Linotype-Hell

Technical Information

PostScript to High-End Links

A designer's task is to make words and images work together effectively. In production, the goal is the same. You must assure that the words and images (which may come from any number of hard copy or electronic sources) all end up as planned on the final printed page. To do that, you want to use the best technology available for both words and images.

Historically, the best images have been produced by high-end scanners (like Linotype-Hell's DC3000 line of scanners). Text (as well as line work) would normally be supplied on a mechanical. This mechanical would be photographed and later the scans would be manually stripped into the page.

If you wanted to electronically merge text with images (thereby avoiding manual stripping) then the mechanical would have to be scanned. However scanned type and line work may exhibit 'jaggies' as a result of the scanning process. In addition, if editing changes are required, the type must be reset and rescanned. This slows the revision cycle.

The introduction of the PostScript** page description language in 1985 provided a wonderful solution for electronically merging text, line work and scans on a single page. But until recently there was no way within PostScript of accessing scans from high-end scanners. How do you take advantage of the best of both worlds? A way is needed to either:

- Make high-end scans available to PostScript users, or,
- Bring PostScript page geometries, objects, text, and synthetic illustrations onto a high-end page assembly system.

Products that accomplish this are often called 'links', but they may also be referred to as bridges, extensions, gateways, interfaces or hybrids.

Link terminology

In the broadest sense, a link allows scanners, output devices[1], page layout and retouching systems, file servers, and storage devices to share information. But the terminology for links is not particularly well-defined.

[1]There are several ways of describing output devices. Often high-end output devices are called recorders or plotters. With PostScript, the most commonly used term for output device is imagesetter, however the term recorder is also used to describe an output device without an internal RIP (Raster Image Processor).

The most commonly used definitions of bridge, gateway, interface, and link come from the field of networking. A **bridge** connects two networks of the same type. A **gateway**, on the other hand, connects two different types of networks. An **interface** is simply the connection between two devices. A **link** describes the line over which data is transmitted. In terms of linking PostScript to the high-end, these words are often used generally rather than in the specific networking sense.

Extension is used to describe a specialized addition to a software program that can be used for a specific purpose. **Hybrid** describes systems that are made up partially of proprietary or closed-system devices and software, and partially of off-the-shelf or openly available hardware and software.

Within the Linotype-Hell product line, a **link** is defined as a connection between two different system environments. This could mean a connection between a high-end system (like ChromaCom*) and PostScript, between two high-end systems, or between a high-end workstation and a film recorder or color printer. An **interface**, on the other hand, is a connection between a stand-alone scanner and a PostScript workstation. Since the term link is the one most commonly used in product names, it is used here as a generic term to describe a wide class of products.

Work flow

There are a number of steps in assembling a page on a high-end system: scanning of text, line work and contones, image manipulation (i.e., retouching, color correction, gradation, etc.), page layout, final page calculations, and output. (See Figure 1.) On the PostScript side, although the procedure is similar, there are some differences. For example, type and synthetic line work are usually created by a software application rather than by being scanned from an original. In addition, the procedure for preparing data for output varies from high-end to PostScript.[2]

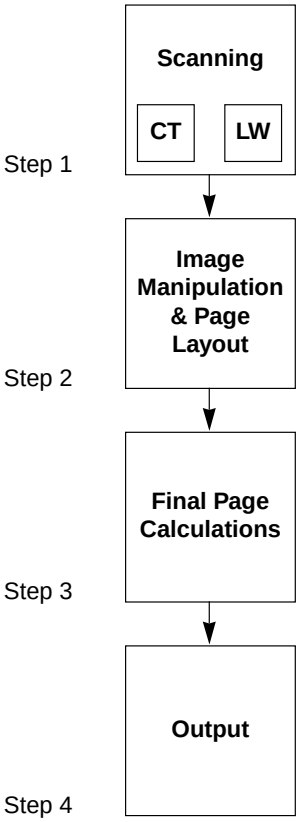


Figure 1 - The four basic steps in assembling a page on a high-end system (Scenario 1).

[2]With PostScript devices, halftoning is usually handled by the RIP, which also produces the so-called display list (i.e., the arrangement of elements on the page in preparation for output). On the high-end, these two functions, display listing and halftoning, are not always handled by the same device. Often the high-end system prepares the display list, while halftoning is handled by dedicated hardware in the recorder. Final page calculations may be considered synonymous with the process of creating a display list.

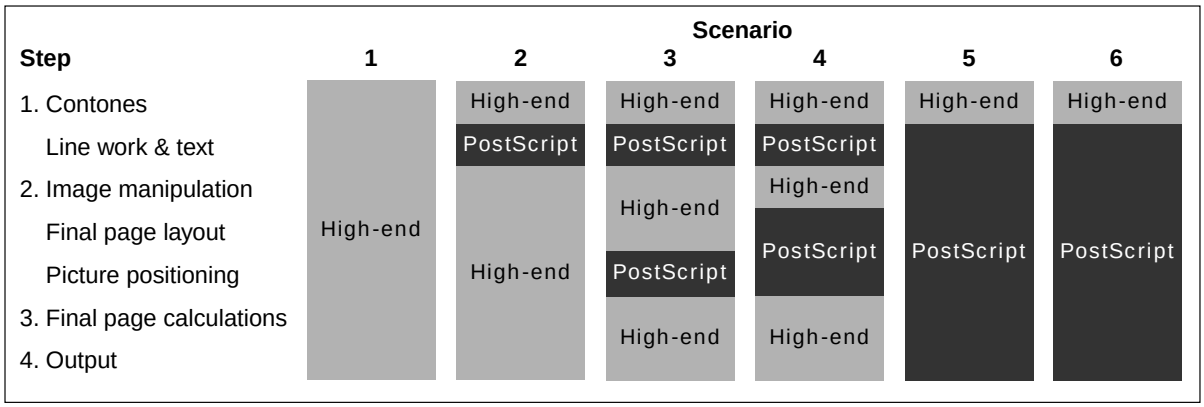
The scenarios described below are some examples of work flow in the Linotype-Hell product line. They range from a scenario which does not include any PostScript, to a scenario in which the only high-end contribution is the scan. (See chart on the following page.) These scenarios are not meant to encompass every possible configuration, they are simply some basic examples of the process.

Scenario 1 - Contones and line work are scanned on a high-end scanner. Image manipulation, page layout, and final page calculations are done on a high-end system. Output is done on a high-end recorder.

- Step 1 - The Linotype-Hell scanner produces two files in Hell native format, one is contone (CT) and the other is line work (LW).
- Step 2 - Retouching, color correction, gradation, and page assembly are handled by a ChromaCom workstation (either the ChromaCom W1000 or the ChromaCom W2000.) The result of this stage is called an end parameter which is a description of the page. This page description may also be stored as a kinojob (or C-job) which is an editable file that may be used by the operator to make changes in the end parameter.
- Step 3 - The end parameter from Step 2 is used to create the final page data (i.e., the display list). These final page calculations are handled by a special program. For the ChromaCom 2000 this program is called CCRun*.
- Step 4 - The final page contone and line work are merged into a contour data file (KTD for digital recorders). This process is called a contour or konti run. Konti is a contour generation program. The resulting data file is output on a high-end recorder. Halftoning takes place on output.

Scenario 2 - Contones are scanned on a high-end scanner. Line work and text come through a PostScript link. Image manipulation, page layout, and final page calculations are done on a high-end system. Output is done on a high-end recorder.

- This scenario changes the way that line work and text are handled. PostScript line work can be brought in (through CCMac or ScriptMaster* II) and used in one of two places. If it requires further work, it can be brought in at Step 1. If it needs no work, it can be brought in at Step 4.



Scenario 3 - Contones are scanned on a high-end scanner. A low resolution view file is created by a PostScript link. Picture positioning, line work and text come through a PostScript link to the high-end system. Image manipulation, final page layout (if necessary), and final page calculations are done on the high-end system. Output is done on a high-end recorder.

- In this scenario, more of the page layout tasks are shifted to PostScript. View files for image placement are provided by ScriptMaster II or CCMac. The preliminary page layout, including picture positioning, is created on the Macintosh and turned into a kinojob by ScriptMaster II or CCMac. The kinojob is sent from the Macintosh to Step 2.

Scenario 4 - Contones are scanned on a high-end scanner. A low resolution view file is created by a PostScript link. Line work and text are done with appropriate PostScript applications. Picture positioning and page layout are done in QuarkXPress** and converted to a kinojob by the PostScript link. Final page calculations are done on a high-end system. Output is done on a high-end recorder.

- Here again, view files are created by ScriptMaster II or CCMac. The page layout is done in QuarkXPress and translated into a kinojob by XTract (a QuarkXTension**). The kinojob is sent from the Macintosh to Step 2. The primary difference between Scenarios 3 and 4 is that in Scenario 4 the entire page layout is converted via XTract directly into a kinojob. (This page layout may be re-edited on the workstation if necessary.)

Scenario 5 - Contones are scanned on a high-end scanner. These scans are converted by a PostScript link into TIFF format where they can be used in PostScript programs. Page calculations and output are handled by a PostScript RIP and imagesetter.

- ScriptMaster II and CCMac can convert contone scans into TIFF format.

All of these scenarios involve some amount of conversion, either from the high-end to PostScript, or vice versa. High-end scan or line work formats may be converted into TIFF. PostScript line work, text or page geometries may be converted into a format that is usable on the high-end. This type of conversion is a defining aspect of a link. Based on this, the next scenario falls on the border of link products, but it still allows communication between the high-end and PostScript.

Scenario 6 - Contones and line work are scanned directly into TIFF format. These TIFF files are passed to a PostScript workstation where they can be used in PostScript programs. Page calculations and output are handled by a PostScript RIP and imagesetter.

- The ColorPath* product line allows Linotype-Hell scanners to create TIFF files. (See the appendix on the last page for more information.)

Common link acronyms

CC - ChromaCom, a high-end page assembly and retouching system

CT - Continuous Tone, description for an image made up of many levels of gray or color

CT2T - Continuous Tone to Tape, the process of storing a scanned continuous tone image on magnetic tape

DCS - Desktop Color Separation, color separation standard developed by Quark, Inc., see EPS5

DDES - Digital Data Exchange Standards, allow data exchange between different high-end vendor's equipment

EPS - Encapsulated PostScript, PostScript file format that simplifies the inclusion of a PostScript file into another document

EPS5 - EPS5 includes CMYK files plus a Pict view file. EPS5 is also known as DCS

ICS - Includer Color Separation, color separation standard developed by Linotype-Hell for use in LinoColor

LW - Line work (line work may also be referred to as RLC or RLE)

OPI - Open Prepress Interface, a set of PostScript language comment conventions developed by Aldus that allow prepress systems to electronically incorporate high-resolution color images into a page layout program

RLC & RLE - Run-Length Coding & Run-Length Encoded, line work formats

TIFF - Tagged Image File Format, scanned image file format developed by Aldus. TIFF falls into a number of categories: TIFF B (Bilevel), TIFF G (Grayscale), TIFF P (Color Palette), TIFF R (RGB), and TIFF S (Separation, i.e., CMYK)

Key issues

Any link must be able to handle the following key issues: data transmission, file access, and file formats, image replacement, and storage.

- **Data transmission -** Does the product allow two-way (i.e., bidirectional) transmission of data, or does it form a one-way interface only? For example, CCMac and ScriptMaster II allow you to move data back and forth between PostScript and a ChromaCom system.
- **File access** - Access time is an important factor in storage devices. For example, magnetic tape has the potential to store large amounts of data, but its serial nature plus slow access times make it more appropriate for long term archiving (where images are not accessed as frequently). Optical storage is faster, but generally cannot hold the large volumes of other methods. Removable hard disks (like MegaShuttles) are quite fast, and may be used to move data manually to the place where the data is needed.

  Because of formatting and communication protocols, it may not be possible, for example, to scan data directly into a storage device. In addition, data will move more quickly through some ports and over certain communications lines. To understand the production capabilities of any system, it is important to understand these implications.
- **File formats** - File formats allow a range of devices to manage the same set of data. The list of common acronyms at the top of this page includes many common file formats as well as a brief definition.
- **Image replacement** - Image replacement makes it possible to use a low resolution view file for placement in a page layout, but replace that file with the high resolution data on output. There are three commonly used methods for image replacement: DCS, ICS, and OPI (see chart above). DCS, ICS, and OPI all use view files, but the approach is slightly different. DCS files include a view file, but the color-separated CMYK files must be kept in the same folder as the low resolution view file. When the job is printed, the color-separated CMYK files are sent to the Macintosh workstation. This means that the workstation will be tied up until the job is finished transmitting. With ICS and OPI the view files are referenced. This means that the view file can be used for placement, but upon output the view file will reference the separated files so that they don't have to be called to the workstation. This makes it easier to keep scanned files on an image server, and it greatly reduces the movement of large files. Examples: LinoColor* uses ICS and DCS, ScriptMaster II uses OPI and DCS. CCMac uses DCS and will also use OPI in the next software version.

- **Storage -** Because of the large size of high-end scans, storage of scanned images must be a central concern of any link. Storage methods that are common within the Linotype-Hell product line are listed to the right. In addition, the M26, M56 and M70 computers serve as high-end intermediaries, handling the flow of data. Though they contain no storage they play a vital role in moving data. They are the interface to disk storage, and they are also the location where final page calculations take place. The M computers (and the earlier R computers) can be accessed by many devices: scanners, recorders, retouching and page assembly workstations, storage units, disks, and PostScript links.

File storage methods

Optical disk - Optical storage of approximately 600MB of data (300MB per side).

Removable hard cartridge - Removable storage, SyQuest**, for example, which allows storage of 44 or 88MB of data.

Removable hard drive - Removable storage, for example MegaShuttle, which is capable of handling 765MB of data. With MegaShuttle the entire hard drive may be pulled from a holder at one workstation and plugged into another in a matter of seconds.

Storage Module Device - (SMD) 300MB hard disk canisters that are mounted in box-like devices resembling washing machines. SMD is also the name of an interface protocol used for the R and M computers that allows high-speed transmission of large amounts of data.

8mm magnetic tape - Exabyte**, for example, is usually used for long-term archiving.

9 track magnetic tape - This is another technology that is usually used for long-term archiving.

Borderline links

The borders of high-end links are by no means clear. For example when Adobe first released Photoshop**, one reason for its popularity was its extensive file conversion facilities. These conversion facilities allowed Photoshop users to translate files into many different formats including Scitex CT. This made Photoshop valuable to them whether they used it for image manipulation or not. And in this sense, Photoshop became a link to the high-end.

And if a high-end scanner can create a TIFF file by itself, does that make it a link? It certainly provides high-end scans to PostScript, but the real link is the TIFF file format. And what about the PostScript page description language itself? Isn't that the underlying link?

Finally, if you have a PostScript-compatible RIP that can be used with a high-end recorder, is that RIP a link? (Example: RIP 60 for the ChromaGraph* R 3020/3030PS.) It doesn't link a scanner to the desktop, but it does link PostScript to a high-end recorder.

High-end to high-end links

And, of course, there are more things to link than the high-end and PostScript. High-end to high-end links are also popular for allowing various devices from high-end manufacturers to communicate. ChromaLink is an example of a high-end to high-end link in the Linotype-Hell product line. ChromaLink also allows a connection between a high-end workstation and a color film recorder or printer.

Conclusion

The division between the high-end world and the PostScript world is rapidly disappearing. A spectrum of devices and standards allow users to trade bits and pieces from one part of the process to another. The process is by no means seamless, but PostScript has become a tool of the high-end trade.

For information on links in the Linotype-Hell product line, please refer to the appendix on the following page.

Comments

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Appendix: Linotype-Hell links

ColorPath provides a connection between PostScript and high-quality analog and digital scanners in the Linotype-Hell product line. There are three parts of this product: ColorPath 3000, ColorPath 380, and ColorPath 300.

- ColorPath 3000 provides a PostScript link for the S 3010 scanner. Data is output in TIFF-S, TIFF-R, and TIFF-B formats and recorded on a 765 MB MegaShuttle, optical disk or SyQuest removable cartridge
- ColorPath 380 connects existing Linotype-Hell digital repro scanners (the DC 380 and CP 345) to a Macintosh.
- ColorPath 300 connects Linotype-Hell analog scanners to a Macintosh.

CC Mac provides a (two-way) ChromaCom to Macintosh link. CCMac is dedicated workstation that is particularly effective for moving contone data from ChromaCom to the desktop.

ScriptMaster II is another product which provides a PostScript link to ChromaCom. In addition to this it also supplies OPI support and an on-line connection to M and R computers, as well as a Macintosh network.

XTract allows QuarkXPress pages to be converted into ChromaCom kinojob files. XTract is a QuarkXTension.

Note: Product capabilities change with each new release of software and hardware. The functions described in this document are current as of June 1992.

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