available on the client system, but it does not test the host emulation system.

Test 2 – Sample letterhead form test:

Use section 4.1 to run Main Menu option 1, Work With Overlays. Use section 4.3 to run option 5, Test Overlay, using form PHSLH, our letterhead. One page should print; it will contain our letterhead with four lines of overlay identification information. Note: this form does **not** count against the activated forms limit!

Test 3 - Full merge test:

Run Work With Overlays again. Run option 2, Download Overlay, again using form PHSLH. Nothing should print during the download; you should not even get a blank page. You may be able to see a printer status light blink while data is being received and stored. Next, execute the following host commands:

```
OVRPRTF QSYSPRT RPLUNPRT(*NO) PAGESIZE(66 78) OVRFLW(60) +  
  PAGRTT(0) LPI(6) CPI(10) OUTQ(XXX) LVLCHK(*NO)  
CALL FMSCBL
```

FMSCBL will create a spoolfile which merges our letterhead onto a page of sample text. The page will be printed four times, each identically. The primary purpose of this test is to insure the form merges properly with the text on **all** pages. In some cases, the letterhead form may be compressed to one-half normal size. If this occurs, but the letterhead is readable with no corruption, just ignore it.

2.0 - Basic Features And Startup

2.1 Benefits

With FORMagic/400, you can quickly realize a number of important business benefits:

- **Eliminate pre-printed** letterhead, invoices, statements, purchase orders, CAD drawing forms, labels, even checks! End custom printing expense forever and never stop to load the printer with special forms again!
- **Regain the time** spent controlling custom forms; never lose productivity again by being out of forms.
- **Improve the professionalism** of plain paper documents. Add forms to memos, faxes, sales reports, accounting reports, customer documents, anything printed on plain paper!
- **Eliminate scrapping** forms made obsolete by constant changes in telephone numbers, area codes, ZIP codes, mailing addresses, website addresses, and E-mail addresses. Print everything "on demand"!
- **Save time** by eliminating manual signatures; incorporate electronic signatures in checks, purchase orders, and other forms wherever needed.
- **Maintain control and save time** with centralized forms design and administration.
- **Customize** the headings and constant information in documents produced by purchased software. Overlay existing text with new font styles and sizes, graphics, images, and white space. Even ugly and space consuming boiler-plate legalese can be replaced with information tailored to *your* needs.

2.2 Features

FORMagic/400 provides a powerful toolkit for developing electronic forms applications. Its many features include:

- **Simple operation:** only a simple change, if any, is needed to add forms to host programs. If you can design and print the forms you need, FORMagic/400 can merge them with printed output from almost any application. To use a form overlay, just a 12-character command is required. It can normally be placed **anywhere** on the page, using **any method** for inserting printable data.
- **Automatic merge features:** when your application has several blank lines at the bottom of the page, MiniMerge allows the same overlay to be merged automatically on every page, without program changes. Full AutoMerge, an optional feature, completely eliminates program changes in most situations!
- **Get the maximum performance possible:** all overlays are merged onto the printed page **in the printer**; very little valuable host processing power is consumed.
- **Handle even the most complex applications:** just vary the 12-character command to insert the right form on each page.
- **Composite forms:** when applications employ numerous similar forms, it's often easier to assemble the final form like a bill of material! Just design individual small form pieces and use **multiple 12-character commands on the same page** to build a composite form **dynamically**.
- **No new software or training is required** to create forms. You can use almost any word processor, desktop publisher, text editor, or graphics design system that you are already familiar with to create your forms.
- **Support for S/34 and S/36 platforms.** Ask us about special support for these older systems!
- **Support for Windows, DOS, Unix, AIX, Linux, HP, DEC, Sun, and almost all ASCII systems.** Use the same overlay forms in all your environments! Call for more information about our Host Developer Kit.

2.3 Forms Application Overview

Forms are initially designed with your favorite PC-based word-processor, text editor, forms designer, or desktop publisher **prior to** any use of FORMagic/400. You can use almost any product for forms design, but most of our customers use some version of Word.

After a form has been designed, the Windows-based FORMagic/400 client system is used to convert the form into an electronic forms overlay. Next, it is uploaded into the host for storage and use. To promote maximum ease of use and efficiency with host applications, forms are stored in the host database, **not** in the Integrated File System.

Once stored on the host, overlays can be used in host applications. Just two things are required:

- The overlay(s) **must** be downloaded to the printer, into either ram or flash memory, via command, CL program, or interactive menus depending on your needs.
- The host application **must** be changed to include a 12-character merge command wherever a form is needed. This can be done in multiple ways. Because the merge command includes characters below the Space (x'40'), you **must** also specify RPLUNPRT(*NO) in the application printer file. **Note:** The AutoMerge feature completely eliminates the need to modify existing applications!

That's it, a complete overview of a forms application. Full details begin in the next section.

2.4 Getting Started with FORMagic/400

This section provides a more comprehensive overview of the steps required to further test printer compatibility and implement a complete host-based forms overlay application. It is not intended to cover all the possibilities or the more complex situations. The actual menus and commands used to perform the necessary functions are not discussed; references to appropriate sections of this manual are provided.

The printer(s) and emulation hardware/software you will be using with host forms applications must be installed and working together correctly before they can be used with FORMagic/400. You should be able to use the printer normally, with any host application, before attempting to use it with FORMagic/400.

This is especially important if you are not familiar with 3812 printer features. They provide many advanced capabilities, such as print rotation and reduction, that may be invoked **automatically** depending on your printer setup and host print file parameters. Automatic reduction and/or rotation is **highly undesirable** in all forms applications, and you **must** know how to control it. So, it's a good idea to become familiar with 3812 printer operation **before** beginning to work with FORMagic/400. If you are **not** completely familiar with the operation of this printer, please see Chapter 6 now.

To build an actual host application, just follow the steps listed below. They are performed only once, each time a new or changed form is required. After you have completed enough of an application to gain a basic understanding of using FORMagic/400, you should study Chapters 3-6 completely. Then, you may find that you will want to follow a slightly different sequence of steps, bypassing some entirely and perhaps adding others relevant to your specific environment.

For your first application, we strongly recommend that you keep things **really simple**. A great deal of software and hardware, from multiple suppliers, is involved. So, many things can go wrong, especially while you are learning. If you keep it very simple, you will learn the overall process **much more quickly** and **greatly reduce** the learning curve. See "Shortcuts for that First Application:" below.

Steps in building a host application:

- | | |
|--|-------------------------------|
| (1) Create an electronic form | (Section 2.5) |
| (2) Generate an electronic overlay | (Sections 3.3 and 3.4) |
| (3) Test the overlay on the PC | (Section 3.6) |
| (4) Upload the overlay into a host folder | (Section 3.9) |
| (5) Complete the upload into the host database | (Section 4.3, option F6 or 1) |
| (6) Test the overlay on the host | (Section 4.3, option 5) |
| (7) Perform a Merge Diagnostic Test | (Section 4.1, option 23) |
| (8) Add a merge command to host application | (Chapter 5) |
| (9) Download the overlay to the printer | (Chapter 4.3, option 2) |

Now, just run your application. It will print with an overlay merged with the regular spoolfile print data wherever you included a merge command.

You can generally skip step 7. Its only purpose is to diagnose the printer emulator's sensitivity to the location of the merge command on the page. FORMagic/400 is designed to allow you to place a merge command **anywhere**, but some emulators just won't allow all locations. The Merge Diagnostic Test shows you where you can, and cannot, place these commands. Skip it unless you just can't get a form to merge.

Shortcuts for that First Application:

Here are some shortcuts you can take to get that first application up and running most smoothly and quickly:

- Skip steps 1 thru 6. Use our sample letterhead form PHSLH, already loaded in the host system. It probably won't line up with anything you can print, and it won't be pretty; but you will see results quickly and very easily.
- For step 8, just copy a sample program to a test library. Samples are provided in the FMAGIC/FMFSRC source file. Use FMSRPG (RPG code) or FMSCBL (Cobol code). You can either just compile the sample program, **as is**, or use it as a guide to write a your own **trivially simple** print application, just hard coding a few print lines. That's all you need to see a real merge in action.
- Run step 9 as described, then run the trivial application. That's it!

Next, try another test with a form we have provided. Our letterhead is contained in the PC client file SAMP600.PRN. Skip step 1 and perform steps 2-6, 8, and 9, similar to what was done in the first test above.

Then, try another test with **your own form**. Here though, don't develop a real form; make a **trivially simple** form. Just place the word **TEST** in large letters in the center of the page. Or, just place a box around the margins of the page. Use this as your first test form. It will be quick to do, and give you a full overview of all the steps in a complete application. Run steps 1-6, 8, 9, then your trivial program with this simple form.

You are now ready for a **real** application. As you follow the steps, now may be a good time to start studying the other options available to you in each step. As you perform each step, study the referenced section completely. After the first real application is working, it's time for the advanced course: study the remainder of this manual completely. **It won't take long, and it will save you a lot of time in the long run.**

2.5 Creating Electronic Forms

The forms creation process begins on a PC with any designer product providing the features **you need for your form**. Again, most of our customers use some version of Word; but FORMagic/400 allows you to use any product capable of "placing toner on the page". This includes any word processor, forms designer, graphic designer, text editor, or publishing system. All Windows, and almost all DOS and OS/2, applications meet this criteria as long as a proper PCL 5e print driver is supported for printing. Choose your favorite designer, or choose a product ideally-suited for the form you need to make **at the time**; no single product is ideal for making all forms.

Note that, if a form already exists in hard copy form, you can scan it instead of re-designing it. You may not be pleased with the scan quality or print performance, however. Also, many standard government and industry forms are available at various websites. If you can obtain them in PRN, PDF, or editable format (such as DOC), you may be able to skip the design process.

Designing the Form:

When designing a form overlay, the form should be thought of as occupying a page with the same environmental settings (page size, orientation, margins, etc.) as the document pages it will be overlaying. FORMagic/400 will **always** align the top-left corner of the form with the top-left corner of the document page. The form should also be thought of as covering the entire page, but it can actually be as small as a letterhead, logo, or signature.

The contents of a form are always static; their locations are always the same. Forms cannot include "floating" entities such as signatures at the bottom of a letter. Signatures in a letter are generally located relative to the last line of text and thus vary in location. FORMagic/400 can easily handle a static signature on forms such as checks and purchase orders where it is **always** in the same location; just scan it and make it part of the form!

When designing the form, you can use any and all features of the design product that "put toner on the page". Place everything on the page you need for your form: lines, boxes, shading, legends, logos, signatures, images, etc. But remember, the more graphic content used, the larger the form will be and the more slowly it may print. Also, when designing the form, whitespace **might** become an issue. See Chapter 6 for more information.

Be certain to design a **one page form** and use the same page environment (page size, orientation, margins, etc.) that your host application will be using. If this caution is not observed, a variety of difficult to diagnose problems can occur. Also, when using a spreadsheet product such as Excel to make forms, it is very easy to generate multiple pages in the form without noticing it. **Don't** allow this to happen!

As you complete the design process, print and tweak the page as many times as needed until you are satisfied that it is complete. At this point, only one step remains before turning the form over to FORMagic/400: printing the form to a file. Before we discuss it, however, we need to understand a little about printer drivers.

Printer Drivers:

PCL is a rich language offering many capabilities, and it has evolved through multiple language generations and multiple versions for specific printers. There are numerous HP-compatible printers in use today; and each may use a slightly different driver. It is therefore quite easy to find widely varying versions of PCL printer drivers installed at one location. Using the wrong driver in a forms application can produce unexpected results; and, unfortunately, there are generally at least two printers involved in a complete forms application. This factor should be taken into account, up front, when designing forms.

The first printer involved in the process is the one used to print the form from the PC design product. The second is the one used to print the host application, both the form and the text. Occasionally, these two printers are actually the same device; but, most of the time, two separate printers are involved.

To make matters even more complex, most host applications will need to print a given form on multiple printers, which can easily be different models, even from different manufacturers. **There is no absolute certainty that you can print a given form on multiple printer types because the printer driver used for initially creating a form must be compatible with all printers on which the form will later be printed.**

Fortunately though, you can **almost always** eliminate this potential problem; but you will have to employ a **lowest common denominator** approach. For usability on the broadest possible variety of printers, two things are required. First, we strongly recommend using a plain (no suffix) HP LaserJet 4 print driver for making forms, unless you have a specific reason not to. Second, you will occasionally have to change certain elements of a form. If the form basically works, but one or two items don't, try changing the failing elements. For instance, shading and rounded box corners don't always work the same way on all printers. You may have to experiment with slight variations to achieve the best results; in these cases, try using another level of shading and square corner boxes.

The HP LJ4 driver is very efficient for forms and works with **almost** all full-support, HP and HP-compatible, laser printers manufactured since the late 1980's. We strongly recommend that you use the Add Printer wizard to add an HP LJ4 printer to your PC. Then, connect it to your printer even if it is not actually an HP LJ4. Use it for some of your **regular** printing to determine its true level of compatibility. Use it for **all** of your forms design work!

If a rare failure occurs when using the LJ4 driver, it will most likely be related to one of the following:

- It doesn't support advanced features such as duplexing. This is **not** a problem for forms design.
- Failures will generally affect only a few features; in this case, change those form elements.

If you don't use the LJ4 driver, you should generally use the exact driver made for your printer. And test the forms on all host printers that will be using it. Doing otherwise can lead to a variety of hard to diagnose problems. However, you should **never** use PCL 6 (or PCL 5XL, a beta version of PCL 6) print drivers to make forms; these drivers are **not** compatible with OS/400 itself or with FORMagic/400 and will waste a **lot** of paper. Use an equivalent PCL 5e driver instead; PCL 5e is fine for forms and works with PCL 6 printers.

It should be obvious, but you **cannot** use the LJ4 driver with printers not supporting PCL 5e. This includes numerous printers, most of which don't have the necessary internal hardware support for forms. But, it also includes the LaserJet III printer. You **must** use an LJIII driver to make forms for use with an LJIII printer. These forms **will** work on later printers, but the forms will be much larger and print more slowly. So, if you have a mixture of LJIII and later printers, you will have to decide whether to use one LJIII form for all printers and accept the inefficiencies or deal with the application complexities of using two forms, one for LJIII printers and one for the later models.

As a summary, the LJ4 and later models are all **excellent** for forms. The LJIII is **okay**. The LaserJet II, which uses PCL4 and **is** actually compatible with FORMagic/400, is **very poor**; it's just too old and resource-limited for real-world forms work. Color laser printers, based on PCL5c, are generally **excellent**, too; but they can introduce additional issues unrelated to FORMagic/400.

For more discussion of printers, print drivers, and their use with FORMagic/400, see Chapter 6.

Printing to a File:

When the form is finished, the final step is printing it to a file. It is critical that you do this with the **same** printer driver, whether or not it is an LJ4 driver, that you used for printing and reviewing the form from inside the designer product. If you don't use the same driver, the electronic form will **most likely not** be formatted the same as the form you printed and declared to be the final version.

The easiest method of printing to a file is supported by Word. Just check the "Print to File" option in the printer dialog box. Other designers may do it differently, and some won't provide the capability at all. Just look for the function; if you can't find it, you can use the "Connect to FILE" method described in Chapter 6.

Regardless of the specific method used, you will be asked to provide a name for the print file. You can give it any name you want, and you can place it in any folder. Frequently, these files will automatically be given a file name extension of PRN; thus, we call them PRN files. We recommend assigning the name xxxxxxxx.PRN where xxxxxxxx is the same name that will later be used in FORMagic/400.

The PRN files become the input to FORMagic/400. They contain numerous PCL printer commands, actually generated by the printer driver, that must be compatible with all host printers on which the form will ultimately be printed.

Implied in this process is that **identical** printer commands are generated by the designer when the form is actually printed **and** when it is captured in the PRN file. Specifically, the form **must print totally identically** when printed directly from the designer and when the PRN file itself is printed. Identical results normally occur; but when they don't, there is nothing FORMagic/400 can do to overcome this unusual operation. See Chapter 6 for more information.

As mentioned in the initial paragraphs of this section, some standard forms are available in PRN format. If the PRN file was made with a driver that is compatible with your printer(s), you may be able to skip the entire forms creation process described above!

Important Note about Printer Driver Versions:

Generally, you should use the latest driver available. However, we have begun to see evidence this recommendation may no longer be advisable. Some of the latest driver versions, including those for the LJ4, are creating print files significantly larger, **ten to twenty times**, than previous versions. This can have a major negative impact on performance. Generally, PRN files will be 5-50k, depending, of course, on form content. If yours is significantly larger, created with an LJ4 driver, and you consider it an "average form", you may want to see the effect of creating the PRN file on an older system, perhaps using Windows 98, Word 97, and/or an older version LJ4 driver.

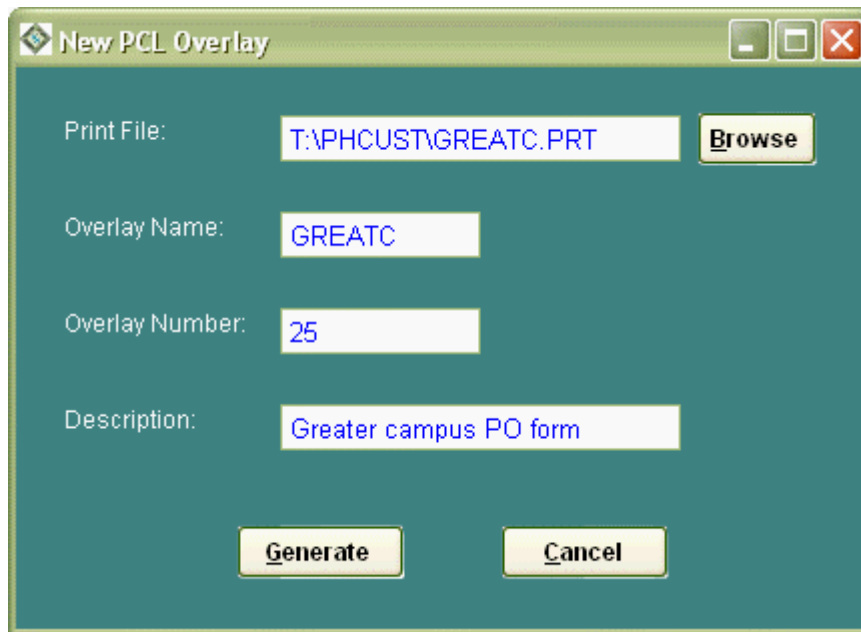
- **Download:** Download overlays to the printer (Section 3.7)
- **Remove:** Remove overlays from the printer (Section 3.8)
- **Host Upload:** Upload overlays to the host (Section 3.9)
- **FlashMagic:** Non-volatile Memory Manager (optional feature) (Section 7.5)
- **HDK:** Host Developer Kit (optional feature for use with non-AS/400 hosts) (Section 7.6)
- **FontMagic:** This product is covered in the [FontMagic/400 User's Guide and Reference Manual](#)
- **ProSign:** This product is covered in the [ProSign/400 User's Guide and Reference Manual](#)

Existing overlays are displayed in a scrolling list showing the form name, form number, description, print file used for generation, and the date created or last updated. Clicking anywhere on a line will select it for use. Clicking a function button will then perform that function for the selected overlay. Usage of some functions may benefit from optimizing Preference settings from the Tools menu. More information is provided in the Installation Guide.

3.3 New Overlays

The **New** function generates a new overlay from a previously saved print file and adds it to the list. The New Overlay window requires you to specify the information needed to generate the overlay. This function is identical to the Regenerate function, except the overlay must not already exist. See section 3.4 below for further information.

Note that you cannot add more overlays than your form limit allows.



3.4 Regenerate Overlays

The **Regenerate** function regenerates an existing overlay from a previously saved print file. The Regenerate Overlay window is displayed with current information which can be changed as needed. Note: this operation varies from that in some prior versions.

The information required for each overlay is:

- **Print File:** The file created when the source form was printed to a file. These files usually have a .PRN extension, but this is not a requirement. The total length of the fully qualified path and file name must not exceed 250 characters. See section 2.5 for details of creating print files. You can specify separate default folders for print files, for both PCL and PDF form types, in the Tools-Preferences menu option.
- **Overlay Name:** The name for the overlay as it will be known throughout the system. The name must consist of 1-8 characters, A-Z and 0-9 only, and must begin with an alphabetic character. The overlay name does not have to be the same as the print file name, but it is generally a good idea to use a common name. The name of a PCL overlay cannot duplicate the name of a PDF overlay.
- **Overlay Number:** The number, 1 – 9999, to be used by the printer for managing the overlay. This setting is not applicable to PDF forms.
- **Description:** A text description for the overlay. This information is not used by system functions; it is only intended to provide identifying information.

The Overlay Number is very important for PCL forms because HP-compatible printers identify and manage all downloaded overlays with these numbers. It does not have to be unique, but the printer can store only one overlay at a time with a given number. A newly downloaded form will replace any form already in the printer if they have the same overlay number.

Give the assignment of overlay numbers careful thought. Well-assigned numbers, especially having multiple overlays with the same number, can greatly simplify development and operation for some applications.

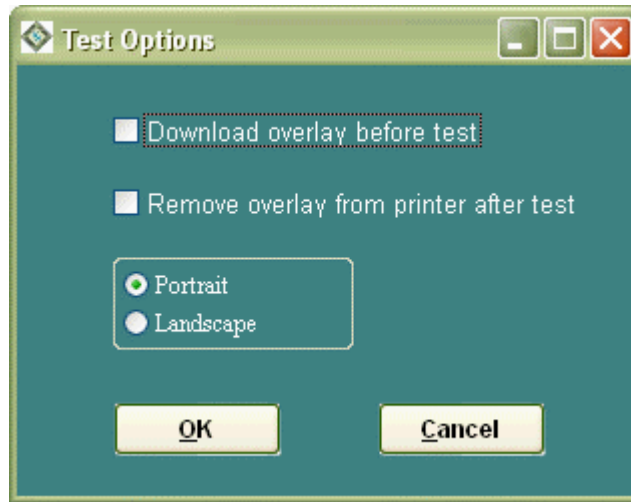
Generating an overlay should take from two to sixty seconds, depending on processor speed and size of the overlay. The overlay size will approximate that of the PRN file used to generate it. The most efficient overlays will be between 5 and 50k in size. Anything larger indicates a very complex form, an inefficient print driver used to save the print file, or an inefficient forms designer. Consider that typical report pages contain less than 2k of print data; even an efficient 50k form will multiply the total data to be processed, *per page*, by 26. So, very large overlays may reduce total print throughput.

3.5 Delete Overlays

The **Delete** function allows a selected overlay to be removed from the system. Note that if you are changing an overlay, you do not have to delete and re-add it; simply use the Regenerate function instead. This function deletes the overlay from the system, but does **not** remove any overlays previously downloaded to printers. It also does not delete the original print file used to generate the overlay. Be careful to understand the differences between the Delete and Remove functions.

3.6 Test Overlays

The **Test** function allows the selected overlay to be merged with a trivial “test document” and printed to verify correct operation. It also allows you to insure proper alignment of the overlay with the application print data. Just “manually overlay” the printed test page onto the intended document and hold them up to a light to verify proper alignment. If a problem exists, you will have to adjust spacing for either the overlay or the report. Note also that forms and data may print in slightly different relative locations on different printers. You may have to adjust printer settings to correct this. It may also be appropriate to perform this test from the host as well.



The Test Overlay window allows you to specify whether the overlay is to be downloaded before sending the test page and removed after the test is complete. Be sure to download the overlay, unless you know it has already been done, before testing it. Otherwise, the test “report data” will print without the overlay.

3.7 Download Overlays

The **Download** function allows the selected overlay to be downloaded and stored in a printer. No actual printing will occur, and no page eject should occur during the download. The only evidence of download activity will be printer status lights or messages. Note that an overlay must always be downloaded before it can be used in a merge application, whether for initial testing or actual production activity.

3.8 Remove Overlays

The **Remove** function allows the selected overlay to be removed from a printer. Removing overlays is usually necessary only if printer memory is limited or for security reasons. Otherwise, overlays can simply be left in the printer; they will remain unused until a document contains an appropriate merge command. Thus, overlays can be downloaded only once, instead of each time the application is run, if you are certain nothing will remove them. Otherwise, they should be downloaded each time the application is processed. Note that forms are automatically removed when the printer is powered off.

3.9 Upload Overlays

After an overlay has been designed, generated, and tested on the PC, it must be uploaded into the host before it can be used with host applications. Select a form, and press the Host Upload button to begin the upload. Because this process is **very** similar to that used for installation, please see the Installation Guide for details if you are not familiar with it.

3.10 Register/Upgrade

The **Register/Upgrade** function, accessed from the Tools menu, allows you to enter Activation Keys which provide expanded functionality for the Windows client, including permanent operation, additional forms, and optional features.

The screenshot shows a Windows-style dialog box titled "Register/Upgrade". The dialog has a teal background and a title bar with a diamond icon and standard window controls. The fields are as follows:

Name:	John Rogers	All fields are required and must be entered exactly as shown on your registration form.
Company:	Calhoun Distributors	
# Overlays:	99	To register or upgrade, call: Keowee Systems, Inc. (864) 885-0094
Exp. Date:	99/99/9999	
Features:	0480 ---	
Serial Number:	26074-14957	
Activation Key:	246-BK45-1357	

At the bottom of the dialog are two buttons: "Register Now" and "Cancel".

If you wish to purchase a new or enhanced Activation Key for FORMagic/400, please call Keowee Systems. We will ask for the normal contact, system, and billing information and provide the key by email after payment is received. A temporary key can also be provided, enabling immediate usage of the new capabilities.

When you receive a new key, it is critical that all information be entered **exactly as provided**; otherwise, the key entry will **not** be accepted. If, for example, your company name is shown incorrectly, you must nonetheless enter it exactly as provided for the key to be accepted. (But please let us know, so we can correct our records!)

Please retain **all** Activation Key information in a permanent location. It will be needed if the client software is transferred to another computer. There may be a charge for replacing misplaced Activation Keys.

Please note that each purchase of FORMagic/400 is intended for use on one PC only. If you need to use the FORMagic/400 client on another PC, you must purchase an additional client copy.

4.0 - Using Host Menus and Commands

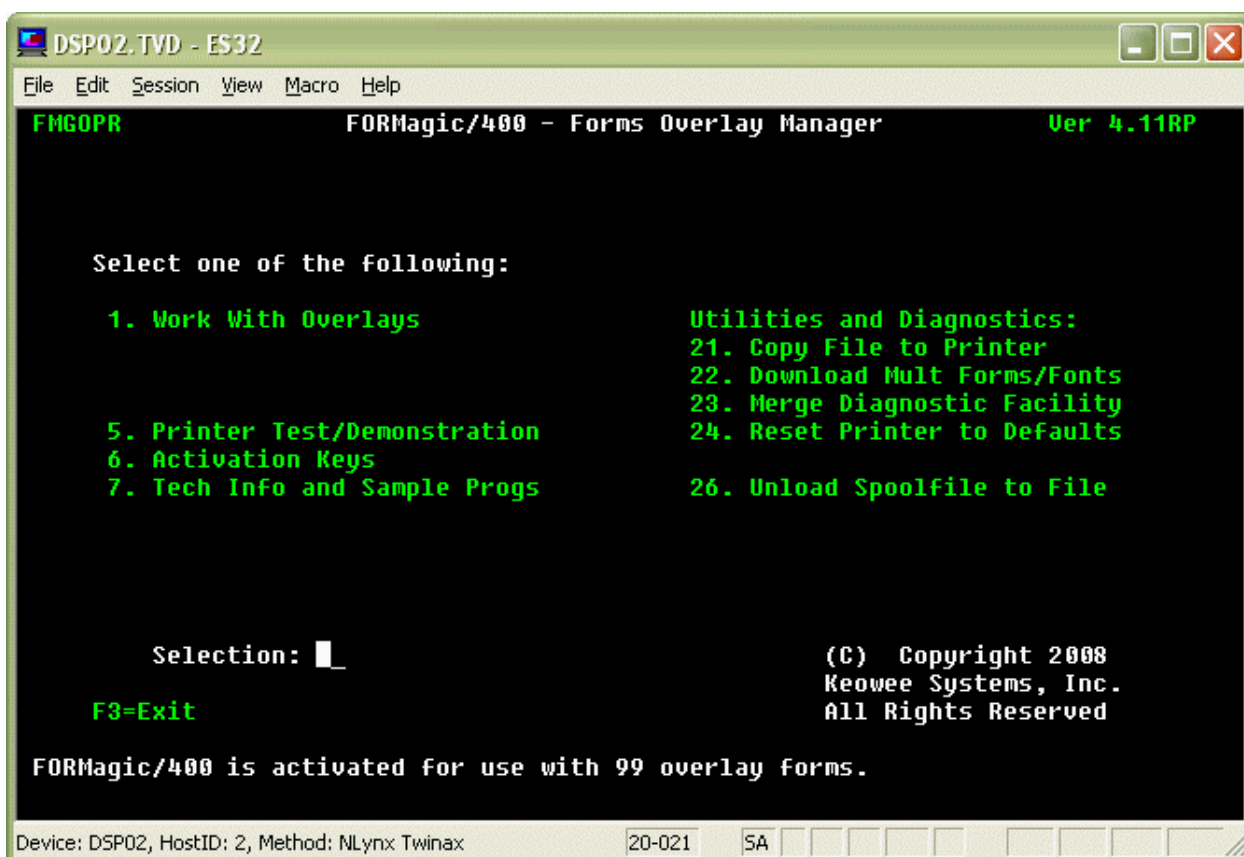
This chapter discusses each function provided for managing forms on the host. All functions can be accessed through Main Menu options and/or through CL commands.

4.1 Starting the Main Menu

To start FORMagic/400, insure that you are signed on with at least programmer authority, then add the FMAGIC library to your library list. The ADDLIBLE command can be used as follows on a host command line:

ADDLIBLE FMAGIC

The FORMagic/400 Main Menu can now be started with the FMGOPR command. Simply type **FMGOPR** with no parameters on a host command line.



The Main Menu provides all the functions needed to upload, test, manage, and use overlays from the host. It also provides options for development information and diagnostic functions.

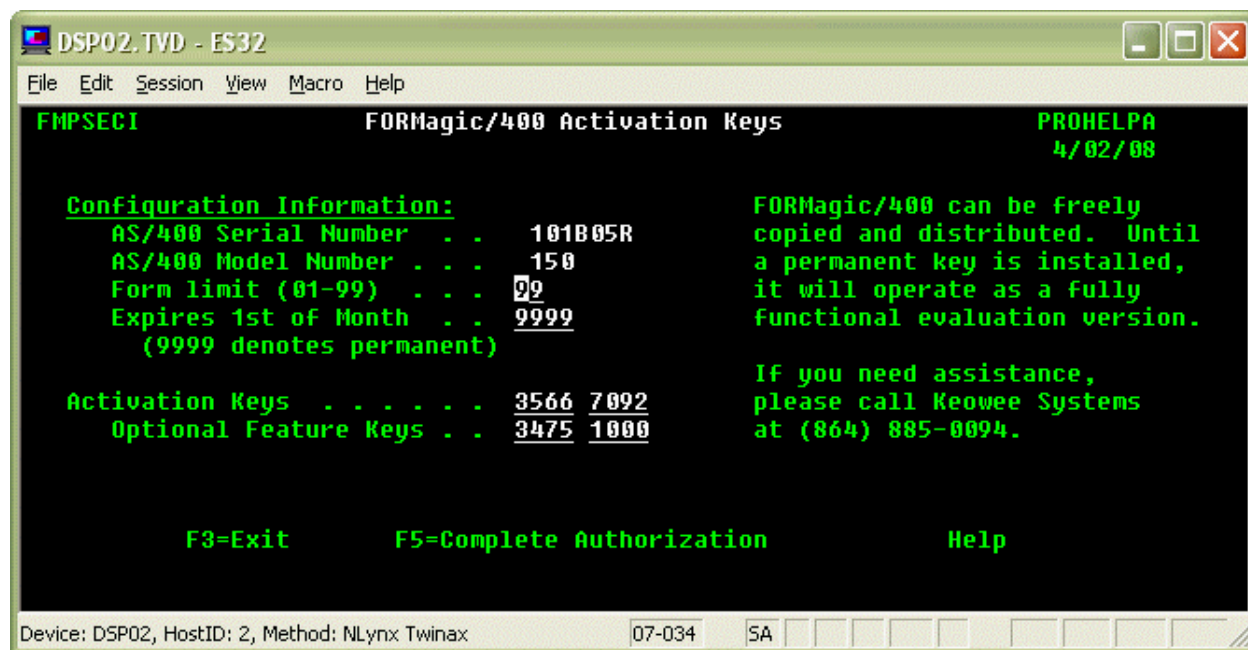
- (1) **Work With Overlays:** provides a subfile selection screen from which you can upload, download, remove, delete, and test overlays. This facility is fully described in section 4.3.

- (5) **Printer Test/Demonstration:** performs a printer test to determine its compatibility with FORMagic/400. It also demonstrates a typical form merge application. See the command FMGDEMO in section 4.4 below.
- (6) **Activation Keys:** provides the means for entering FORMagic/400 Activation Keys. This function is not needed for the Evaluation Version. See section 4.2 for details.
- (7) **Tech Info and Sample Progs:** provides access to the FMFSRC source file which includes sample source programs and a variety of technical information. Member AAINDEX provides a table of contents. See section 5.6 for details of the sample programs.
- (21) **Copy File to Printer:** used in special situations only. See section 4.4, command FMGCPYF.
- (22) **Download Mult Forms/Fonts:** provides convenient access to command FMGMULOVL which allows you to download multiple forms, and FontMagic/400 fonts, with a single command. See section 4.4 for details.
- (23) **Merge Diagnostic Facility:** provides convenient access to command FMGMDIAG, a diagnostic test which determines an emulator's sensitivity to the location of the merge command within the page. See section 4.4 for details.
- (24) **Reset Printer to Defaults:** provides a convenient means for resetting a printer to its power on defaults. See section 4.4 for details of command FMGRESET.
- (26) **Unload Spoolfile to File:** provides a diagnostic function for copying the **entire** contents of a spoolfile, including SCS page commands, to a database file. See section 4.4, FMGUNLSPLF.

The next few sections describe each of these menu functions in detail.

4.2 Activation Keys

In order to gain permanent operation, extend the evaluation period, use additional forms, and/or activate optional features, the installation of an Activation Key is necessary. Option 6 on the Main Menu provides a facility for entering these keys. You do not normally need to use this function with the Evaluation Version as it provides full use of the system, with up to three overlays and all optional features enabled, for at least 30 days.



If you wish to purchase a new or enhanced Activation Key for FORMagic/400, please call Keowee Systems. We will ask for the normal contact, system, and billing information and provide the Activation Key by email after payment is received. A temporary key can also be provided, enabling immediate usage of the new capabilities.

When you receive Activation Key information, enter it in the fields above, exactly as received, and press F5 to save it permanently. You can confirm the new key is effective by returning to a command line and restarting the Main Menu and this function.

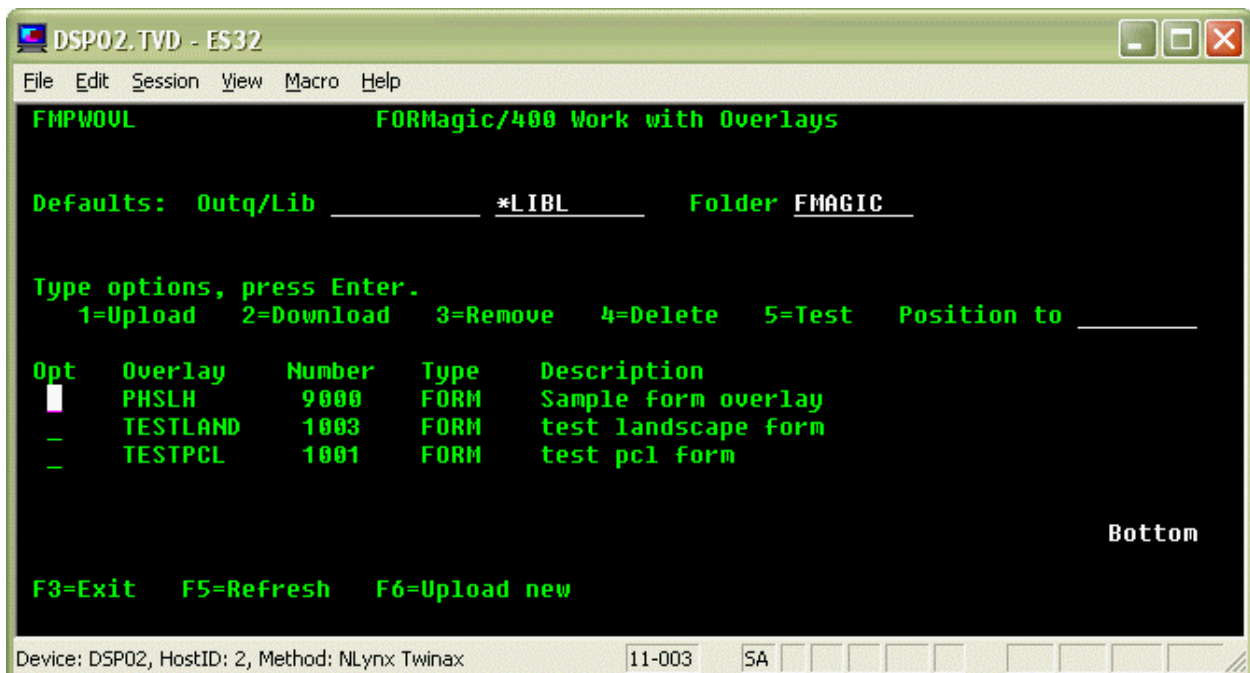
The Form Limit indicates the number of overlay forms allowed by the Activation Key. Evaluation systems generally limit you to three overlays during the trial period. 99 denotes unlimited usage. Zero indicates an expired trial; you will be unable to use many of the system functions. Limits between 01 and 98 denote the specific number of overlays allowed. You cannot enter a new Activation Key which enables fewer forms than are currently in use; you must delete sufficient forms to reduce the count to a value which is less than or equal to the limit provided by the new key.

The Expires field indicates when the Activation Key will expire. 9999 indicates a permanent key which does not expire. Other values indicate the Activation Key will expire on the first day of the month and year shown (MMYY format). If you need an extension of the expiration date or an increased form limit for an evaluation system, please call Keowee Systems. We can provide reasonable extensions and form limit upgrades when appropriate.

If the serial number for your system changes, FORMagic/400 may revert to a reduced level of operation. You must obtain and install a new Activation Key to resume the prior level of function. There may be a charge for re-issuing keys for use on the new system.

Please retain **all** Activation Key information in a permanent location. There may be a charge for replacing misplaced keys.

4.3 Working With Overlays



The Work With Overlays screen provides an interactive subfile interface to the individual commands which provide various overlay management capabilities. These commands use the Outq/Lib and Folder parameters as needed; be sure to set them correctly. The next section provides details about each function and its parameters.

After an overlay has been uploaded by the Host Upload facility of the client system, it must be brought into the host database. This function, and all others involving the use of overlays on the host, can be accessed from the Work With Overlays screen. All the functions needed to upload, download, maintain, and use overlays are provided.

- (F6) **Upload new:** Bring a new form, which has been previously uploaded into a folder or the FTP holding area, into the host database. This process can be thought of as the means for creating "new" host overlays. Each overlay must be uploaded separately. Just type the name of the overlay when prompted. **Existing overlays will be replaced without confirmation.** See the command FMGUPLOVL below for complete details.
- (1) **Upload:** Upload a changed version of an existing overlay into the host database. The overlay must have been previously uploaded into a folder or the FTP holding area by the client system. See the command FMGUPLOVL below for complete details.
- (2) **Download:** Download an overlay into printer ram memory. See the command FMGDNLOVL below for complete details.
- (3) **Remove:** Remove an overlay from printer ram memory. See the command FMGRMVOVL below for details.
- (4) **Delete:** Delete an overlay from the host database. Confirmation is required. See the command FMGDLTOVL below for details.
- (5) **Test:** Perform an overlay test. See the command FMGTSTOVL below for the details.

4.4 CL Commands

Most of the functions provided by the interactive menus and screens can also be accessed from a standard OS/400 command-level interface. This enables them to be used in CL jobs and programs so you can automate complete applications using FORMagic/400 overlays. Each command is documented separately below. When using a command for the first time, just use the prompter and online help; complete help information is provided for all parameters.

FMGCPYF - Copy File to Printer

Sometimes, in special situations, it is useful to create a file in SEU, or even with a temporary program, for diagnostic purposes. Once created, FMGCPYF provides a means to print the file by copying it, **as is including any hex characters**, to a printer. **Nothing** is added during printing, except that a page eject is added after each 59 lines to prevent page overflow. If the file contains any characters below x'40', you **must** override the printer file to specify RPLUNPRT(*NO).

FMGDEMO - Printer Test/Demonstration

The FORMagic/400 printer test and capability demonstration will print three pages to the specified OUTQ. These pages serve the multiple purposes of confirming a successful installation of FORMagic/400, confirming a minimal level of printer compatibility, and demonstrating a typical forms merge application.

The three pages will print as follows: a typical invoice which does **not** use an overlay, a blank invoice overlay, and the original invoice merged with the form. Note the variable invoice information is the same on both invoices.

The results will be very obviously correct or improper. If correct, installation and initial printer compatibility are verified. If anything appears to have been printed incorrectly, verify the installation and printer setup. For assistance, please call Keowee Systems.

FMGDLTOVL - Delete Overlay

The delete overlay command will permanently remove the specified overlay from the host system. It does not delete the overlay on the client system or remove overlays which are resident in printers.

The deletion will be performed immediately; no confirmation is requested. Once deleted, the overlay will have to be re-uploaded from the client system if needed again.

FMGDNLOVL - Download Overlay

The overlay download function provides the means for downloading overlays to printer memory. Overlays **must** be downloaded and stored in the printer before they can be used in a merge application. Once downloaded, they can be used at any time in any application, until removed. Removal occurs whenever the printer is powered off or the overlay remove command is used. Thus, overlays do not have to be downloaded before each job using them. They can be downloaded every time, or just periodically, depending on the needs of your environment and applications.

Note that when printers are shared between host and PC-based applications, some PC-based applications may issue commands which remove overlays downloaded from the host. This will occur without notice to the host system or to the PC user. The overlays will simply appear to have been "lost". If this occurs, you must download overlays before **every** print job or use flash memory. Some printers also provide a setup option to prevent this undesirable operation from occurring; it is often known as "Resource Save". See section 6.2 for more information.

The specified overlay will be downloaded to the printer connected to the specified OUTQ. The downloaded overlay will replace any previously downloaded overlay using the same overlay number. If the same overlay is present in both ram and non-volatile memory, the ram version will generally be selected by applications. This is useful for testing new versions of overlays before they are downloaded into non-volatile memory.

No printing occurs when a form is downloaded, including a blank page. But, it does create an extra spoolfile that must be taken into account when managing the spoolfiles created by an application. See command FMGMULOVL if your application uses multiple forms or FontMagic/400 fonts.

Note that multiple overlays can be resident in the printer simultaneously. The actual number is limited only by printer memory, which is not generally an issue with host printers.

Note also that if your printer is connected to both the host and the client systems, overlays can be downloaded to the printer from **either** the host or the client system. This ability can be helpful in some applications, especially those running on non-compatible hosts such as a System/36. If you need the ability to download overlays directly at remote sites, possibly for performance reasons, please contact Keowee Systems. We can provide a variety of optional products to facilitate such needs.

FMGMDIAG - Merge Diagnostic Facility

FORMagic/400 has been designed to allow you to place the merge command **anywhere** on the page. Most of the time you can do this; but occasionally, an emulator will restrict the merge command to certain locations on the page. If you have problems getting a form to merge, execute this diagnostic function to determine whether this condition is the cause. Just prompt the command and use HELP to obtain complete information.

FMGMRGxx - AutoMerge Facility

The AutoMerge facility completely eliminates the need to change programs when implementing most form merge applications. It is an optional feature of FORMagic/400, but it is enabled for evaluations. Each FMGMRGxx command handles different types of merges; choose the command which is most suitable for your application. Just prompt the command and use HELP to obtain complete information. See section 7.3 for additional details.

FMGMULOVL - Download or Remove Multiple Overlays

This command has function similar to FMGDNLOVL for downloading overlays and FMGRMVOVL for removing overlays. It allows you to download, or remove, up to fifty forms, plus up to ten FontMagic/400 fonts, with only one command. You will almost never need to manage more than one extra spoolfile! Forms and fonts specified for removal are processed before those specified for download. To use this command, just prompt it and access HELP to get complete details.

FMGPDFxx - PDF File Creation Facility

The PDF file creation facility creates PDF files, with or without FORMagic/400 forms. It is an optional, companion product to FORMagic/400; but it is enabled for evaluations. Each FMGPDFxx command handles different types of PDF file creation; choose the command which is most suitable for your application. Just prompt the command and use HELP to obtain complete information. See section 7.4 for additional details.

FMGRESET - Reset Printer

The host does **not** always reset the printer to a power-on default state when a job completes. This potentially allows printer setups left over from prior jobs to affect subsequent jobs. If this becomes an issue, add the printer reset command to your CL program **after** your application. FMGRESET is designed to reset the printer without causing any printing to occur, including a blank page; you will generally get an extra page eject if you place a PCL reset command within your own application program. FMGRESET creates an extra spoolfile that must be taken into account when managing the spoolfiles created by an application.

FMGRMVOVL - Remove Overlay

The overlay remove function provides a convenient means for removing overlays which are currently resident in printer memory but no longer needed. There is generally no reason to remove overlays, except to free printer memory or to limit the usage of secured forms such as checks.

The specified overlay will be removed from the printer connected to the specified OUTQ. Removal will occur from ram memory only; forms stored in non-volatile memory will not be affected. If the overlay is not actually present, the printer will ignore the request. Once removed, the overlay must be re-downloaded prior to its next use. Specifying the special value *ALL for the overlay name will cause all overlays currently resident in ram memory to be removed.

No printing or page eject occurs when a form is removed. But, FMGRMVOVL does create an extra spoolfile that must be taken into account when managing the spoolfiles created by an application. See command FMGMULOVL if your application uses multiple forms or FontMagic/400 fonts.

FMGTSTOVL - Test Overlay

Generally, you should test a new or changed overlay to verify that it works as expected; the overlay test function provides a quick means for doing so. It also performs a partial test of printer compatibility. After a form has been uploaded into the host database, simply execute this function to test its operation. The resulting printout can be used to verify the overlay and printer are working together as expected. **Note:** The test function does **not** currently support PDF forms; using it will waste a **lot** of paper.

The test function will download the specified overlay to the printer connected to the specified OUTQ, print a sample test page with the merged overlay, and remove the overlay from the printer. **Please note that if the overlay being tested is resident in printer ram memory prior to the test, it will not be there after the test!** The test page will include overlay identification information printed several times. This identification information will **not** print when the overlay is used in an actual application.

This test is designed for overlays using portrait mode. Landscape overlays will print in portrait mode and may be truncated on the right. If the portion that can be seen is correct, the overlay has been sufficiently tested. This is a test of the overlay only, and not a full test of printer compatibility.

FMGUNLSPLF - Unload Spoolfile to a Database File

Sometimes, it is useful to know exactly what is in a spoolfile. Due to the hex characters in PCL commands, ordinary display techniques will not always work. As an alternative, execute this command and view the resulting database file in DSPPFM. You can get an excellent display, showing both characters and hex, by pressing F10 then F11. To use this command, just prompt it and access HELP to get complete details.

FMGUPLOVL - Upload Overlay

This function allows you to complete the overlay upload process; it is normally used from the Work With Overlays screen. It can be thought of as the means for "creating" host overlays. Each overlay is initially created on the client system and uploaded to a host folder or the FTP holding area; this function transfers it into the host database and makes it available to host applications. An overlay with the same name, and already present in the host, will be replaced without confirmation.

In order for this host upload process to know where your uploaded forms reside, in a folder or in the FTP holding area, you **must** insure the Form Upload Option is set correctly. This choice can be changed from time to time, but it applies to all uploads until changed again. The default setting specifies use of a mapped network drive for upload into a folder; to use FTP or another file transfer product, execute the following host command. Use VALUE(' ') to switch back to using a mapped drive. You **must** use the FT setting if you are using the automated FTP upload process which is now the recommended method.

CHGDTAARA DTAARA(FMAGIC/FMAMTXT (101 2)) VALUE('FT')

The client portion of the form upload process is **very** similar to that used for installation of the Keowee Product Suite. Please see the Installation Guide for details if you are not familiar with it.

5.0 - Using PCL Commands in Host Applications

PCL-based laser printers have a very high level of functionality, most of which is not directly accessible from a host program. With the techniques described in this chapter, however, you can use **any** of the dozens of powerful PCL commands directly from host applications. This capability is **essential** for merging overlay forms. Optionally, it can also be used for special programming effects which simply cannot be handled with normal spoolfile attributes. Such effects include multiple copies of specific pages, variable line spacing within a page, variable font size within a page, using both portrait and landscape pages within a spoolfile, and many other advanced functions.

5.1 Command Notation

PCL commands must be typed **exactly** as shown, with no intervening spaces and with upper and lower case as indicated. Special notation is used in this manual to indicate certain portions of the commands. Please note that all commands are shown with ASCII data values. When PCL commands are used in host programs, various transparency and EBCDIC-ASCII translation issues, which are discussed later, **must** be considered.

- **[esc]** represents the one-character ASCII Escape code (decimal 27, hex 1B). Because the Escape character cannot be typed directly from a keyboard, a special means is necessary for entering it.
- **[ol#]** represents the 4-digit FORMagic/400 overlay number. Sufficient leading zeroes must be included so that you have exactly 4 numeric (0-9 only) digits. Examples: 0001, 0023, 0574, 2384.

5.2 Overlay Merge Commands

The most important PCL commands for FORMagic/400 users are the overlay merge functions. In fact, a single command covers almost all applications.

After developing a complete application, which prints correctly without a form as if a pre-printed form were being used, just add a merge command wherever a form is needed. Different forms can be used on different pages, some pages can have no form, and some pages can even use multiple forms to create a dynamically-built, composite form.

Commands are available for merging an overlay onto a **single page** only, for merging an overlay onto **every page** starting with the current page, and for **discontinuing every page insertion**. You can place as many single page merge commands on a given page as needed. You can combine both the single page and every page merge commands on a given page. But, only one every page command can be active at a time.

- Insert overlay on current page only **[esc]&f[ol#]y3X**
- Insert overlay on every page **[esc]&f[ol#]y4X ****
- Disable every page overlay insertion **[esc]&f5X**

For example, **[esc]&f0016y3X** will cause overlay number 0016 to be merged with the current page only.

**** Important Note:** Some emulators and printers do **not** support the 4X command for every page insertion. If it does not appear to work, you will have to use the 3X command on every page. You may want to write a trivial test application to determine whether your printers and emulators support this feature; a simple modification of one of the sample programs is all that is necessary.

5.3 Constructing Commands for Host Programs

You must know the command you want to use, and you must use it correctly as defined by the PCL language. Almost all PCL commands, unfortunately, require using the Escape character. This character cannot be typed on the host keyboard, so special means are required for handling it. All other characters generally used in PCL commands **can** be typed normally on the keyboard.

Almost all host emulators support the SNA SCS ASCII transparency feature. If so, you can insert any PCL command into a host application by using the technique described below. You may also be able to use a proprietary method provided by your printer emulator. Proprietary methods are sometimes easier to use, but they will tie your application to a specific emulator; and we cannot provide support for using them.

- Identify the command to be used and translate it into ASCII hex. Section 5.7 provides a hex translation table for this purpose.
- Prefix the command with hex '03xx' where xx is the hex value of the decimal length of the command itself, excluding the '03xx'. For example, x'19' is the value for a 25-character command.
- Place the entire string in your program as a hex literal or as a hex field value.

As a general example, the string x'030Baabbccddeeffgghhiijjkk' denotes a PCL command where 03 introduces the SNA ASCII transparency sequence, 0B is the hex value of the decimal length (11) of the ASCII command following it, and aa-kk denote the hex values of an 11-byte ASCII PCL command the emulator must pass transparently through to the printer.

As a specific example, to send **only** an escape character (hex 1B, decimal 27) to the printer, enter the following 3 bytes, in hex, in your print file at the location where you want the escape character: **03011B**. x'03' is the constant, x'01' denotes a command length of one byte, and x'1B' is the one byte to send.

In the real world, an actual command would be something more like [esc]&f0003y3X to merge an overlay. You would enter a total of twelve bytes in order to pass a ten-byte command to the printer:

x'030A1B266630303033793358'

Study the above command very carefully. It is most likely the only special command you will ever need. Note that, regardless of the form being merged, the command is always 12 characters long and is constant except for the four bytes designating the form number. Set up a standard method, or shell, for placing the sequence in your program. The sample programs show one way for doing it. Several others are described in the next section below.

Here are two examples of merge commands for different forms. Spacing has been added for readability; do **not** use the spaces in your program!

x'030A1B2666 **30303033** 793358' (form 3)
x'030A1B2666 **30303138** 793358' (form 18)

Note that all portions of this command except the escape character can be typed as normal characters, so you might be tempted to try x'03011B'&f0003y3X. This will often work fine, but many emulators will **not** allow you to split a PCL command into a transparent portion and a regular portion. Whether or not this notation is supported is almost never documented. Either don't do it, or test it **very carefully** first!

When using the SNA transparency method, or **any** hex character below x'40', you **must** use the print file option RPLUNPRT(*NO). Otherwise, spooling will replace these critical command bytes with spaces before sending them to the printer. The printer will then interpret the sequence as print data, instead of a valid PCL command, and print characters which will most likely appear to be "strange" or "garbage".

5.4 Placing Commands in Host Programs

When using PCL commands, you must construct the proper PCL command string, convert it to the proper transparency format as described above, move it to a print field, and print it. In addition, you must consider the impact of the command on horizontal and vertical spacing within the print page.

All PCL commands require space in the program print record because the host will treat them as print characters. At the printer, however, they do not consume print space on the page; they are executed instead. They do **not** change the current print column position, and any valid printable data to the right on the same print line will be shifted to the left when actually printed.

It is, therefore, **much** easier to place a PCL command on a completely blank line using normal single-line vertical spacing. The command **will** be executed by the printer, doing whatever it is intended to do, but will **not** actually be printed itself. The printed result will be **exactly** as if the positions containing the PCL commands were blank.

If a completely blank line is not available, place the PCL command at the **end** of a line, after all print characters. This approach operates identically to that described above except the data characters will be printed normally, as expected.

Both methods above allow you to completely ignore the "print shifting" issue. If you must place a command on a line to the left of any printable data, be careful! If your PCL command is ten characters long, it will use ten print positions in the spoolfile print record. These ten characters will have no effect on print spacing at the printer; **they are not printed as spaces!** Your actual print data, beginning in position 11, will thus begin printing in column 1 at the printer. This situation can be confusing; but it can be completely eliminated by following a simple rule: **always place PCL commands on a blank line or after any print data on the same line.**

Both of these methods are compatible with both internally and externally defined print files. However, be aware that you cannot always predict the sequence in which externally defined print files will send some of the necessary page formatting commands to the printer. This situation will sometimes cause problems that can only be resolved by trial and error repositioning of your PCL command fields.

If you simply can't use either the blank line or the end of line technique described above, you can use overprinting techniques. They are **almost never** needed, however, so we don't discuss them here.

The above techniques apply when using any PCL command. Additional considerations, including rules for where commands should be placed on a page, may apply when using specific commands; consult the manufacturers' various PCL reference manuals for details.

You can generally place a merge command **anywhere** on the page. We strongly recommend placing it on a blank line in columns 1-12, but **not** on line 1. Place it on a blank line **after** several lines have been printed. This recommendation is made from our experience with many emulators; some simply will not work if the merge command is placed in any other location. Section 6.2 provides more information about this issue. If you are merging multiple forms onto a page, use columns 13-24, etc. for additional merge commands.

You have several options for placing the merge command within an application:

- Directly in a program using either an internally-described or externally-described printer file.
- In an externally-defined printer file as a title or message constant; no program change is necessary!
- If you need the same form on every page, you may be able to use the Auto MiniMerge feature. Place the command in the PRTTXT parameter of the OVRPRTF command; no program change is required! If this method causes page overflow, however, you will have to adjust the OVRFLW and other parameters; and you may have to change page overflow handling in the program. Thus, it does not always eliminate program changes. See the Tech Notes document on the FORMagic menu in the client system for more information.

- If you can't change the program source, use CPYSPLF with the CTLCHAR(*FCFC) parameter to copy the spoolfile produced by your unchanged application into a database file. Write a simple program to read it back, and place the merge command in **that** program as appropriate.
- If you have the optional AutoMerge feature, you can use it to merge forms without making **any** changes in most applications. See section 7.3 for more details.

Don't be misled into thinking this is something complex; it's only 12 characters per form! Regardless of the insertion method chosen, just treat the merge command like any other 12 character print field on the page. But, be certain to load it with the proper 12 hex values. If you have trouble, try replacing the 12 characters with any 12-character **text** constant, such as "ABCDEFGHIJKL". Run the application until this string prints on pages where a form is needed. Then, replace it with the proper hex command; you will get a form the next time!

5.5 Other Useful Commands

The PCL command language includes dozens of commands, most of which are relevant only for very low-level or specialized development. The complete language is covered in the [PCL5 Printer Language Technical Reference Manual](#), HP publication number 5961-0509.

Use of other PCL commands is beyond the scope of FORMagic/400 and our free technical support, so please use them carefully. Refer to your printer and language documentation if further information is needed.

We do support two additional commands as part of FORMagic/400, however, since using them is rather simple and may allow you to reduce the number of extra spoolfiles needed for an application.

Overlay Removal Commands

Normally, you will just leave downloaded overlays in the printer or use one of the FORMagic/400 commands to remove them. The FORMagic/400 overlay removal commands, however, will generate an additional spoolfile which can be rather easily prevented. You can instead simply place one of these commands at the end of your spoolfile.

- Delete all overlays in printer ram **[esc]&f6X**
- Delete a specific overlay **[esc]&f[ol#]y8X**

For example, **[esc]&f0016y8X** will remove overlay number 0016.

Printer Reset Command

The printer reset command will reset the printer to its power-on default environment; it is **not** normally required. If you have a problem with job setup conflicts that a reset might prevent, you can try adding a reset **prior to** running the program which experiences the problem. You can add the reset with command FMGRESET, but it will generate a separate spoolfile.

You can also place the reset directly in your application program. But, it will most likely cause an extra page to be generated wherever it is located. This occurs because a reset also prints the current page if it contains any printable data. If placed at the end of the spoolfile, the final page advance added by spooling causes the extra page to be completely blank. So, you have to decide which approach is best for each given application. When used in a program, the Reset command should be placed on the very last line of your spoolfile. It should **never** be used elsewhere as it will most likely remove critical printer setups established by the host printer file and needed for proper page formatting. The Reset command is only two characters long: **[esc]E**.

5.6 Sample Programs

Several sample RPG and Cobol programs are included to illustrate using the form merge command in host applications. Generally, you will want to use program FMSRPG (RPG) or FMSCBL (Cobol). They can be found in the source file FMAGIC/FMFSRC. See member AAINDEX for a summary of all available sample programs and technical documents. It can be conveniently accessed using option 7 on the Main Menu.

5.7 ASCII Hex Value Table

When composing PCL command sequences, the following table will be helpful. Just look up the character you need to place in a command, and the ASCII hex value is shown to its right.

Char	ASCII	Char	ASCII	Char	ASCII	Char	ASCII
A	41	a	61	0	30	̄	5F
B	42	b	62	1	31	ˆ	22
C	43	c	63	2	32	'	27
D	44	d	64	3	33	+	2B
E	45	e	65	4	34	;	3B
F	46	f	66	5	35	=	3D
G	47	g	67	6	36	Space	20
H	48	h	68	7	37		
I	49	i	69	8	38		
J	4A	j	6A	9	39		
K	4B	k	6B				
L	4C	l	6C	?	3F		
M	4D	m	6D	&	26		
N	4E	n	6E	-	2D		
O	4F	o	6F	:	3A		
P	50	p	70	.	2E		
Q	51	q	71	\$	24		
R	52	r	72	,	2C		
S	53	s	73	#	22		
T	54	t	74	<	3C		
U	55	u	75	>	3E		
V	56	v	76	*	2A		
W	57	w	77	%	25		
X	58	x	78	(28		
Y	59	y	79)	29		
Z	5A	z	7A	!	21		

6.0 - Technical Considerations

6.1 Printers and Emulators

The material in this section applies to both FORMagic/400 and FontMagic/400 applications.

Compatible Printers:

FORMagic/400 and FontMagic/400 can be used with any HP laser printer, or compatible, which provides **full, hardware-based** support for PCL 5e or above. Numerous printers meet this requirement, numerous printers do **not**, and numerous others **partially** satisfy it.

It is not possible for us to test each of the hundreds of available printers or even to become aware of all the new ones as they are introduced. The statement above provides a concise technical description of the requirements printers must meet, but it is not always easy to determine whether a printer actually qualifies. To assist with this determination, we provide some general guidelines below. There are many variables involved, however, so we cannot guarantee any particular printer is absolutely compatible. Therefore, final confirmation through actual testing is **always** necessary.

- Most inkjet, "office", and "multi-function" printers are based on PCL 3 and do **not** comply.
- Many low-cost laser printers, often known as "Windows printers", derive a portion of their functionality from the Windows printer driver instead of hardware. There is no Windows printer driver on the host, therefore these printers do **not** comply. The HP "L" models (4L, 5L, 6L) and the 1000-1100 series fall into this category. They work fine with some forms and fonts, yet fail with others. Extreme caution is advised. We have received reports, however, that the 1200 and 1300 series comply.
- The HP LaserJet II is based on PCL 4, but is actually compatible with FORMagic/400. However, it is so resource-limited that we strongly recommend against using it.
- The HP LaserJet III is based on PCL 5, not 5e, and can be used with FORMagic/400. However, we consider it as only "okay" and do not recommend using it. It is **not** recommended for use with FontMagic/400.
- The following printer families **generally comply**, and are excellent for forms and font applications:
 - HP:** 4, 4P, 5, 5P, 6, 6P, 2000, 4000, 5000, 8000; 4500 and 4600 Color Lasers
 - IBM:** InfoPrint, Network Printers
 - Lexmark:** Optra models equivalent to the HP families listed above
- Several users have successfully implemented applications using HP color laser printers. We believe FORMagic/400 and FontMagic/400 are compatible with these printers; but they have not been specifically tested with PCL 5c, and these printers are still not widely used. Further, color printing introduces several new issues, completely unrelated to our products so caution is advised.

Compatible Emulators:

Overall, we have seen the following general experience with 3812 emulators; but they can vary widely in subtle ways which might impact forms and font applications. Again, only actual testing can confirm compatibility.

- Hardware-based twinax and network printer adapters, both internal and external, generally provide trouble-free operation.
- 5250-compatible terminals with parallel printer ports generally work well.

- Host-based TCP/IP printing methods generally provide trouble-free operation, and they are becoming the preferred method of host printer attachment for most users.
- Windows-based workstation printer emulators, including Client Access products, introduce many variables that can cause a variety of support issues that are difficult to diagnose. They are **generally compatible** with FORMagic/400. Due to their complexity and variability, however, we cannot provide much support for configuring and using them. You must be **very careful and methodical** during installation, setup, and configuration in order to achieve a stable environment. Due to the Windows architecture, these products frequently reduce print speed significantly. Overall, we do **not** recommend them for host printing applications.

When using Client Access printer emulation products, you must generally configure them to perform emulation on the host; this will set Host Print Transform to *Yes in the host device description. You **must** do this on the client system because its setting will override the host value whenever automatic device configuration is being used. You must also be certain to specify a Manufacturer Type and Model which is **highly** compatible with the actual printer receiving the print data.

Using Host Print Transform is necessary because the host-based emulator is far superior to the emulator supplied with Client Access itself. The Client Access emulator generally does not even support the SNA ASCII Transparency command x'(03)' which is vital to form merge and special font applications.

3812 Printer Operation:

These printers were developed by IBM long before HP started its laser printer business and were much more functional than HP's original printers. One of their main features is allowing reports designed for old-style 14-7/8 x 11 green-bar paper to fit 8-1/2 x 11 pages **without changing the program!** To accomplish this, these printers can **automatically** scale and rotate large-size content to fit a smaller size page.

This scaling and rotation occur by default, when needed. Frequently, it occurs in normal operations with no one even realizing it is happening. Obviously, such function is **highly undesirable** in electronic forms and special font applications where precise alignment must occur!

These effects are managed by the emulator and printer, but can be controlled by host printfile parameters. You must carefully set the parameters for PAGESIZE, LPI, CPI, and PAGRTT to prevent unintended operation. If the columns in PAGESIZE cannot be printed at CPI within normal left and right margins (about 8", and hardware dependent), or if the lines in PAGESIZE cannot be printed at LPI within the top and bottom margins, then if PAGRTT is set to *AUTO, printing will be scaled and/or rotated to fit the page.

To prevent such operation, you must insure the text content is physically printable at the specified settings. Sometimes, the easiest thing to do is set PAGRTT to 0 (portrait pages) or 90 (landscape pages). That will stop rotation and scaling; but, the remaining parameters must still be set properly for the printer to select font sizes which will allow text to line up with forms and to render special fonts as expected.

These facilities **must** be understood when developing electronic forms and special font applications. If they are new to you, the best practice is to get your application printing properly on plain paper first, next design a matching overlay form, then, as the final step, add the form merge and/or special font commands.

So, become familiar with 3812 operation; and study these parameters!

Printfile Parameters:

FORMagic/400 and FontMagic/400 are compatible with all printfile parameters, except those intended for use with IPDS/AFP and DBCS applications. Generally, you should use these printfile parameters, instead of embedded PCL commands, to control printing options. You can do this with either the CRTPRTF or OVRPRTF command.

IBM 3812 printers support numerous printfile parameters for advanced features including landscape orientation, lpi, cpi, duplexing, input drawer, and output bin. However, emulator setups are sometimes required to map these features to your specific printer. Some emulators may also be set to override some or all host settings; these facilities **must** be disabled for forms and special font applications. And, **all emulators must know specifically the printer types they are emulating (receiving from) and sending to** in order to emulate all printer features correctly.

While standard printfile selections are transparent to FORMagic/400 and FontMagic/400, highly complex applications will sometimes require embedded PCL commands. Thus, 3812 capabilities should be well understood when developing these types of applications. Again, our advice is to first learn how to control the printer features you need, next get a very simple version of your application printing properly on plain paper, then slowly add the advanced features necessary to complete the application.

Printer Memory:

Forms and special fonts use printer memory just as programs require memory to execute. However, the printer does not "talk back" to the host application. When there is insufficient memory, the printer will **not** tell the host; but forms and special fonts will **not** print correctly, and error messages may or may not be displayed on the printer control panel.

Actually, however, memory availability is seldom a problem. Most forms and fonts don't require much; and most current printers provide large amounts of standard memory, intended for use with Windows graphics applications, that is not needed by the vast majority of host applications.

Some applications may, however, benefit from flash memory or hard disks. They provide additional capacity for storing forms and fonts and will increase operational efficiency in many environments. Such memory is non-volatile and the contents are not lost when the printer is powered down. Once forms and fonts are initially downloaded, they do not have to be downloaded again until a content change is needed. The optional FlashMagic component of FORMagic/400 provides support for downloading forms (but not FontMagic/400 fonts) into flash memory and hard disks.

6.2 Merge Failures

If a form does not print at all, or does not merge as expected, this section may help determine the cause.

No Form is Printed:

Several conditions can cause a page to print with no form:

- The form was not downloaded, the wrong form was downloaded, or something has removed it. The number assigned to the form during overlay generation must match the number used in the program merge command. If a valid form number, 1-9999, is used in the program but no form of that number is present in the printer, the merge command is **completely ignored** by the printer. The text itself will print correctly, but no form is merged, and there will be no "strange characters" on the page.

- Error in the application. The merge command has not been placed in the application, the wrong command or form number has been used, or the command has been constructed improperly. If needed, the FMGUNLSPLF command may be useful in determining the command characters actually being sent to the printer. See Chapter 4, Main Menu option 26.
- If the form prints sometimes, but not others, the problem is likely due to the Page Protection feature of the printer. Page protection commands are often used by PC graphics applications and cause the entire ram memory of the printer to be reformatted. All downloaded overlays and fonts are removed during the formatting. This problem is generally present only when the printer is shared for both host and PC applications. Either dedicate the printer to host applications or download forms and fonts before each job using them. Some newer printers also have a feature, often called Resource Save, to preserve downloaded forms and fonts during the reformatting; if possible, enable it.
- If "strange characters" print on the page in the location where the merge command was placed, either:
 - The merge command is constructed improperly and the printer is interpreting it as printable data. Due to EBCDIC-ASCII translations, many of the characters in the merge command will often print as seldom-used, "international" characters which we often refer to as "strange" or "garbage".
 - OVRPRTF RPLUNPRT(*NO) was not specified. Spooling is corrupting the merge command so the effect is the same as an improperly constructed merge command.

Form and Text on Separate Pages:

If a form prints, but does not merge correctly, there is mostly likely a problem in the program or emulator. If this occurs when using Auto MiniMerge, it generally indicates the PRTTXT parameter is causing page overflow because the program itself is printing all the way to the bottom margin. You must use another merge technique, change the OVRFLW parameter to allow more lines to be printed on each page, or change the line count handling within your program.

Many of the problems we see are related to improper handling of the merge command by an emulator. The form and data print, but on separate pages. This problem can also be caused by programming errors, so it can be difficult to resolve. Check your program **very carefully**. The FMGUNLSPLF command may be useful in determining the command characters actually being sent to the printer; see Chapter 4, Main Menu option 26. If you are certain the program is correct, continue reviewing this section.

FORMagic/400 is designed to allow you to place the merge command **anywhere** on the page. Some emulators, such as those made by I-O Corporation however, do not handle a merge command properly if it starts in line 1, column 1; others won't handle it properly unless it is at the end of the page. A few require it to be in the middle of the page. Others, notably NetSoft, simply mishandle the merge command within the first few pages; the only solution is to circumvent the problem by ejecting several "dummy" pages before sending the real print pages. To assess whether sensitivity to the location of a merge command is the cause of a merge problem, we have provided the Merge Diagnostic Facility, command FMGMDIAG. See Chapter 4, Main Menu option 23.

Merge issues are more far more prevalent in Windows-based emulators than in hardware-based products. Software emulators, especially Client Access/400, account for most of our technical support calls; and caution is advised when using them. Due to more trouble free operation, better performance, and similar cost, we recommend the use of hardware-based emulators wherever possible, especially in critical or high volume environments.

6.3 Form Content Issues

Total Garbage Prints:

You have probably used a PCL 6 or 5XL driver during forms generation. Don't! See Chapter 2.

Minor Corruption in the Form:

If the form does not print **exactly** the same way from the host as it does from the PC, then one of the following has occurred:

- You are experiencing one of the hardware or environmental incompatibilities described elsewhere.
- The wrong driver was used to create the form.
- There may be a bug in the client system overlay generation process. Make a minor change in your form to handle the corrupted area slightly differently or use the client's alternate generator to create the overlay. There are not many situations the generator will mishandle; but, overlay generation is a highly complex process that is very time-consuming to change. Please report **all** problems, however, so we can address them in a future release.

Captured PRN Form Not Identical to Application Designer Form:

Implicit in the procedure for capturing a PRN file is that the captured file will print **exactly** as it does when printed directly from within the design application. For example, when using Word to design forms, we assume the form printed directly from within Word will be identical to the form produced when the PRN file is printed to the same printer.

Occasionally, but not very often, the captured PRN file will not print identically as it must for successful use with FORMagic/400. There is no Windows-provided function for printing PRN files, so FORMagic/400 includes the utility program FMPRDRCT.EXE for this purpose. Just click on it from Explorer, and specify a file to be printed and a PCL-compatible printer.

If the PRN file does not print **exactly** as it does when printed from within the design application, it is not a problem in FORMagic/400; and there is nothing FORMagic/400 can do to overcome the unexpected operation.

Whitespace:

Forms always include whitespace. For instance, most of a letterhead form is just whitespace below the actual letterhead information. Whitespace can either be transparent, like most windows, or opaque, like bathroom windows.

Whitespace is a very important concept; it can both solve and create problems. It can be used to intentionally replace portions of the spoolfile text. For instance, you may want to "white-out" price information on the Shipping Copy of an invoice with a form containing opaque whitespace. But, the actual operation of whitespace makes it necessary to understand a bit about how the printer actually works in order to prevent very undesirable consequences.

Everyone understands that the contents of print line 2 should be sent to the printer **after** the contents of print line 1. But, the contents of an entire form are "laid down" when the form merge instruction is received by the printer. If the merge instruction is located on line 1, for instance, the form is laid down first; then all spoolfile text is laid down on top of the form.

In this case, it won't matter whether whitespace in the form is transparent or opaque because the text will be on top of it. If the merge command is located on the **last** line of the page, however, the form will be laid down on **top** of the text. For this case, the whitespace **must** be transparent wherever spoolfile text must show. When the merge command is located in the middle of a page, then a combination of these situations occurs.

Unfortunately, several additional factors can complicate this situation:

- When an externally defined printfile is used, you **cannot** be certain of the order in which OS/400 will actually send data to the printer; it's all done "under the covers". If a problem occurs, there is nothing you can do except to move the location of the merge command or change the form to use transparent whitespace.
- Sometimes, it's just **easier** to place the merge command at the bottom of a page. When you do this, you **must** use transparent whitespace in the form.
- Many forms designers don't give you any control over the type of whitespace, or even tell you which type is being used. When they do provide an option, it may be difficult to find.

Fortunately, though, transparent whitespace is generally the default for forms design products; and this usually eliminates the issue. But, you must be aware of the potential problem and deal with it appropriately when it occurs.

Overlays and Documents Must use the Same Resolution:

Overlays must be generated in the same resolution as the documents they will be used with. For example, if a form is designed and printed at 600 DPI and converted to an overlay, the documents the overlay will be used with should be printed at 600 dpi as well. Inconsistency will often cause portions of the form to print at one-half or double normal size.

6.4 Other Information

Connect to File:

If your Windows-based forms design application does not provide an option for printing directly to a file, you can change the normal printer destination port (for example, LPT1 or a network path) to "connect the printer to a FILE". Different versions of Windows may do this slightly differently, but the procedure is generally similar to the following:

- Select Start, Settings, Printers, right click on the printer being used, select properties, and go to Details. (Whew. Glad Windows is easy to use!)
- Find "Print to the following port" and note the current setting. Change it to FILE and press OK.

Now, whenever you print from a Windows application to this printer, it will ask you for a destination file name instead of actually printing. Just enter the folder and a unique filename. When you are finished capturing the form, you can perform the same procedure to restore the original port setting. If you create forms often, it may be desirable to use the Add Printer wizard to create a duplicate printer permanently connected to FILE. Be sure to observe the recommendations for selecting the most appropriate printer driver when doing this!

Library Names:

FORMagic/400 should be installed in a library named FMAGIC. If your Activation Key does not allow unlimited forms, FORMagic/400 will run **only** from the FMAGIC library. If your Activation Key does allow unlimited forms, FORMagic/400 can be used from any library. In this case, you can duplicate the entire library, or just the "forms files" (see below), to additional independent libraries.

This procedure can be very useful if you are maintaining forms for other locations. However, **whenever it is employed, you must be very careful with the library list. You must never allow two libraries in the library list to contain the "forms files". Doing so will corrupt these files and render them useless.**

Distributing Forms:

If you maintain forms for multiple locations using FORMagic/400, several options are available to simplify the forms distribution process. Brief information is provided here; feel free to call Keowee Systems for additional discussion.

- The PC client supports multiple installations in separate folders on a single PC. You can therefore dedicate a folder to each location in order to segregate forms by location. All installations must be on a single PC unless you have purchased additional copies of the client system.
- Once a form has been developed and tested, you can distribute its PRN file to the other locations. Each location would then generate and upload the form to its own host. This method requires that each location have its own client system installation.
- To eliminate the need for client systems at every location, generate the form at your master location and upload it to a local pc folder. Then, distribute the uploaded HPI, HPO, and HPS files to the FMAGIC folders at each location. Each location would then complete the upload of the new form in Work With Overlays.
- To eliminate the need to complete any of the steps above at remote locations, upload forms to your own host system, then save the “forms files” into a savefile. The “forms files” are the two files FORMS (all members) and FMFOLMST. Send this savefile to each remote system. At each remote system, restore these two files (all members) from the savefile into the FORMagic/400 library. You **must** distribute the “forms files” together and with **all** members. Effectively, this method distributes **all** forms from the master host; you **cannot** distribute a subset. **It also deletes all previously existing forms at the remote locations, including any forms not being replaced.** This method works well if all remote locations use the same forms.
- To distribute selected forms only, you can delete the unnecessary forms at each remote location after the “forms files” are restored. This method may be acceptable if all remote locations use mostly the same forms.
- Alternatively, you can employ multiple libraries on the master host system, one for each remote location as described in the **Library Names** section above. This method necessitates that you upload new forms into each library where they are relevant, then distribute the changed “forms files” from each library to its associated remote location. This method may be appropriate when each remote location uses mostly different forms. ***But, be careful to manage the library list properly!*** Note: The Automated FTP Upload facility uploads **only** to the FMAGIC library.

Additional Technical Information:

Additional technical information is provided in the Tech Notes document available from the FORMagic menu in the client system. It is periodically updated with information not available in this User's Guide.

7.0 - Optional FORMagic/400 Environments and Features

7.1 Overview

FORMagic/400 can be purchased and configured with Activation Keys to meet a variety of needs, but all include a common Windows-based client system. Three separate client environments are available; any combination of these environments can be activated for a given installation.

- **Client system and AS/400 host support:** for implementing a complete AS/400 electronic forms environment. All AS/400 host and client functions are active. Because this environment is the one most commonly used, this User's Guide and initial client settings are optimized for it. However, when references to the AS/400 functions are ignored and/or the additional material in this section is used, this guide is fully applicable for all features and all environments. If you will not be using this environment, you can hide almost all AS/400 client functions with the "Windows Functions Only" setting from the Tools-Preferences menu.
- **Client system only:** This environment is also known as FORMagic/Windows.
- **Client system with the Host Developer Kit:** for implementing an electronic forms environment on almost any non-AS/400 platform. The HDK is fully enabled in the evaluation version.

FORMagic/400 also offers optional components for both the client and AS/400 host systems; all are fully enabled in the evaluation version. Because these features will not apply to everyone, we have implemented them as optional components to keep FORMagic/400 as cost effective as possible for all users. These optional features extend the capabilities of FORMagic/400, allow electronic forms applications to be created more quickly, easily, and efficiently, and improve the convenience of daily operations:

- **AutoMerge:** for merging forms without changing host applications (AS/400 only; see section 7.3).
- **FORMagic/400 PDF:** for creating PDF files with or without forms (AS/400 only; see section 7.4).
- **FlashMagic Non-Volatile Memory Manager:** for storing forms in flash memory, ram disks, and hard disks on HP laser printers.

The basic client environments and optional features are more fully described in the sections below. However, there are numerous application environments and numerous ways of providing electronic forms capabilities for them. Only the most common are described, but we can generally provide components to handle any application in an optimal manner.

Feel free to call and discuss your specific application and environment; we can almost certainly provide a low-cost, optimized solution using components already available.

Client System Only:

When only the client system is activated, overlays must be downloaded from within the client and the merge command must be manually inserted into any documents to be overlaid with electronic forms.

This approach works well for many DOS applications which allow you to specify printer setup commands. Windows, however, generally makes it very difficult to insert the merge command in applications which make use of the Windows printer driver, unless the application provides a means to insert printer "escape" commands. Word allows such escape commands to be entered into documents; thus FORMagic/Windows **can** be used to insert forms in Word documents!

7.2 Using the Documentation

Some of the information provided in this User's Guide does not apply to non-AS/400 environments. Most of it is, however, applicable for all environments.

When not using the AS/400 host component, you should ignore references to the AS/400, Client Access, and host systems (when the reference is to an AS/400). Chapter 4 can be skipped entirely, unless you would like to use it as an overview for processing requirements of your own host system. Similarly, you can ignore section 5.3.

7.3 AutoMerge

AutoMerge will merge FORMagic/400 forms overlays with an existing AS/400 spool file (the Original Spool File or OSF) created by an **unchanged** AS/400 application. This eliminates the need to change HLL programs. The result is a new spool file (the Final Output spool File or FOF) which is used for actual printing.

AutoMerge is intended to support a large percentage of SCS spool files which are generated as normal, mono-spaced, row and column text and where no special PCL, DDS, or AFP functions occur within the text. Both internally and externally defined printer files can be used to create the OSF.

AutoMerge uses CPYSPLF as the basis for creating the FOF. As a general rule, CPYSPLF copies only the actual text and vertical line spacing from the OSF. Special functions provided through DDS and externally defined print files are therefore **not** compatible with AutoMerge. These include variation of CPI, LPI, font type, font size, etc. within the OSF, and other effects such as bolding and underlining. In general, when displaying spool file attributes for the OSF, all Device Requirements must be N.

The chart below shows all spool file attributes (as of V5R1) which are derived from the print file used to create the OSF and how they are and are not supported by AutoMerge. It is our intention to support usage as defined below, but we may have to add new restrictions based upon volume production experience. When possible, we may relax some of the defined restrictions. OSFs must be created in strict accordance with this chart; otherwise, you will most likely obtain improper results.

Spool file attributes which cannot be set via override, such as Accounting Code and User Defined Text, will be set by OS/400 with values in effect when the FMGMRGxx command is executed.

Any page width (in columns) can be used, but it must be at least 13 times the maximum number of forms merged onto any page. For several reasons, it may be desirable to use one of the following page widths: 40, 80, 96, 105, 120, 126, 132, 157, 175, 198, 225, 300, 378.

Note that, unless one of these page widths is used in the OSF Pagesize parameter, several undesirable effects may occur, including:

- Scaling and/or rotation may occur.
- Incorrect font size may be used.

Note also that messages CPF4011 and CPF4906 may be present in the joblog for each invocation of FMGMRG01, regardless of line length. They can be ignored since they are automatically handled by the AutoMerge process.

This version of AutoMerge will be known as Type 01. Additional types will be developed based on user feedback and development requirements.

Print File Parameters	Notes	Values Allowed in OSF	See Note 5 FMFPRTAM Used For AutoMerge	Override Allowed to FMFPRTAM
File	3 R	Any	FMFPRTAM	FMFPRTAM
Tofile	3 R	n/a	n/a	No
Dev	3 R	Any	*JOB	No
Devtype	3 T	*SCS	*SCS	No
Pagesize	3 A 1	Any	OSF	Yes
LPI	3 A E	Any	OSF	Yes
CPI	3 A E	Any	OSF	Yes
Frontmgn	3 X I			
Backmgn	3 X I			
Ovrflw	3 A	Any	OSF	Yes
Fold	3 X Y			
Rplunprt	3 R	Any	*NO	No
Align	3 A	Any	OSF	Yes
Drawer	3 A E	Any	OSF	Yes
Outbin	3 A	Any	OSF	Yes
Font	3 T	*CPI	*CPI	No
Formfeed	3 A	Any	OSF	Yes
Prtqlty	3 A	Any	OSF	Yes
Ctlchar	3 T	*NONE/*FCFC	*NONE	No
Chlval	3 X U			
Fidelity	3 X I			
Chrid	3 B	Any	*DEVD	Yes
Decfmt	4 R	Any	*JOB	No
Fntchrset	3 X I			
Cdefnt	3 X I			
Pagdfn	4 X I			
Formdf	4 X I			
Afpchars	4 X I			
Tblrefchr	4 X I			
Pagrtrt	3 A	Any	OSF	Yes
Multiup	3 X I Y			
Reduce	3 X I Y			
Prttxt	3 R	Blank	Blank	Yes
Justify	3 X Y			
Duplex	3 A E	Any	OSF	Yes
Uom	3 A	Any	OSF	Yes
Frontovl	3 X I			
Backovl	3 X I			
Cvtlindta	4 X I			
Ipdspastr	4 X I			
Usrrsclibl	4 X I			
Cornerstpl	4 B	Any	*NONE	Yes
Edgestitch	4 B	Any	*NONE	Yes
Sadlstitch	4 B	Any	*NONE	Yes
Fntrsl	4 X I			
Dfrwrt	3 B	Any	*YES	Yes
Spool	3 R	*YES	*YES	No
Outq	3 A C	Any	OSF	Yes
Formtype	3 A	Any	OSF	Yes
Copies	3 A	Any	OSF	Yes
Pagerange	3 A	Any	OSF	Yes
Maxrcds	3 R	Any	*NOMAX	No
Filesep	3 A	Any	OSF	Yes

Print File Parameters	Notes	Values Allowed in OSF	See Note 5 FMFPRTAM Used For AutoMerge	Override Allowed to FMFPRTAM
Schedule	3 A	Any	OSF	Yes
Hold	3 A C	Any	OSF	Yes
Save	3 A C	Any	OSF	Yes
Outpty	3 A	Any	OSF	Yes
Usrdta	3 A	Any	OSF	Yes
Splfown	4 B	Any	*CURUSRPRF	Yes
Usrdfnopt	4 X F			
Usrdfndta	4 X F			
Usrdfnobj	4 X F			
Splfname	3 A	Any	OSF + P	Yes
Waitfile	3 R	Any	*IMMED	No
Lvlchk	3 R	Any	*NO	No
Secure	3 R	Any	*NO	No
Ovrscope	3 B W	Any	*ACTGRPDEFN	Yes
Share	3 R	Any	*NO	No
Opnscope	3 B W	Any	n/a	No
Igcdta	3 X D			
Igcexnchr	3 X D			
Igcchrrtt	3 X D			
Igccpi	3 X D			
Igcsosi	3 X D			
Igccdefnt	3 X D			

Notes for Print File Parameters:

- A. Fully supported parameter:** AutoMerge will use the value from the OSF, but it can be overridden in FMFPRTAM if needed. Some specific parameter values may exist (indicated by Note E) that should not be used because they are only used in conjunction with other parameters which are not allowed with AutoMerge (indicated by Note X).
- B. Partially supported parameter:** Compatible with AutoMerge, but the value in the OSF is ignored when creating the final output spool file. If a value other than the default is required, it must be obtained by an override to FMFPRTAM.
- C. Command option:** To prevent the need for an override to FMFPRTAM in common situations, the FMGMRGxx command provides an optional parameter for specifying the final output value. Thus, the final value can be specified with either the FMGMRGxx command parameter or by an override to FMFPRTAM.
- E. Limited values:** Some of the specific values for this parameter must not be used because they are used only in conjunction with other parameters which are disallowed entirely (indicated by Note X).
- R. Restricted parameter:** AutoMerge requires this parameter be used strictly as shown. **Incorrect operation will most likely occur if a non-compliant value is used.**
- T. Restricted parameter:** AutoMerge requires the indicated parameter value be used in the OSF. AutoMerge will terminate if other values are used.
- W. FMGMRGxx processes are based on OPM programs:** Override FMFPRTAM appropriately for your specific OPM or ILE environment.

X. Do not use parameter: AutoMerge does not support this parameter for the reason indicated. **Any value other than the default will most likely cause improper operation.**

D. DBCS parameter: AutoMerge is not intended to support any DBCS functions.

F. Unsupported: The AutoMerge process does not include the necessary function to support this parameter.

I. IPDS/AFP parameter: AutoMerge is not intended to support IPDS or AFP functions.

U. Unsupported: The AutoMerge process does not include the necessary function to support this parameter.

Y. Incompatible with forms: The parameter controls functions which are incompatible with an electronic forms environment.

1. *ROWCOL is required; *UOM will cause termination.
3. This parameter is supported by V3R7 and all later versions of OS/400.
4. This parameter was incorporated into an OS/400 version after V3R7 and is seldom needed.
5. Print file FMFPRT is used to generate the overlay download file. The following parameter values are assigned from OSF values and can be overridden if needed. No other values should be changed.

OUTQ, SPLFNAME (with D suffix), FORMTYPE, HOLD, SAVE, OUTPTY, SCHED, USRDTA

The Type 01 AutoMerge Command FMGMRG01:

Prompt the command and press the Help key to access complete usage information, including examples.

Other Considerations:

1. For CL programs, all parameters use character variables except the Starting and Ending Page sub-parameters of MRGOVLS are numeric variables Dec (6 0).
2. When the *MID merge location is used, opaque whitespace in forms may cover spool file text. See section 6.3 for details.
3. When the *MID merge location is used, no forms will be merged onto blank pages. If a form is required on blank pages, use *TOP or place one character on the page in a location where the form will cover it.

How to Use the Type 01 AutoMerge Command FMGMRG01:

Change the CL program calling the application which creates the OSF. If you cannot change the CL program, see the next section.

Before Change: Override print file as needed
Call your application

After Change: Override print file as needed (it must **not** print)
Call your application
Override FMFPRTAM *
FMGMRG01 xxxx
** Override FMFPRTAM *
** FMGMRG01 xxxx

* Overriding FMFPRTAM is usually not required:

- FMGMRG01 will automatically use most parameter values from the OSF. See chart above.
- FMGMRG01 will automatically use RPLUNPRT(*NO).
- FMGMRG01 allows OUTQ, SAVE, and HOLD to be specified in order to change values from those used in the OSF without an override.
- If the above factors do not produce a spool file with all values as needed, use an override specifying OVRPRTF FMFPRTAM plus the specific parameters as needed to produce the required results. But, you can override **only** those parameters which are listed in the chart above as acceptable for override.
- **Caution: Overrides may propagate from higher call levels within your application. The highest level usually wins!**

** If the FOF is needed with different forms or for additional outqs: By running FMGMRG01 multiple times, you can send the report to multiple printers, each with different forms. You can also use it to duplicate spoolfiles which do not use forms.

If You Cannot Change Your CL Program:

If you cannot change the CL Program which creates the OSF, this section documents a method for merging forms without changing the existing application at all. It requires a small amount of programming and setup using sample programs in the FMFSRC source file. Only the basic approach and typical commands are illustrated; you must tailor these guidelines to your specific needs. **Do not create any of these objects in the FMAGIC library.**

This procedure and sample programs are not considered a formally supported part of FORMagic/400. Feel free to call us if you have questions, but we can only provide general support for implementing this solution in your environment.

1. Create a data queue named FMQMON01.

```
CRTDTAQ xxlib/FMQMON01 MAXLEN(128) FORCE(*YES) TEXT('AutoMerge Monitor')
```

2. Change the existing output queue(s) which receive OSFs to send a message to FMQMRG01 whenever a new spool file arrives on the queue.

```
CHGOUTQ xxlib/xxoutq DTAQ(xxlib/FMQMON01)
```

Note that a data queue entry will be received **each** time a spool file becomes READY. If a file is held then released, an entry is received. Thus, multiple entries could be received for a single file while it exists in the system. This fact must be taken into account by operational procedures or by the overall systems design used in the monitor application.

3. Create program FMPMON01 to monitor the Message Queue. Sample source is provided in FMAGIC/FMFSRC member FMPMON01. This program must be tailored to do several things:

- a. Discard spool files which do not need forms added. If FOF spool files are sent to output queues being monitored, be sure to discard them also; otherwise, you will create an endless loop! You may also have to ignore spool files which have been previously processed, but have become READY again (see Item 2 above).
- b. Identify each remaining OSF, in some manner, so you can determine which forms must be merged into it. You will probably have to use some combination of spool file attributes, such as these, to make a unique determination:

```
SPLFNAME, FORMTYPE, USRDTA, OUTQ, DRAWER, OUTBIN, DUPLEX
```

- c. Add a section of code to call FMGMRG01 with appropriate parameters for each OSF. Depending on your specific needs, this could be a highly generic procedure handling all OSFs, a specific procedure for each application, or a combination of both.
4. Create program FMPMON99 to end FMPMON01 when necessary. Sample source is provided in FMAGIC/FMFSRC member FMPMON99.
5. Add facilities to execute FMPMON01. Generally, you should run it constantly; so you may want to add it to your system startup procedures.

7.4 FORMagic/400 PDF

The FORMagic/400 PDF File Creator and Forms Manager is an optional feature of FORMagic/400. Installation of FORMagic/400 PDF occurs automatically when FORMagic/400 is installed or upgraded. It is fully active during all evaluations. When a permanent key is installed, FORMagic/400 PDF will be disabled if it has not been purchased. However, it will remain operable, with a one form usage limit, for customers covered by Annual Support.

Limitations:

FORMagic/400 PDF uses a similar approach to that of FORMagic/400 AutoMerge for processing an existing spoolfile and generating an output PDF file, with or without forms. To qualify for PDF processing, the spool file must meet the following requirements:

- Print file parameters (attributes of the spool file) must satisfy all requirements described in the table below.
- The spoolfile must be in a READY, HELD, SAVED, or CLOSED state.

Output PDF files are not compressed internally and may be somewhat larger than if compression were used.

Creating a PDF file is a complex process. Further, the demands of inserting different forms on different pages based on page matching criteria are intense. For this reason, FORMagic/400 PDF may not provide optimal performance in all environments. Generally speaking, these factors tend to eliminate performance concerns:

- Recent vintage AS/400 hardware
- Faster processors
- Smaller PDF files (up to 1000 pages)

When older or slower processors, larger PDF files (over 1000 pages), or higher volumes of production are required, we recommend that you test FORMagic/400 PDF with a typical production mix to insure your performance requirements are met.

Creating PDF Files - An Overview:

Creating PDF files, with forms, involves multiple steps. Steps 1-4 below are performed once only, whenever a form is created or changed. When a PDF file is created without forms, steps 1-4 are not required at all.

Note: Files PGRNBAR.PDF and LGRNBAR.PDF are provided with the client system. These are one-page portrait and landscape “greenbar form” PDF files. You can experiment with them and see the entire PDF creation process **before** performing steps 1 and 2 to create your own forms. Begin with step 3 to convert either into an HPO file, upload it, create a spoolfile by printing **any** source file or compiler listing, and use the FMGPDF01 command to quickly create a PDF file. And, this illustrates a great way to archive reports, such as program compilation listings!

1. Create the necessary form(s) in your favorite forms design product, such as Word. This step is identical to that in FORMagic/400. If you already have a form being used with FORMagic/400 applications, you can use it.
2. When forms design is complete, the form is converted into a one page "PDF Form File (PDFFF file)". You must have a PDF writer product to create the PDFFF file; see "Creating the PDF Form File" below. This step is equivalent to creating the PRN file in FORMagic/400.
3. The FORMagic/400 PDF client is used to convert the one page PDFFF file into a mergeable HPO file. See "Using the Client" below. This step is very similar to that in FORMagic/400.
4. Upload the HPO PDFFF file to the AS/400. This step is similar to that in FORMagic/400.
5. Run the AS/400 job which produces a spool file that must be converted into a PDF output file. This spool file must remain on the outq if it is also printed.
6. Run the command FMGPDF01, with appropriate parameters, to create the PDF file. See "Using the Command FMGPDF01" below. This step is similar to executing the AutoMerge command FMGMRG01.

Creating the PDF Form (PDFFF) File:

Creating the PDFFF file is a one-time operation, performed whenever a new form is created or a form is changed. It assumes you have previously completed the design of a one page form as described here.

- Design your form in any application suitable for creating forms, such as Word. It **must** be exactly one page, and it **must** align with the data to be printed on it. When complete, print this form normally (no scaling, etc). Print a sample data file. Hold the form and data pages up to a light source to verify they align **exactly**. If not, revise the data generation program and/or the form until they align properly.
- Make a one page PDF Form File (PDFFF file) for the form. Use **zero margins and no compression**. This step requires that you have and use a PDF writer product. Various PDF writers create vastly differing output which our converter must be able to handle; therefore, it is not possible for us to support all writers. Currently, we support Acrobat Writer 6 and below, and CutePDF Writer. CutePDF Writer is highly recommended by PC Magazine, works well, and is free at www.cutepdf.com. Both of these products install as Windows printer drivers. When your form design is complete, just print your form using one of these drivers. The result will be a one-page PDF Form File we call the "PDFFF File". **Note: If the form requires landscape mode, please see www.keoform.com/fm-lsp.htm for critical steps to observe.**
- Open the PDFFF file in a PDF reader product and print it **full size** (no 'fit to page', etc).
- The form printed directly from the forms designer application and the form printed from the PDFFF file must **match and align exactly**. Overlay both pages and hold them up to a light source to verify the alignment.

If the above criteria are met, our merge process will work as needed in most cases. If not, please send us the PDFFF file for analysis (zip it to prevent alteration by email systems).

FORMagic/400 PDF also allows you to place different forms on different pages of the final PDF output file. This is called a multi-form application. Multi-form applications require that **all** forms reside in **one** multi-page PDFFF file so the above descriptions referring to one-page results actually apply only when one form is being used.

All forms in a multi-form application must be created in the same design product (such as Word). Each form must be on a separate page in the same source file (such as .DOC). The source file is limited to 9 pages (thus, 9 forms). The entire source file must be printed to **one PDFFF file**.

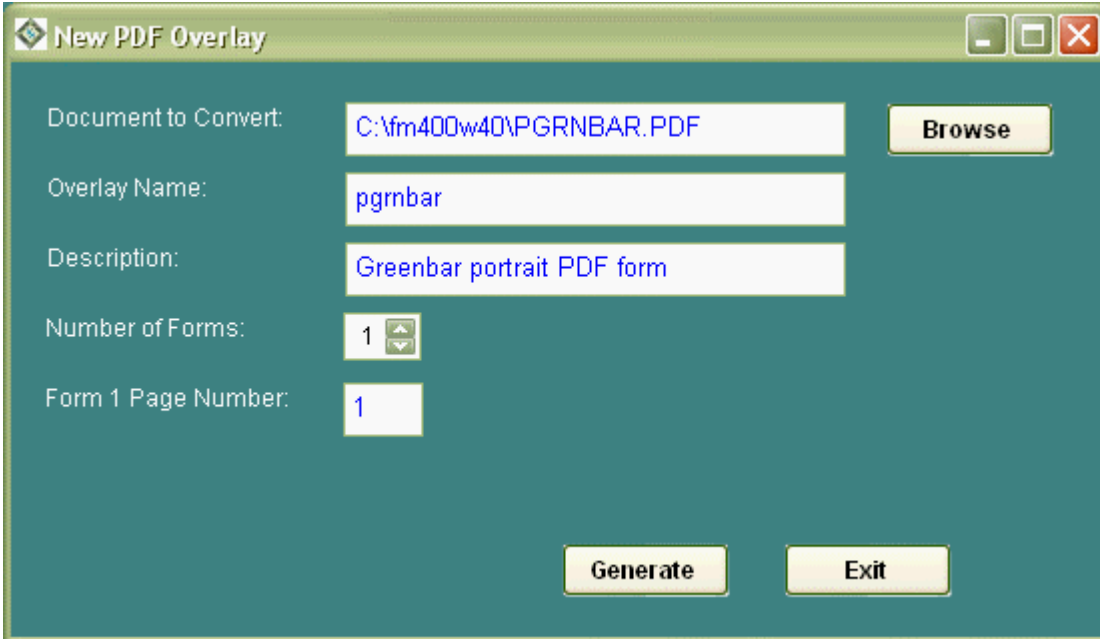
Up to 5 of the PDFFF pages can be selected as separate forms for generation into the HPO file actually used by an AS/400 PDF application. The AS/400 application does **not** have to use all the forms actually present in an HPO file, but all forms in the HPO file are placed in the final output PDF file. Thus, it is generally a good idea to place **only**

those forms required by an application in an HPO file. No new forms design is required to accomplish this; you can simply generate multiple HPO files from a single PDF file, each time specifying the exact combination of forms needed for the application.

Using the Client:

PDF form generation is **very** similar to the generation of PCL forms. Simply select the PDF form type instead of PCL. Use the same Administrator functions; however, some will be suppressed as they do not apply to PDF forms.

After the PDF file is generated, you must generate an HPO file containing at least those forms an application requires. Generally, only one form is necessary; but, up to five are allowed when different forms are placed on different pages. As noted above, for smaller output PDF files, you may want to include **only** those forms actually needed by the AS/400 application. If several applications share the same forms in various combinations, simply generate an HPO file for each specific combination of forms you will use.



The image shows a screenshot of a software dialog box titled "New PDF Overlay". The dialog box has a title bar with a diamond icon and standard window controls (minimize, maximize, close). The main area is teal and contains several input fields and buttons. The "Document to Convert" field contains the path "C:\fm400w40\PGRNBAR.PDF" and has a "Browse" button to its right. The "Overlay Name" field contains "pgrnbar". The "Description" field contains "Greenbar portrait PDF form". The "Number of Forms" field is a spinner box set to "1". The "Form 1 Page Number" field contains "1". At the bottom of the dialog, there are two buttons: "Generate" and "Exit".

When creating the HPO file, the Document to Convert is the 1-9 page PDF file. You must specify the number of forms (1-5) the HPO file will contain and, for each of these, which page within the PDF file it is to be obtained from. **Critical note:** The form numbers assigned here (1-5) correspond to the form numbers (1-5) used in the FMGPDF01 command that actually creates PDF files for the host applications.

After generation, the form must be uploaded to the host. The **same** upload process is used for both PCL and PDF forms. See command FMGUPLOVL in section 4.4 if you are not familiar with it. After upload from the PC to the host, you must complete the upload from the FMGOPR menu on the AS/400 using option 1, Work With Overlays, to bring the PDF form into the FORMagic/400 PDF host database.

After final completion of the upload, the form will show in the list of overlays with Form Number 0000 and Form Type PDF. **Do not attempt to use the Download, Remove, or Test functions with PDF forms! Errors and many pages of garbage will result because host commands are not currently enforcing logical usage by form type (ie, download is illogical for PDF forms).** This enforcement will be added in the next version.

Tech Note Regarding the PDF Writer Used to Create the PDF: The PDF file being converted into an HPO file cannot be fully compressed, but stream compression is allowed. Each page must not contain more than approximately 35 objects as PDF Form Contents. You will not be able to verify the PDF file meets these requirements, but our converter will display an error message if they are violated. Following our requirements for generating the PDF file will minimize the chance of these errors occurring. If a conversion error of **any** type occurs, please let us know.

Using the AS/400 Component:

FORMagic/400 PDF will create a PDF output file, with or without forms overlays, from an existing AS/400 spool file (the Original Spool File or OSF) created by an unchanged AS/400 application. Our process eliminates the need to change HLL programs. The result is an output PDF file in the Integrated File System.

FORMagic/400 PDF is intended to support a large percentage of SCS spool files which are generated as normal, mono-spaced, row and column text and where no special functions occur within the text. Both internally and externally defined printer files can be used to create the OSF. IPDS and AFP spoolfiles are **not** supported.

FORMagic/400 PDF uses CPYSPLF as the basis for creating the PDF file. As a general rule, CPYSPLF copies only the actual text and base vertical line spacing from the OSF. Special functions provided through DDS and externally defined print files are therefore not compatible with FORMagic/400 PDF. These include variation of CPI, LPI, font type, font size, etc. within the OSF, and other effects such as bolding and underlining. In general, when displaying spool file attributes for the OSF, all Device Requirements must be N.

Note: FORMagic/400 PDF does **not** support spoolfiles having embedded PCL commands, other than FORMagic/400 merge commands in certain cases.

The chart below shows all spool file attributes (as of V5R1) which are derived from the print file used to create the OSF and how they are and are not supported by FORMagic/400 PDF. It is our intention to support usage as defined below, but we may have to add new restrictions based upon volume production experience. When possible, we may relax some of the defined restrictions. OSFs must be created in strict accordance with this chart; otherwise, you will most likely obtain improper results.

Spool file attributes which cannot be set via override, such as Accounting Code and User Defined Text, are not used by FORMagic/400 PDF.

Messages CPF4011 and CPF4906 may be present in the joblog for each invocation of FMGPDF01, regardless of line length. They can be ignored since they are automatically handled by the FORMagic/400 PDF process.

Allowable Spoolfile Parameter Values:

Print File Parameters	Notes	Values Allowed in OSF
File	3 A	Any
Div	3 A	Any
Devtype	3 T	*SCS
Pagesize	3 B 1	See note 1
LPI	3 B E 2	4,6,8,9,12
CPI	3 B E 2	5,10,12,15,16.7
Frontmgn	3 X I	Do not use
Backmgn	3 X I	Do not use
Ovrflw	3 C	Any
Fold	3 X Y	Do not use
Rplunprt	3 C	Any
Align	3 C	Any
Drawer	3 C	Any
Outbin	3 C	Any
Font	3 T	*CPI
Formfeed	3 C	Any
Prtqlty	3 C	Any
Ctlchar	3 C	Any
Chlval	3 X U	Do not use
Fidelity	3 X I	Do not use
Chrid	3 C	Any
Decfmt	4 C	Any
Fntchrset	3 X I	Do not use
Cdefnt	3 X I	Do not use
Pagdfn	4 X I	Do not use
Formdf	4 X I	Do not use
Afpchars	4 X I	Do not use
Tblrefchr	4 X I	Do not use
Pagrftt	3 B 5	Any
Multiup	3 X I Y	Do not use
Reduce	3 X I Y	Do not use
Prttxt	3 C	Any
Justify	3 X Y	Do not use
Duplex	3 C	Any
Uom	3 C	Any
Frontovl	3 X I	Do not use
Backovl	3 X I	Do not use
Cvtlindta	4 X I	Do not use
Ipdspasthr	4 X I	Do not use
Usrrsclibl	4 X I	Do not use
Cornerstpl	4 C	Any
Edgestitch	4 C	Any
Sadlstitch	4 C	Any
Fntrsl	4 X I	Do not use
Dfrwrt	3 C	Any
Spool	3 R	*YES
Outq	3 A	Any
Formtype	3 C	Any
Copies	3 C	Any
Pagerange	3 C	Any
Maxrcds	3 C	Any
Filesep	3 C	Any
Schedule	3 C	Any

Print File Parameters	Notes	Values Allowed in OSF
Hold	3 C	Any
Save	3 C	Any
Outpty	3 C	Any
Usrdta	3 C	Any
Splfown	4 C	Any
Usrdfnopt	4 C	Any
Usrdfndta	4 C	Any
Usrdfnobj	4 C	Any
Splfname	3 A	Any
Waitfile	3 C	Any
Lvlchk	3 C	Any
Secure	3 C	Any
Ovrscope	3 C W	Any
Share	3 C	Any
Opnscope	3 C W	Any
Igcdta	3 X D	Do not use
Igcexnchr	3 X D	Do not use
Igcchrtrt	3 X D	Do not use
Igccpi	3 X D	Do not use
Igcsosi	3 X D	Do not use
Igccdefnt	3 X D	Do not use

Notes for Print File Parameters:

- A. Fully supported parameter:** FORMagic/400 PDF will use the value from the OSF. Some specific parameter values may exist (indicated by Note E) that should not be used because they are only used in conjunction with other parameters which are not allowed with FORMagic/400 PDF (indicated by Note X).
- B. Partially supported parameter:** Most values can be used. Other notes apply and describe any limitations.
- C. Irrelevant parameter:** This parameter is irrelevant to the PDF process and is not used. In some cases, the parameter is used by spooling to control page formatting, and is therefore indirectly used by FORMagic/400 PDF. Any value can be specified in the OSF.
- E. Limited values:** Some of the specific values for this parameter must not be used because they are used only in conjunction with other parameters which are disallowed entirely (indicated by Note X).
- R. Restricted parameter:** PDF requires this parameter be used strictly as shown. **Incorrect operation will most likely occur if a non-compliant value is used.**
- T. Restricted parameter:** PDF requires the indicated parameter value be used in the OSF. FORMagic/400 PDF will terminate if other values are used.
- W. FMGPDFxx processes are based on OPM programs:** Use overrides as appropriate for ILE applications.
- X. Do not use parameter:** PDF does not support this parameter for the reason indicated. **Any value other than the default will most likely cause improper operation.**
 - D. DBCS parameter:** PDF is not intended to support any DBCS functions.
 - I. IPDS/AFP parameter:** PDF is not intended to support IPDS or AFP functions.
 - U. Unsupported:** PDF does not include the necessary function to support this parameter.
 - Y. Incompatible with forms:** The parameter controls functions which are incompatible with an electronic forms environment.

1. *ROWCOL is required; *UOM will cause termination. Further, these maximums must be observed:

Print columns per line: 376

Print lines per page: 170

Pages selected for PDF: 31500

At this time, only A size (8.5x11) physical pages are supported. B size (11x17) and legal size (8.5x14) in both portrait and landscape orientation can be added upon request. Other sizes which can be printed on standard laser printers can also be added upon request.

The spool file can contain up to 99,999 pages, but only 31,500 pages can be placed in a single output PDF file. Maximum pages may be reduced slightly, depending on the number of forms being merged and their complexity.

2. Certain combinations of LPI and CPI will cause overlap between characters on adjacent lines. This includes all cases where the LPI value equals or exceeds the CPI value.
3. This parameter is supported by V3R7 and all later versions of OS/400.
4. This parameter was incorporated into an OS/400 version after V3R7 and is seldom needed.
5. Spool file values for PAGRTT are translated as follows:

Portrait = 0, 180, *AUTO, *COR, or *DEVD

Landscape = 90 or 270

Spool files with *AUTO, *COR, or *DEVD may not actually use portrait orientation. Therefore, we strongly recommend using an explicit value 0 or 90.

180 and 270 represent reversed delivery in the printer output bin. FORMagic/400 PDF treats them the same as 0 and 90 respectively.

Using Command FMGPDF01:

A schematic view of this command and some of its most important usage requirements are provided below. For additional usage information, including examples, prompt the command and press the Help key.

Numbers under each parameter indicate the maximum size value allowed. [D] indicates the default supported by the command prompter. #n refers to Special Notes below.

```

SPLF(name) --> IFSPATH(path) --> PDFFILE(name) -->
  10                50 #8                50

SPLNBR(*Last [D], *Only, 1-9999) --> JOB| -----* [D]| -->
  5                                     | Name, User, No |
                                     | 10 10 6 |

SLTPGSTR(*FIRST [D], 1-99999) --> SLTPGEN(*LAST [D], 1-99999) -->
  5                                     5 #1

SPLFDISP(*Keep [D], *Delete) -->
  7

      | *None [D] #6 | | *None[D], *MatchInfo |
      | ----- | | ----- |
PREPROCPGM| Name *LIBL [D] | -->BLANKING| 1-170 1-376 1-99 | -->
      | Pgm *CURLIB 10| #7 | Row Column Length |
      | 10 Library | | 3 #9 3 2 |

      | *None [D] |
MRGOVLS| *FormInfo | --> No further parameters are allowed for *None
      | *MatchInfo |
      | 10 |

OVLNAME(*None[D], name) -->PAGEINFO(*None [D], SplPageCmd Text) -
  8                50 #11

```

Go to (a) for parameters required for MRGSOVLS(*FormInfo)
 Go to (b) for parameters required for MRGSOVLS(*MatchInfo)

(a) Parameters required and only allowed for MRGSOVLS(*FormInfo)

```

      | *NONE [D] |
      | ----- |
FORMINFO| 1-5 *First [D] *Last [D] | --> RPTOVLS| *Yes[D] | End of
  #3 | FormNo FirstPage LastPage | 5 #4 | *No | parameters
      | 2 5 5 #1 | | 1-31499 | for *FormInfo
      | - Up to five sets allowed -- |

```

(b) Parameters required and only allowed for MRGOVLS(*MatchInfo)

```

      | *NONE [D] |
      | ----- |
MATCHINFO| 1-170 *ALL *Calc [D] *EQ [D] | End of
  #5 | 3 #9 Row Column Value Length Meth | parameters
      | 3 3 15 2 3 | for *MatchInfo
      | ----- Up to five sets allowed ----- |

```

Special Notes:

#1. Last Page must be greater than or equal to First Page.

#3. The FORMINFO form insertion process operates as follows:

When *None, no forms are inserted.

Otherwise, up to 5 forms can be specified. All forms must be contained in one HPO form file, but all forms do not have to be used. For each form, specify the Form No, Starting Page for inserting the form, and Ending Page for inserting the form. The Form No must be used in sequence 1-5 and must correspond to the form numbers 1-5 assigned during HPO file generation at the client system.

#4. The RPTOVLS parameter allows forms to be repeated in a cyclic fashion throughout the entire page range being processed. For instance, FORMINFO and RPTOVLS can be set up to insert forms 1-5 on pages 1-5 respectively, then repeat the same process on pages 6-10, 11-15, etc. In this case, the Repeat Cycle is 5.

When *No is specified, no cyclic insertion is performed and page numbers specified in FORMINFO are considered absolute.

When *Yes is specified, the cycle size is set to the highest ending page among all forms used.

When a numeric value is specified, it becomes the cycle size and must not be less than the highest specified ending page number among all forms used.

If *LAST is used as the ending page for any form, this parameter is ignored and *NO is assumed.

#5. The MATCHINFO form insertion process operates as follows:

When *None, no forms are inserted.

Otherwise, area matching insertion data can be specified for up to 5 forms. All forms must be contained in one HPO form file, but all forms do not have to be used. For each form, specify all matching information: Row, Column, String Value, String Length, and Matching Method. If the matching process succeeds, the form is placed on the page; see details below.

The Form No (1-5) is implied by the order entered, must be used in sequence 1-5, and must correspond to the form numbers 1-5 assigned during HPO file generation at the client system.

The matching process for form insertion operates as follows, separately for each page:

For each available form (1-5, as specified):

- If Method = *EP, the form is unconditionally inserted. All other MatchInfo fields are ignored.
- The specified page area (Row, Column, Value, Length) is tested. If row is *ALL, **every** row is tested. If a match occurs, (a) the form is inserted (but only once per page), and (b) if Blanking is *MatchInfo, the match area is blanked (see Blanking). The specific test varies according to the Match Method being used:

*EQ - If the Page Value equals the Match Value.

*GT - If the Page Value is greater than the Match Value.

*LT - If the Page Value is less than the Match Value.

*GE - If the Page Value is greater than or equal to the Match Value.

*LE - If the Page Value is less than or equal to the Match Value.

*NE - If the Page Value does not match the Match Value.

- If Method = *DF, all other MatchInfo fields are ignored. If **no** form is inserted on this page by *EQ-*NE tests (after all forms 1-5 have been tested), the **last** *DF Default Form found, if any, will be inserted. There should be no more than one *DF line among all the specified forms. Note that *DF and *EP can both cause form insertion on the same page; they will **not** cause blanking when Blanking = *MatchInfo.

This facility should be used with great care, especially when ROW(*ALL) is specified. Unintended consequences can easily occur if *GT, *LT, *GE, *LE, or *NE Match Methods are used in conjunction with ROW(*ALL).

#6. This facility is active and will be documented later. It is provided as a means of meeting special requirements, and will seldom be needed.

#7. If *None, no area blanking occurs.

If *MatchInfo, any match areas (see MATCHINFO) causing insertion of forms 1-5 (methods *EQ-*NE only) will be blanked after the match is processed. *MatchInfo is not allowed unless MRGSOVLS is also *MatchInfo. **Caution:** When Match Row uses *ALL, all matching areas on all rows are blanked even though the form is inserted only once.

Otherwise, specify all Blanking information: Row, Column, and String Length. The page area defined is unconditionally blanked on **all** pages.

This function provides a means to blank the area containing X'03' merge commands in FORMagic/400 spool files so they can be used to generate PDF files without any change to the FORMagic/400 application. To meet very special forms requirements, it can also be used to blank special forms insertion codes added to the page so that forms can be inserted using *MatchInfo data.

#8. Do not include an ending / unless it is the complete path.

#9. Row always refers to text row number excluding blank lines. Failure to assign the line number properly will result in the wrong page line, or none at all, being matched or blanked.

#11. The Special Page Command is provided to facilitate aligning the data with the form when the form is otherwise acceptable. When needed, the command is entered in this format:

h v Td where up to 4 decimals allowed and case must be observed
 h is the horizontal print data movement (+ moves right, - left)
 v is vertical print data movement (+ moves up, - down)

Movement is specified in points at 72 points per inch. The form remains stationary as designed; only print data is moved. As an example, to move the print data down .1 inch and right .5 inch, use this command:

36 -7.2 Td

How to Use Command FMGPDF01 in a CL Program:

Change the CL program calling the application which creates the OSF. If you cannot change this program, see the next section. When using variables for the command parameters, all parameters should be specified as character variables.

Before Change: Override print file as needed
 Call your application

After Change: Override print file as needed (it must not print)
 Call your application
 FMGPDF01 xxxx
 MONMSG MSGID(FMA0000) EXEC(as needed) *1
 FMGPDF01 xxxx *2
 MONMSG MSGID(FMA0000) EXEC(as needed) *1

- *1. A variety of escape messages can be generated by improper parameter values and conditions which prevent generation of a PDF file. It is suggested that one global monitor be used after the FMGPDF01 command to handle all error conditions.
- *2. If multiple output PDF files are needed with different forms, just run FMGPDF01 multiple times specifying appropriate parameters each time.

If You Cannot Change Your CL Program:

If you cannot change the CL program which creates the OSF, this section documents a method for creating the PDF file without changing the existing application at all. It requires a small amount of programming and setup using sample programs provided in the FMFSRC source file. Only the basic approach and typical commands are illustrated; you must tailor these guidelines to your specific needs. **Do not create any of these objects in the FMAGIC library.**

This procedure and sample programs are not considered a formally supported part of FORMagic/400 PDF. Feel free to call us if you have questions, but we can provide only general support for implementing this solution in your environment.

Note: The sample programs noted with ** below are supplied with FORMagic/400 in the FMFSRC source file for use with AutoMerge processing. They can be used with slight modifications for PDF processing as well.

1. Create a data queue named FMQMON01.

```
CRTDTAQ xxlib/FMQMON01 MAXLEN(128) FORCE(*YES) TEXT('FORMagic/400 PDF Monitor')
```

2. Change the existing output queue(s) which receive OSFs to send a message to FMQPDF01 whenever a new spool file arrives on the queue.

```
CHGOUTQ xxlib/xxoutq DTAQ(xxlib/FMQMON01)
```

Note that a data queue entry will be received each time a spool file becomes READY. If a file is held then released, an entry is received. Thus, multiple entries could be received for a single file while it exists in the system. This fact must be taken into account by operational procedures or by the overall systems design used in the monitor application.

3. Create program FMPMON01 to monitor the Message Queue. Sample source is provided in FMAGIC/FMFSRC member FMPMON01 **. This program must be tailored to do several things:
 - Discard spool files which do not require PDF processing. You may also have to ignore spool files which have been previously processed, but have become READY again (see Item 2 above).
 - Identify each remaining OSF, in some manner, so you can determine which PDF processing and forms are required. You will probably have to use some combination of spool file attributes, such as these, to make a unique determination: SPLFNAME, FORMTYPE, USRDTA, OUTQ, DRAWER, OUTBIN, DUPLEX
 - Add a section of code to call FMGPDF01 with appropriate parameters for each OSF. Depending on your specific needs, this could be a highly generic procedure handling all OSFs, a specific procedure for each application, or a combination of both.
4. Create program FMPMON99 to end FMPMON01 when necessary. Sample source is provided in FMAGIC/FMFSRC member FMPMON99 **.
5. Add facilities to execute FMPMON01. Generally, you should run it constantly; so you may want to add it to your system startup procedures.

7.5 FlashMagic Non-volatile Memory Manager

FlashMagic is initially activated as an evaluation version. The only difference between the evaluation and permanent versions is that all forms generated during evaluation include "banners" which indicate they are for evaluation only. These banners will be removed if you purchase the product and install a permanent key.

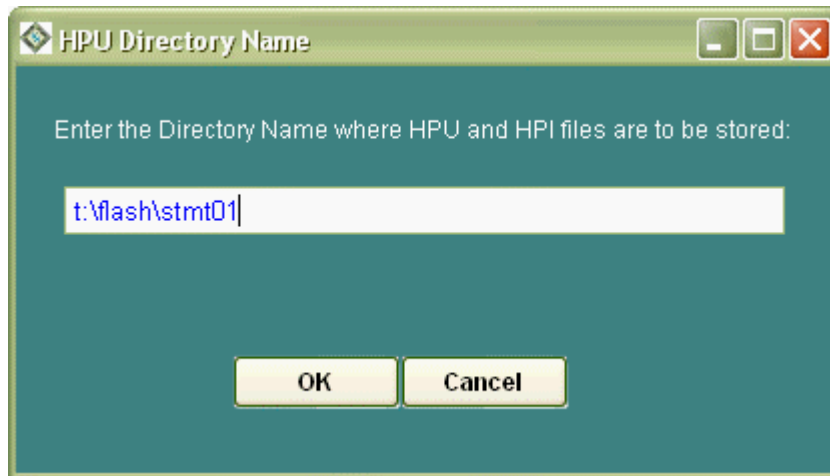
Complete documentation will soon be added for this product. Please call if you need this support now.

7.6 Host Developer Kit

FORMagic/400 provides a complete environment for creating, implementing, and using electronic forms on iSeries and AS/400 platforms. The Host Developer Kit (HDK) allows overlays generated by the client to be used with almost any other, non-AS/400 platform.

The HDK converts standard overlays into a secondary format which allows them to be easily uploaded to, stored on, and downloaded into printers from any host system supporting binary ASCII files. This includes virtually all ASCII systems, plus IBM mainframes. The developer can generally use standard host system utilities, or create a small custom application, to upload, store, and download overlays. Host applications are then modified to insert merge commands as needed. Chapter 5 provides details for constructing merge commands.

To create an HDK overlay, you must first generate a standard PCL overlay (see Chapter 3). Then, select this overlay, press the HDK button, and specify the folder where the converted overlay is to be placed.



The HDK generates two files in the folder with the same name as the PCL overlay and with the extensions .HPU and .HPI. The HPU file contains the actual overlay to be stored on the host. HPU files can be copied after generation, **as is, as binary files**, to the host for storage. For download, they can be copied, **as is, as binary files**, from the host to the printer. The HPI file provides information about the overlay that can be helpful when storing and using the overlay on the host. It is a one-line, 80-character, text file. You should ignore all columns except these:

- 1- 8 Overlay name
- 11-14 Overlay number
- 42-70 Overlay description
- 74-79 Date created

The HDK is initially activated as an evaluation version. The only difference between the evaluation and permanent versions is that all forms generated during evaluation include "banners" which indicate they are for evaluation only. These banners will be removed if you purchase the product and install a permanent key.