ImageQuick Option

Technical Reference

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Introducing the ImageQuick Option

The ImageQuick™ option provides seamless integration of image printing capabilities into the Lexmark RIP architecture. With the option installed, your printer automatically prints files in addition to any standard Printer Control Language (PCL) emulation or PostScript emulation jobs.

Unlike some image file processing options, the ImageQuick option is not a translator; therefore, there is no impact to throughput of standard PCL or PostScript emulation jobs. It adds image format processing capabilities as fully integrated extensions to your printer. With the option installed, the printer automatically detects image formats in the incoming data stream and processes them.

The printer automatically detects and identifies images on a job boundary when a PJL UEL is received or when the printer is idle. For network ports, it also occurs when a connection is opened or closed. It is possible to send several identical format images without an intervening job boundary. The images print correctly and are treated as a single job for job cancel and tracking purposes. Mixing image types in the same manner is not supported and causes an error after the first image prints.

Disabling PostScript datastream sensing for a port also disables image detection. Setting the PostScript systemparam **/Filtering** to **/None** has the same effect.

Supported image formats

This section focuses on details not covered in the Overview section of the ImageQuick option *User's Guide*.

TIFF support

The ImageQuick option supports the baseline TIFF file format as described in the TIFF Revision 6.0 specification, published by the Adobe Developers Association. The TIFF format allows for image compression by numerous methods.

The option supports the following compression formats:

- TIFF RGB full color images
- TIFF palette full color images
- TIFF tiled images
- TIFF grayscale images (monochrome)
- TIFF CCITT Group 4
- TIFF CCITT Group 3 2D
- TIFF CCITT Group 3 1D
- TIFF Type 2
- TIFF PackBits
- TIFF Uncompressed
- TIFF LZW

Note: The ImageQuick option does not support JBIG compression or IPCL TIFF segments.

CCITT Group 3 and 4 formats are often referred to as "fax compression" methods. They were designed to be used by fax machines for electronic data transmission. However, they are also popular methods for storing documents electronically, particularly Group 4. TIFF Type 2 is also called "Modified Huffman run-length encoding," and is a variant of CCITT Group 3. TIFF PackBits is a simple form of run-length encoding, which stores data as sequences of uncompressed bytes or as repeat-counts.

The printer recognizes a file as a TIFF image if the file begins with **0x4d 0x4d 0x00 0x2a or 0x49 0x49 0x2a 0x00**.

The following TIFF fields are accepted by the ImageQuick option. All other tags are ignored.

Tag name	Required in Image File directory?	Value restrictions
ImageWidth	Yes	None
ImageLength	Yes	None
Compression	Yes	1 (Uncompressed) 2 (CCITT 1D) 3 (Group 3 Fax) 4 (Group 4 Fax) 5 (LZW) 32773 (PackBits)
PhotometricInterpretation	Yes	0 (WhiteIsZero) 1 (BlackIsZero) 2 (RGB) 3 (RGB Palette) 5 (CMYK)
Xresolution	Yes	0 is mapped to 96 dpi.
Yresolution	Yes	0 is mapped to 96 dpi.
StripOffsets*	Yes	None
StripByteCounts*	Yes	None
RowsPerStrip*	Yes	None
TileWidth	No	None
TileLength	No	None
TileOffsets*	No	None
TileByteCounts*	No	None
BitsPerSample	No	Defaults to 1.
FillOrder	No	Defaults to 1.
SamplesPerPixel	No	Defaults to 1.
T4Options	No	Only bit 0 and bit 2 honored.
ResolutionUnit	No	Defaults to 2 (inches).
Predictor	No	Defaults to 1.

Tag name	Required in Image File directory?	Value restrictions
Colormap	Required for Palette image.	None
ExtraSamples	No	None
PlanarConfiguration	No	Must be 1 (chunky) if SamplesPerPixel > 1.

*If **TileWidth** and **TileLength** are present, then **TileOffsets/ TileByteCounts** must be present. Otherwise, **StripOffsets/ StripByteCounts/RowsPerStrip** must be present. The Orientation field is ignored.

If **ExtraSamples** is nonzero, the extra samples are discarded for each pixel. Associated alpha handling is not supported and is ignored.

Other supported formats

In addition to TIFF, the ImageQuick option supports these document and image formats:

- JPEG baseline
- JPEG progressive
- GIF87a
- GIF89a
- PNG
- BMP
- Monochrome PCX Compression
- DCX, which is based on monochrome PCX
- HTML 4.0 (except animated GIF files, DHTML, and Java Script)
- PDF 1.3 for Adobe Acrobat 4
- PDF 1.2 for Adobe Acrobat 3

The following rules are used to recognize file types.

JPEG

The ImageQuick option supports direct printing of both color and monochrome JPEG format images including both baseline and progressive encodings. It does not support lossless JPEG images.

The printer recognizes a file as a JPEG image if it has an HTTP Content-type of **image/jpeg,** or if the file begins with **0xff 0xd8**.

GIF

The ImageQuick option supports direct printing of both color and monochrome GIF format images, including both GIF87a and GIF89a.

The printer recognizes a file as a GIF image if it has an HTTP Content-type of **image/gif**, or if the file begins with either **GIF87a** or **GIF89a**.

PNG

The ImageQuick option supports direct printing of both color and monochrome PNG format images.

The printer recognizes a file as a PNG image if it has an HTTP Content-type of **image/png**, or if the file begins with **0x89 0x50 0x4e 0x47 0x0d 0x0a 0x1a 0x0a**.

BMP

The ImageQuick option supports direct printing of both color and monochrome Windows BMP format images including versions 2 (Win2x), 3 (Win3x and WinNT), and 4 (Win95). Version 1 is not supported.

The printer recognizes a file as a BMP image if it has an HTTP Content-type of **image/bmp**, or if the file begins with **BM**.

PCX

The ImageQuick option supports direct printing of bitonal monochrome PCX format images.

The printer recognizes a file as a PCX image if the file begins with **0x0a**, followed by a value less than **0x06**, but not equal to **0x01**, followed by **0x01**.

DCX

The ImageQuick option supports direct printing of bitonal monochrome DCX format images.

The printer recognizes a file as a DCX image if the file begins with **0xb1 0x68 0xde 0x3a**.

HTML

The ImageQuick option supports numerous character set encodings within the HTML emulator. These encodings are utilized by either of two methods.

1. The HTTP Response Header Field

   The printer recognizes a file as an HTML image if it has an HTTP-Content type of **text/html; charset=xxx**.

Note: The HTTP Response Field is not usually accessible for setting by the user.

2. The HTML Meta tag

   The printer recognizes a file as an HTML image if it has the following tag:

   ```
   <META HTTP-EQUIV="Content-type" CONTENT="text/
   html; charset=xxx">
   ```

In the given methods, **xxx** indicates the desired character set encoding:

- ISO 8859-1
- ISO 8859-2
- ISO 8859-5
- ISO 8859-7
- ISO 8859-9
- ISO 8859-10
- ISO 8859-15
- Windows 1250
- Windows 1251
- Windows 1252 (default)
- Windows 1253
- Windows 1254
- Windows 1257

PostScript extensions

Userparams and systemparams

The following keys have been added to the userparams and systemparams dictionaries to let the user modify the Image Menu options from a PostScript job. The new keys, their possible values, and the corresponding Image Menu values are shown below.

Key	Value	Image Menu value
ImageAutoFit	0	Off
	1	On
ImageInvert	0	Off
	1	On
ImageScaling	0	Anchor Center
	1	Fit Height/Width
	2	Fit Height
	3	Fit Width
	4	Not used
	5	Anchor TopLeft
	6	Best Fit
ImageOrientation	0	Portrait
	1	Landscape
	2	Reverse Portrait
	3	Reverse Landscape

The Values in the table are integers.

When set using the setsystemparams operator, the values persist from job to job, like when they are set using the Image Menu.

When set using the setuserparams operator, the values only persist until reset or the end of the job. Changes to userparams are subject to Save and Restore. The default userparams at the beginning of a job are equal to the current systemparams values.

Userparams only persist for a single job:

```
%!PS
<</ImageInvert 1>> setuserparams
```

Systemparams are written into NV and persist across power cycles:

```
%!PS
true 0 startjob
<</ImageScaling 2>> setsystemparams
```

Network files

The **file** operator has been extended to pull files from a Web server using HTTP. It will read any type of file:

```
(%net%http://www.foo.com/myfile)(r) file
```

Imagetiff and directimage operators

The imagetiff operator lets the user process TIFF, PCX, and DCX images within a PostScript job. Similarly, the directimage operator processes GIF, JPEG, PNG, and BMP images. The format of the operators is:

```
file imagetiff -
file directimage -
```

Where file is a file object that contains the image data.

After processing, the file is popped off of the operand stack.

Do not change the PostScript current transformation matrix prior to calling **imagetiff** or **directimage**. Doing so may have unpredictable results. Path operators like **moveto** have no effect.

Binary data requirement

Processing images within PostScript using the **%stdin** file requires that the data be received over a binary communications port.

Note: Turning on binary mode for a port deactivates emulation sniffing.

The following PostScript turns on binary mode for the port it is sent over:

```
%!PS
true 0 startjob
currentsystemparams /CurInputDevice get
<< /Filtering /None >> setdevparams
```

The following PostScript restores the non-binary mode for a port it is sent over:

```
%!PS
true 0 startjob
currentsystemparams /CurInputDevice get
<< /Filtering /InterpreterBased >> setdevparams
```

Imageshowpage and Imagesetclip procedures

Two user-definable PostScript procedures let you customize direct image printing. They let you include time stamps and watermarks, and perform other operations. **Imagesetclip** reserves space for these marks by reducing the printable area on the page. Images do not exceed these bounds. **Imageshowpage** applies the actual marks after the image is rendered.

imagesetclip

At the start of processing of each image, the paper selection, orientation, and scaling settings are resolved. These settings are dependent upon the printable area, which is modified by the imagesetclip PostScript procedure. This is a user-definable procedure that is executed once for each installed paper source (when AutoFit is on) and once after the paper source is selected. It is always run prior to scaling and orientation resolution. Imagesetclip changes the clippath and makes marks on the page, but it should not be used to keep track of the image count. Scaling should not be done here since it adversely affects normal scaling and orientation.

Note: Do not enlarge the clipping path beyond the page or the image may be incorrectly scaled.

imageshowpage

After an image is rendered the imageshowpage procedure is executed. If the procedure is not defined, a showpage is done. Watermarks and page counting are two anticipated uses.

Both procedures are optional, but if present, they cannot do exitservers or unmatched save/restores. The stacks must also be left unchanged.

The following example demonstrates how to add an annotation to all pages within a job. It requires that PostScript setup code be prepended to the job, and cleanup code be appended to the job. In the following example, imagesetclip increases the upper and lower margins by 50 units. Imageshowpage prints a message with a border at the bottom and top of the page. Since the clippath was reduced, an initgraphics is done to allow drawing into the previously protected area.

Setup code to prepend to the job:

```
%!
true 0 startjob
/imagesetclip {10 dict begin clippath pathbbox /ury
exch def /urx exch def /lly exch def /llx exch def /lly
lly 50 add def /ury ury 50 sub def
llx lly urx llx sub ury lly sub rectclip end}def
/imageshowpage {
10 dict begin
% Print lower message
initgraphics clippath pathbbox pop pop 10 add exch 10
add exch translate
/Helvetica 20 selectfont newpath 0 0 moveto (Business
use only bottom message)
dup false charpath pathbbox
/ury exch def /urx exch def /lly exch def /llx exch def

% draw a box around the message
llx 5 sub lly 5 sub urx llx sub 10 add ury lly sub 10
add 2 setlinewidth rectstroke
newpath 0 0 moveto show
% Print upper message
initgraphics clippath pathbbox 32 sub 3 index 10 add
exch translate pop pop pop
/Helvetica 20 selectfont newpath 0 0 moveto (Business
use only upper message)
dup false charpath pathbbox
/ury exch def /urx exch def /lly exch def /llx exch def

% draw a box around the message
llx 5 sub lly 5 sub urx llx sub 10 add ury lly sub 10
add 2 setlinewidth rectstroke
newpath 0 0 moveto show
showpage end}def
```

Cleanup code to append to the job:

```
<esc>%-12345X%!
% Undefine the imagesetclip and imageshowpage
procedures if they exist.
true 0 startjob  % make procedures persist across job
boundaries
/imagesetclip where { /imagesetclip undef} if
/imageshowpage where { /imageshowpage undef} if
```

Note: For an example of the imagesetclip and imageshowpage procedures, see the **imageshowpage_ex.ps** file on your CD.

%net% files

The **file** operator has been extended to open and read HTTP URLs. Prepending **%net%** to a URL lets it open as a read-only, seekable file. The HTTP header is included in the file data, but the initial file position is set to discard it. This means that no special action needs to be performed.

Example:

```
(%net%http://www.lexmark.com/)(r)file
```

Image printing system performance

Image formats are commonly used to store electronic copies of documents. The standard procedure for printing these stored files requires that a host computer read the files into an application, format the images in PCL emulation or PostScript emulation languages, and then send them to the printer.

With the ImageQuick option installed, you can print image format files in their stored format. It is no longer necessary to convert image files to PCL or PostScript emulations. This reduces the host computer's load substantially.

PBM tag descriptions

About PBM language

The ImageQuick option provides support for an XML tag language called Printer Bookmarks Manager (PBM), through which the Printer Bookmarks are specified to the printer. This section defines each of the tags and their attributes that comprise this language.

The PBM emulator supports the following tags:

- DOCTYPE
- BOOKMARKS
- FOLDER
- ITEM
- DEFAULT
- PASSWORD
- SETPASSWORD
- SERVER
- RELOAD

A PBM file that contains no known tags causes nothing to happen within the printer.

PBM tags and their attributes are case insensitive.

The general structure of a PBM file is:

```
<!DOCTYPE LEXMARK_PBM>
…
…SERVER, RELOAD, SETPASSWORD, PASSWORD tags…
…
<BOOKMARKS>
…
…ITEM, FOLDER, DEFAULT tags…
…
</BOOKMARKS>
```

PBM file transfer

The ImageQuick Printer Bookmarks Manager software uses the HTTP GET method to load a printer's bookmarks configuration into the application. The URL is as follows:

http://www.printername/printer/pbm/bookmarks.pbm

where **printername** is the name or IP address of the printer on the network.

Printer Bookmarks Manager uses the HTTP PUT method, with the same URL, to save bookmarks to the printer. The printer also accepts a PBM file sent as a job over any print channel. Because of this, Printer Bookmarks Manager lets you manually create a PBM file or save a PBM file to disk within Printer Bookmarks Manager, then transfer the file to the printer.

PBM tag descriptions

The following sections describe the format and function of the PBM tags supported by the ImageQuick option.

DOCTYPE

The DOCTYPE tag is required at the beginning of a PBM file. Do not put information preceding this tag except for white space. The tag form is:

```
<!DOCTYPE LEXMARK_PBM>
```

If the tag is not exactly like the preceding example the PBM emulator does not recognize the file as a PBM file and the tag is flushed.

BOOKMARKS

The required BOOKMARKS tag and the closing /BOOKMARKS tag surround the section of the file which defines the bookmarks tree. Only ITEM, FOLDER, and DEFAULT tags are allowed within the BOOKMARKS element.

For backward compatibility, the <BOOKMARKS>... </BOOKMARKS> tags may be omitted if the file contains only FOLDER, ITEM, and DEFAULT tags.

The tag form is:

<BOOKMARKS>

The close tag:

</BOOKMARKS>

indicates that no more bookmarks are found in the file. If ITEM, FOLDER, or DEFAULT tags are found outside of the BOOKMARKS tags, then the file is flushed.

To erase the bookmarks in a printer, send the following:

```
<!DOCTYPE LEXMARK_PBM>
<BOOKMARKS>
</BOOKMARKS>
```

For examples, see the **\examples\EraseBookmarks.pbm** file on your CD.

FOLDER

The FOLDER tag is optional and defines a folder (or directory-like) structure in the BOOKMARKS menu on the printer's operator panel. The tag form is:

<FOLDER name = "…." access = "…" >

The 'name' attribute is a string (up to 15 characters) that defines the name that appears on the printer's operator panel to identify this particular folder.

The 'access' attribute is a string that defines whether the FOLDER is served, public, or private. A description of this attribute follows the tag definitions.

FOLDERs without an access attribute are public.

All ITEMs and FOLDERs defined after this tag and before the corresponding </FOLDER> tag are said to reside in this folder.

FOLDERs nest up to a depth of 255 and hold a maximum of 176 ITEMs and/or FOLDERs in a FOLDER. If these numbers are exceeded, the extra ITEMs or FOLDERs are ignored.

The required /FOLDER tag closes the FOLDER tag. A FOLDER tag without a corresponding /FOLDER tag causes the file to be flushed.

ITEM

The optional ITEM tag defines items that are pulled from the network and printed when selected from the BOOKMARKS menu on the operator panel.

The tag form is:

<ITEM name = "…." url = "…." npa = "…." access = "…" >

where ‘name' is the string (up to 16 characters) that defines the name that appears on the printer's operator panel to identify this particular ITEM. The 'url' attribute is a string of up to 4096 characters that identifies the URL that this bookmarked item is to be pulled from. The 'npa' attribute is a hex-encoded NPA Variable Write (Current NV Only) command that defines the job attributes that this item is to be printed with.

The 'access' attribute is a string that defines whether the ITEM is served, public, or private. A description of this attribute follows the tag definitions.

ITEMs without an access attribute are public.

The PBM firmware does not check the validity of the NPA attribute.

If the name attribute exceeds 16 characters it is truncated.

The following characters are not allowed within the URL attribute and are converted by the Printer Bookmarks Manager Application:

- Space - Converted to %20 prior to the query character and to '+' afterward.
- Backslash - Converted to Forward Slash (/) prior to the query and left alone afterward.
- Double quote - Converted to %22.

The PBM firmware does not check the validity of the URL. If it is invalid, then when it is passed to the INA, it will most likely result in an error.

The /ITEM tag is optional and closes the ITEM tag. No tags are expected between the two, and an unclosed ITEM tag does not generate an error.

The tag form is:

</ITEM>

NPA Variable Write Function

The 'npa' attribute is a hex-encoded NPA Variable Write command that defines the job attributes that this item is to be printed with. The command form is:

A5 xx xx 00 E0 B2 81 yy yy ii ii ll ll dd … dd … ii ii ll ll dd … dd

Where 'A5' is the NPA start of packet; 'xx xx' is the length in bytes (most significant byte first) of the remaining commands; 'E0' is the Lexmark Extension Command; 'B2' is the NVRAM Management Subcommand; '81' is the NVRAM Variable Write (Current NV Only) function; 'yy yy' is the number of NPA IDs that are specified to be written; 'ii ii' is the NPA ID being written; 'll ll' is the length (in bytes) of the data associated with the NPA id; and 'dd … dd' is the data being written.

The following are sample NPA hex strings:

Use Duplex (long edge):

A5001000E0B2810002000B000101000E000100

Use Duplex (short edge) and 2-Up:

A5002100E0B281000705C80002000207D00002000007CD000100000B000101000E000101

Disable printing of background images and background colors in HTML:

A5000B00E0B281000180EF0001E

DEFAULT

The DEFAULT tag is optional and identifies a DEFAULT item defined by the printer's firmware. The user or PBM application cannot create a DEFAULT item. The tag form is:

<DEFAULT name = "…." url = "…." >

where 'name' is the operator panel string defined for the document by the firmware and 'url' is the location from which this item is to be pulled. These fields are the same as those defined in the ITEM tag. The DEFAULT tag is really a special-case ITEM tag with no 'npa' attribute. When written to the printer, the 'name' and 'url' attributes are ignored and replaced with the name and URL defined for the default page. When a browser, or other application, reads the DEFAULT tag

from the printer, the 'name' and 'url' attributes are filled in with the name and URL currently in use by the printer.

DEFAULT items are always private.

The /DEFAULT tag is optional and closes the DEFAULT tag. There are no tags expected between the two and an unclosed DEFAULT tag does not generate an error.

The tag is written as:

```
</DEFAULT>
```

PASSWORD

If the printer is configured with a password using the SETPASSWORD tag, the file must contain a PASSWORD tag with the correct password string. Multiple PASSWORD tags may be specified within a file. For examples, see the \examples\SetMultiplePasswords.pbm file on your CD. If any one of the PASSWORD tags matches the printer's password, the PBM file is accepted. If there are no matches, the file is flushed.

If the PBM file is sent to the printer using the HTTP PUT method, the printer sends this response string: **HTTP/1.0 455 PBM invalid password**.

The tag form is:

```
<PASSWORD pwd = "…" >
```

where 'pwd' is an ASCII string of 1–15 characters. It cannot contain the double quote (") character. If the pwd string matches the password previously set for that printer, then the PBM file is accepted. If no password is set, then any password specified is accepted or no password need be specified. If no correct password string is provided, then the PBM file is rejected with an error.

SETPASSWORD

The SETPASSWORD tag is an optional tag that lets the user set a password for secure access to a printer's bookmark function.

The tag form is:

```
<SETPASSWORD old = "…" new = "…" >
```

where 'old' is a string of 1–15 ASCII characters that specifies the current printer password and 'new' is a string of 1–15 ASCII characters that specifies the password the user wants to change to.

If 'old' does not match the current password set, then no change is made. If no password is currently set, then 'old' is not required and, if specified, will match.

SERVER

The SERVER tag is an optional tag that lets the user specify where the printer retrieves an update to its Printer Bookmarks.

Note: The SERVER tag causes an automatic RELOAD tag.

The tag form is:

```
<SERVER url = "…." >
```

where '...' is the URL of the file to be retrieved whenever a RELOAD tag is received. The SERVER tag causes an implicit RELOAD to occur. If 'url' is an empty string of zero length, then the printer is set to not have a server.

RELOAD

The RELOAD tag is an optional tag that causes the printer to update its current Printer Bookmarks by fetching the file specified by the last SERVER tag executed by the printer.

Note: For examples of the **SERVER** and **RELOAD** tags, see the **.pbm** files in the **\examples** directory on your CD.

The tag form is:

```
<RELOAD>
```

The RELOAD tag currently has no attributes.

PBM file and folder access attributes

The files and folders in the Bookmarks menu on your operator panel have an access attribute of either served, private, or public.

Access attribute	Description
Served	The file or folder came from a PBM server. Printer Bookmarks Manager cannot edit a **served** tag.
Public	The file or folder was not received from a PBM server, but it can be served to another printer. Printer Bookmarks Manager can edit a **public** tag.
Private	The file or folder was not received from a PBM server and cannot be served to another printer. Printer Bookmarks Manager can edit a **private** tag.

Note: A PBM server is any printer or host computer specified in a SERVER tag.

When a printer receives a new list of folders and files, it automatically changes each access attribute depending on where the list came from:

Server

Access attribute	Status	Action
Served	Already in the printer.	Erased from the printer.
Served	From the new list.	Saved in the printer as **served.**
Public	Already in the printer.	Preserved as **public.**
Public	From the new list.	Saved in the printer as **served.**
Private	Already in the printer.	Preserved as **private.**
Private	From the new list.	Ignored and not saved in the printer.

Access attribute	Status	Action
Served	From the new list.	Preserved in the printer as **served.**
Public	Already in the printer.	Erased from the printer.
Public	From the new list.	Saved in the printer as **public.**
Private	Already in the printer.	Erased from the printer.
Private	From the new list.	Saved in the printer as **private.**

Printer Bookmarks parameters

Folder capacity

- Each folder holds up to 174 items and subfolders.
- Folders nest up to 254 levels.
- The number of bookmarks that fit in the option's memory depends on the size of the URL and the number of job attributes associated with it, such as duplex or N-Up.

Average URL length (in characters)	Maximum number of bookmarks and folders
100	340
50	460
25	560

Flash space

- The option contains 64KB of flash space for storing Printer Bookmarks.
- Each folder consumes 72 bytes.
- Each bookmark requires 72 bytes, plus the number of characters in the URL, plus the number of bytes required to encode each option in the Bookmark Properties dialog box of the Printer Bookmarks Manager.
- Each bookmark property consumes between 19 and 88 bytes per bookmark, depending on how many options are selected. A minimum of 19 bytes are used even if no properties are selected in the dialog box. Each field that is changed to something other than "Printer Setting" uses an additional 5–6 bytes.

- Each folder holds a maximum of 174 items. If you want to put more than 174 bookmarks in the printer, place some bookmarks in subfolders.
- If you create too many bookmarks, the printer deletes some of them. The Printer Bookmarks Manager application does not warn you that your bookmarks do not fit, but it prevents you from placing more than 174 items in a folder.

PJL tag descriptions

Two PJL tags are used to support pull printing. **LPULLPRINT** lets you specify the file that is pulled by the printer, and **LEXECNPA** lets you set job attributes for the LPULLPRINT job.

LPULLPRINT

Tag: @PJL LPULLPRINT URL = “url” [NPA = hexdata] [<CR>] <LF>

Description: A required tag for printing a document with Drag’N’Print™. This tag requires the URL of the document you want to print. The tag causes the firmware subsystem of the common file system to go out onto the Internet and “pull” that document into the printer for printing. In the given tag, **url** is the URL of the document the printer pulls.

LEXECNPA

Tag (first form): @PJL LEXECNPA NPA = hexdata [<CR>] <LF>

Description: An optional tag that lets you specify job attributes when the URL is pulled. In the given tag, **hexdata** is an ASCII hex NPA tag that is executed immediately.

Tag (second form): @PJL LEXECNPA ID = integer [<CR>] <LF>

Description: Another form of the optional tag that lets you specify job attributes when the URL is pulled. In the given tag, **ID** is the identification of a job initiated by an LPULLPRINT tag.

Operator panel function

Image Menu

The following menu items appear in the IMAGE MENU. Unless otherwise stated, these settings apply to all images printed directly.

Auto Fit

Selects optimal paper size, scaling and orientation. If On, this setting overrides the scaling setting and can override the orientation setting for large images.

Selections: On/Off.

Default: On.

Invert

Inverts bitonal monochrome image. Does not apply to GIF or JPEG.

Selections: On/Off.

Default: Off.

Scaling

Scales image to present page.

Selections: Anchor Center (no scaling), Fit Height/ W, Fit Height, Fit Width, Anchor TopLeft (no scaling), and Best Fit.

Default: Best Fit.

Orientation

Specifies orientation.

Selections: Portrait, Landscape, Reverse Portrait, Reverse Landscape.

Default: Portrait.

Print Test Page

Prints a test page.

Selections: TIFF Image, JPEG Image.

Scaling settings

Anchor Center

Do not scale the image. Anchor in the upper left corner of the printable area unless the image is too big. If too big, center the image in the printable area and clip the excess evenly on all edges.

Fit Height/ Width

Shrink or expand the image isotropically to fit image length and width within the printable area. Anchor at the top left corner of the printable area.

Fit Height

Shrink or expand the image isotropically to fit image height to printable area height. Anchor at the top left corner of the printable area. Using this setting may clip the image in the horizontal dimension.

Fit Width

Shrink or expand the image isotropically as necessary to fit image width to printable area width. Anchor at the top left corner of the printable area. Using this setting may clip the image in the vertical dimension.

Anchor Top Left

Do not scale the image. Anchor the image at the top left corner of the printable area and clip the excess at the bottom and right edges.

Best Fit

Shrink the image isotropically as necessary to fit image length and width to the printable area. If the image is smaller than the printable area, do not scale it; instead, anchor it at the top left corner. The default setting of AutoFit is **On**, which causes scaling to be set to **Best Fit**.

AutoFit Algorithm

The AutoFit function attempts to select an optimal paper size and orientation for a given image. This pseudocode describes the algorithm used:

1. Set AutoFit option On
2. Set IMAGE Scaling to Best Fit.
3. Select the best available paper size and orientation setting for the image.
   a. Calculate physical height and width of image using the image resolution. For image formats that don't contain resolution information (such as JPEG), 96 dpi is used.
   b. Get printable area dimensions for all eligible paper sources.
   c. Select the orientation and paper size among the eligible sources that gives the minimum value for the following measurement:

      ```
      delta = abs (printable area height - physical image height) + abs (printable area width - physical image width)
      ```

When checking different orientations, the physical image height and width values are swapped.

If an image fits on a page in either orientation, the delta values are equal. In that case, the panel setting is used. If the image is larger than the printable area in either orientation, the setting that best matches the image aspect ratio is chosen. Changes to orientation use the following rules:

Default setting	New setting
Portrait	Landscape
Landscape	Portrait
Reverse portrait	Reverse landscape
Reverse landscape	Reverse portrait

Example 1

The image is 10 inches wide by 9 inches high with 8x11 and 11x17 paper installed:

```
delta 8x11 (portrait) = abs (11 – 9) + abs (8 – 10) = 4
delta 8x11 (landscape) = abs (11 – 10) + abs (8 – 9) = 2
delta 11x17 (portrait) = abs (17 – 9) + abs (11 – 10) =
7
delta 11x17 (landscape) = abs (17 – 10) + abs (11 – 9)
= 9
```

Select 8x11 landscape.

Example 2

The image is 18 inches wide by 12 inches high with 8x11 paper installed. The orientation is reverse portrait:

```
delta 8x11 (portrait) = abs (11 – 12) + abs (8 – 18) =
11
delta 8x11 (landscape) = abs (11 – 18) + abs (8 – 12) =
11
```

Since the image is larger than the page in either orientation, the aspect ratio is calculated.

The aspect ratio is 18/12 > 1, so landscape or reverse landscape is chosen. Applying the rule for changing orientation yields reverse landscape.

Note: Only paper trays that have the PostScript page device parameter MediaType set to “Plain Paper,” “Custom Type,” or null are eligible for AutoFit. If no trays meet this criteria, the default tray is used. Other paper types are used by disabling AutoFit and setting the default paper tray.

Color image details

When you use the ImageQuick option to print color images, set the color correction on the printer operator panel based on the content of the image. The default is **Auto**.

Image type	Settings
RGB images of landscapes and people	COLOR MENU/Color Correction/Auto or COLOR MENU/Color Correction/Display
RGB images of maps and satellite imagery	COLOR MENU/Color Correction/Display or COLOR MENU/Color Correction/Vivid
CMYK images	COLOR MENU/Color Correction/Auto or COLOR MENU/Color Correction/CMYK

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