CONVERGENT TECHNOLOGIES

RELEASE NOTICE FOR
2.0 Generic Print System (SAA—1400)

Revised, December 18, 1986

SECTION TITLE   **PAGE**

A note regarding the format of this document

This release notice was created with Document Designer 2.0 using the 12 point Times Roman proportional font for the body text and 12 point Courier monospaced font for file names and to display the CTOS Executive commands. This document was formatted for and printed on the Imagen 8/300 laser printer. The editable form of this document is provided on the distribution diskettes and may be located after GPS installation in file `<ReleaseNote>gps.relNote`.

This document can be easily reformatted and printed on another supported printer (such as a Daisy—wheel printer) by simply reviewing (Document Designer command CODE—f4) the document with the "device type" field in the menu set to the correct value for your printer (such as "Daisy"). If the selected printer does not have a 12 point Times Roman font, the reviewing process will cause a substitution of a font that is supported. The file `<ReleaseNote>gps.relnote.wp` *also represents this document, formatted for the 10.3 version of the Word Processor.*

Introduction

The Generic Printing System (GPS) is a set of related software modules which provide a uniform printing service for application programs executing in the CTOS operating environment on Convergent workstations and servers. The following paragraphs describe some of the printing requirements GPS seeks to address.

Device Independence. Convergent does not directly provide printing equipment with its computer systems, instead, users select the printing hardware which best suits their needs. As a result of this, there is a great variety of printers and printer types in use with Convergent computer systems.

This state of affairs poses special problems upon the developer of application programs intended for general use on Convergent hardware, since application programs that are coded so as to make explicit assumptions about features of a particular printer necessarily limit their utility only to systems that have that printer attached.

The Generic Print System addresses this problem by providing a programming interface, the Generic Print Access Method (GPAM), which allows application program developers to create print jobs in *descriptive* terms rather than *procedural* terms. GPAM allows the programmer to describe the desired result to be achieved but does not require an explicit sequence of printer-specific commands to achieve the result. The mapping of the description created by an application program to a specific sequence of printer commands is done by a *device driver*, a separate program that is coded with specific knowledge about a particular printer or class of printers. Since device drivers are separate from application programs, the application program that prints via GPAM can execute on any Convergent system which has GPS installed with device drivers tailored to the printers attached to that system. GPS currently provides six distinct classes of device drivers as well as providing a programming tool, PrintGen, which enables an application developer to create a device driver for a unique printer that is not otherwise covered by a supported device driver.

Uniform access to resources. Convergent computer systems are most often configured as families (networks, clusters) of computers, rarely as individual, stand-alone systems. GPS provides uniform access to printing devices, irrespective of where they are attached to the network. If a printer is attached to any serial or parallel port on any workstation of a Convergent cluster or CT-Net network, it can be accessed via GPS from all other workstations in that network. A unique *device name* is assigned to each printing device at the time it is installed, this name is all that is needed in order to access the device and to send print jobs to it. Within a CT cluster, all printers are immediately accessible from

all workstations within the cluster. In CT—Net environments, the GPS Print Manager provides a method (Setup) of importing the names of devices attached to other CT—Net nodes. The GPS user may add some or all of these device names to his local environment so that these remote devices can be accessed in a manner identical to that used for local devices. The method of routing print jobs from the application program to the selected printer is left to GPS and is of no concern to the application programmer.

Backward compatibility with prior printing systems. GPS makes every attempt to provide compatibility with previous printing techniques used on Convergent computer systems. The functionality of the pre—GPS Spooler is supported as a subset of GPS. Programs which have printer dependent code embedded within them can utilize the routing facilities of GPS while retaining their unique knowledge of printers. For example, users of the Word Processor, which was written before GPS and has not been modified to use GPS, can send their print jobs which contain printer—specific codes to device drivers controlled by GPS and achieve the same results as previously. One of the device drivers released with this version of GPS, called BinaryMode, acts as a transparent conduit to route device—specific information through the GPS system without interpreting it in any·way. This allows programs such as the Business Graphics Package to drive spooled plotters that are not otherwise supported as standard GPS devices.

GPS provides the Generic Print Access Method (GPAM) as the recommended method whereby application programs direct output to printers. Since many existing applications treat printed output as an ASCII stream with no embedded control codes except line feed, carriage return and form feed, GPS accepts data in this form and maps it to the devices it controls, taking into account the page sizes and margins of the device.

Enhanced printing services; Fonts and Graphics. When Convergent first supplied computer systems in 1980, most printers in common use were restricted to printing the ASCII character set in monospaced form with only one size (usually 12 point or 10 pitch) and one type style (usually the printer manufacturers' version of the Courier typeface). The Diablo daisy—wheel printer and related compatibles provided 'letter—quality' printing: proportional spaced type of a few restricted point sizes and changeable typefaces via interchangeable print wheels. This form of printing was supported only within certain application programs, such as the Word Processor.

The printing industry has changed considerably since 1980. The advent of low cost dot–matrix printers with 'near–letter–quality' capability provide printers that can serve data processing report generation needs and can also perform well as printers for business correspondence. Many recent dot matrix printers also provide a method for direct control of each of the dots on the page, thus providing a pseudo 'graphics' capability to any who have the time and perseverance to compute the location of all those little dots needed to create a graphic image.

Laser printers introduced over the last two years provide levels of typographic quality never before available to the average Convergent workstation user. For the first time, documents could be created which combined text and graphics together in the same document, while simultaneously providing a veritable library of typeface styles and sizes, heretofore seen only in professionally printed material.

The Convergent Document Designer Suite of programs was created to address this notion of documents constructed with integrated text and graphics and the Generic Printing System was created to support the printing needs of the Document Designer Suite. Thus, the GPAM page description language contains graphic operations which can be used to instruct a device driver to draw graphical objects on a page, and font selection operations which allow the selection of typeface, style and point size, provided the device is capable of such operations. GPS provides a Font Service, used by the Document Designer and the various GPS device drivers, which acts as a central repository of printer font size and width information and also provides a facility for character set translation. The Document Designer uses the Font Service while formatting a document prior to printing. Device drivers also reference the Font Service during printing to access a set of substitution or *reduction* rules, which specify which typeface to substitute if the typeface selected is not supported on the printer on which the document is printed. The font database is user–modifiable so that new devices and typefaces may be added at any time.

1.0   Description of Programs

The Generic Printing System is a set of related software components, since pieces of GPS execute on various workstations within a network, as required by the printing configuration. The following paragraphs describe the various GPS components and their usage.

Print Manager, the user interface to GPS. The Print Manager is an application program which can be used to access, control, configure and maintain a GPS configuration within a Convergent network. The Print Manager displays the status of GPS devices and the print jobs being processed via a set of related tabular video displays. Command and display options available at any given point are displayed on a row of visible function keys arrayed across the bottom of the screen, each label corresponding to function key on the workstation keyboard. The Print Manager provides a context-sensitive help system, activated by the Help key, which provides a short description of the action of each of the function keys in that particular context.

A normal user of a Convergent workstation could use the Print Manager to

(1)   submit files to be printed,

(2)   monitor the progress of print jobs through the system,

(3)   interact with and control devices requiring human intervention, such as "pausing" or "restarting" devices that require manual paper loading or font changes, or deleting unwanted print jobs.

(4)   recover from unexpected events, such as a paper jam in a device. The Print Manager can be used to restart the affected print job, possibly backing it up to account for the pages damaged.

A System Administrator would use the Print Manager (with GpsUserClass, Admin) to establish an overall GPS configuration for the network, installing device drivers where needed and installing other servers where they are required to ensure that all devices are made visible to all users.

Routing Switch, the programmatic interface to GPS. Whereas the Print Manager interacts with a human user via the workstation keyboard, the GPS Routing Switch provides the only programmatic interface to GPS. The Routing Switch is an installed service which serves a set of GPS loadable requests, which appear to application programs as external procedure calls. Application requests are served by the nearest Routing Switch (either local to the workstation or at the master), checked for validity, and then forwarded as required to another GPS service for processing. A Routing Switch must be installed wherever a device driver is installed and must also be installed at the master workstation if GPS devices are to be shared across the cluster or across CT-Net.

Spooler, providing simultaneous access to shared devices. The GPS Spooler receives requests from the Routing Switch if the device they reference is marked as needing spooling services. The GPS Spooler maintains two logical job streams for each device it supports. The first stream(s) flows from multiple application programs to a storage area on disk, where the data resides until the device is ready to accept it. The second stream flows from this temporary storage area to the device. The first stream operates at the speed that the application can produce it or at the data rate that can be sustained by the communication links between the application and the spooler, whichever is less. The data rate of the second stream is defined by the speed of the printing device. In most cases, the speed of the second stream is considerably slower than the speed of the first stream. The spooler allows application programs to send their print jobs to the temporary storage area quickly, thus freeing the workstation (and the human user) to do productive work while the printing device is printing the job. The spooler also provides a convenient method of producing multiple copies, since the application need only produce a single copy and command the spooler to produce multiple copies by sending the stored version to the device driver as many times as specified. The Spooler also makes dealing with the physical limitations of printers easier by providing a method of restarting a job that has been fouled up by a paper jam or a print ribbon failure. The Spooler is an installed system service that must be installed at the same workstation as a device driver that requires spooled printing. One Spooler can support multiple devices, the maximum number of device drivers supported is an installation time option.

Font Service, central repository of font information. With this release of GPS, a font service is provided to act as a central database of all font information known to GPS and the Document Designer. Because font information is stored in a database, it can be modified and enhanced without requiring code changes to either the Document Designer or the device drivers. The font database can therefore be enhanced or tuned to individual tastes without requiring source code changes. The Font Service is an installed service which must be installed where it can be accessed by both the Document Designer and the device drivers. Both of these requirements are met if the Font Service is installed at the master workstation of a Convergent cluster. Some performance improvement can be realized if the Font Service is installed locally, at the cost of additional fixed memory overhead (see section 8.1, Memory Requirements, for detailed information).

Device Drivers, servers that map data to specific devices. The design of GPS provides for the *routing* of printing data from application to device, but only the device driver performs any *interpretation* of the data. Whereas a Routing Switch will accept requests and send them on to an appropriate server and a Spooler will accept data and store it temporarily, neither of these servers make any attempt to look at the content of the data. Device Drivers contain a GPAM interpreter, which reads the input stream sent to it and maps that stream into a data stream acceptable to the device it controls. Therefore, device drivers are by design device specific. GPS provides device drivers for the following six device classes:

(1)   **Daisy wheel printer driver, `DaisyDD.run`.** This device driver can convert a GPAM stream, Word Processor stream, or an ASCII stream into a sequence of commands compatible with popular daisy-wheel printers, such the Diablo 630, the Qume Sprint 9 and Sprint 11, and the NEC 3515. The Daisy driver can also support some laser printers which emulate the Diablo 630, such as the AB Dick Smartwriter. The Daisy driver does not support graphics.

(2)   **Imagen laser printer driver, `Imagen8300DD.run`.** This device driver maps GPAM and ASCII streams into the Impress page definition language used by Imagen laser printers. The Imagen printer can be configured as a full typographic and graphic printing device and the GPS Imagen device driver takes full advantage of these capabilities, providing both graphics and publication quality typeface selection. This release of GPS provides three basic font styles for the Imagen device driver. A serif typeface (the one with little feet on all the letters), Times, is available in point sizes ranging from 6 points to 36 points. Bold, Roman, and Italic styles are available. A sans serif typeface (no little feet), Helvetica, is available in the same range of point sizes and styles. Both of these fonts are proportional fonts, the character width varies with each character. A monospaced font, Courier, is also available in point sizes ranging from 6 to 14 points.

If a bold attribute is selected for a section of text, the Imagen driver uses the font database to select the bold font that matches. If no such match exists (for example, there are no bold italic fonts), the Imagen driver will create a bold character by overstriking the character within an area slightly larger than character cell, creating a pseudo-bold character. **NOTE: this can be a very slow process, especially for large point size fonts.**

The Imagen device driver can print in either portrait or landscape page orientation, and can support manual feed of paper or envelopes through the printer's rear paper feed.

(3)   **HP LaserJet driver, `HPLaserJetDD.run`.** This device driver maps GPAM and ASCII data streams into escape sequences required by the Hewlett Packard LaserJet and LaserJet Plus printers. The device driver provides support for the replaceable cartridge font feature of the printer, the font database contains descriptions of two HP font cartridges, part numbers 92286A and 92286B. These two cartridges provide a mix of typefaces and styles useful for most business correspondence, although not as rich a selection as is possible with the Imagen device driver. Additional font cartridges could be supported by adding their descriptions to the font database. This release of the HP LaserJet device driver does not support graphics or the landscape mode of printing, features to be considered for a future release.

(4)   **Epson FX−286 device driver, `EpFx286DD.run`.** This device driver maps GPAM and ASCII data streams into escape sequences required by the Epson FX−286 printer. The various font pitch options provided by the printer are mapped via the font database into monospaced fonts of equivalent point size. This device driver is a full graphic device, and can print all Art Designer or Document Designer output.

   NOTE: There are many different Epson printer models and many other printers that claim Epson compatibility. Only the FX−286 model has been completely tested with this device driver. Other printers may work or they may not, but they are not guaranteed to work.

(5)   **Binary Mode device driver, `BinaryModeDD.run`.** This device driver is provided so that applications which have printer−specific code embedded within them can access those specific devices, using GPS routing to get from the application to the printer over the network. If an application is written to use this driver to control a device that is not otherwise supported by GPS, the application MUST set its output streams' image mode to BINARY or Image (make a SetImageModeGPS(fh, 2) request) after opening the GPS job to ensure that no interpretation of the data is performed. When this is done, this device driver performs NO interpretation on the received data, but copies it unmodified to the device.

`BinaryModeDD.run` must be installed as a spooled device driver when using it with the Business Graphics Package, since this program sends the required image mode information via the queue entry, which is available only when the device is spooled.

(6)   **The simplest device driver, named `LptSimpleDD.run`.** This device driver is intended to support all of the ordinary monospaced, data processing class printers. Any printer that can recognize and interpret the ASCII character set and the ASCII control codes line feed (LF), carriage return (CR), and form feed (FF), can be controlled by this driver. This driver does not support graphics or landscape mode printing.

Font Tool, used to modify the font database. The Font Tool is an interactive application program that can be used to modify and extend the font database. The Font Tool uses a tabular display format of interrelated screens and menu selections to simplify this process as much as possible.

2.0   Changes from Prior Version

This release of GPS is intended to support new printing features required by Document Designer 2.0, primarily the support of the font database facility within the device drivers. The product is used as described in the **Printing Guide**.

2.1   Problems Closed in this Release

SPR A3316:   When the print manager was run in a partition less than 80K, garbage was displayed on the screen. Pressing the finish key crashed the system with an erc 22.

SPR A3364:   Print Manager sometimes lost type–ahead keystrokes.

SPR A3406:   Print Manager didn't write the file GPS.Printers until the user pressed the FINISH key to exit the program.

SPR A3451:   When printing on a 100/200 character per second printer, GPS serviced the printer at such a high rate that all other functions are essentially unusable due to extremely slow response time. Printer was an IBM 4201 proprinter in draft and near letter quality modes.

SPR A3482:	In "binary" mode, the spooler appended the 3 bytes "0d,0d,0c" to the printed output. This caused an extra form feed (page skip) that was not in the spooled output file.
SPR 10042:	Variable form lengths were not supported.
SPR 10043:	Landscape mode printing was not supported on the Imagen.
SPR 10108:	Print Manager did not allow installation of a device with more than 255 characters per line.
SPR 10142:	Improper underlining of subscripts and superscripts.
SPR 10297:	GPS won't resume printing when printer is interrupted for maintenance. If printers run out of paper or ribbon and are serviced, you must reset the master to resume printing. Print Manager "delete" or "restart" keys don't work to resume printing. *With GPS 2.0, use the "restart" key.*
SPR 10356:	No validity checking was performed on port specification ([ptr]xx, [lpt]xx) when a device was installed.
SPR 10359:	Print Manager displayed file size 0 in Detail for documents printed with pre-GPS applications.
SPR 10372:	Local printer status was slow to change if a spooled printer on the master went offline.
SPR 10376:	Was not possible to set the process priority of a device driver.
SPR 10645:	Could not use multiple fonts.
SPR 10800:	Could not print full 132 column width with Daisy driver.
SPR 10890:	Crash could occur if attempting to cancel a paused document.
SPR 10843:	Unable to use landscape mode with the Imagen.

SPR 10890:   We created a document with Document Designer
including a change of print wheel. Then we
printed the document with GPS. We received
the message to change the print wheel, but
instead we wanted to cancel the paused printing.
If you cancel printing from the Document
Designer or the Print Manager after this
message, NGEN with the installed DaisyDD will
crash.

SPR 11010:   GPS documentation states that this level of
Queue Manager no longer needs the
Queue.Index file. However, if this file does not
exist, the Queue Manger will not install. Also,
the SPL directory must exist or the Queue
Manager will not install. *GPS 2.0 requires a
Queue Manager at version 10.3, or later.*

SPR 11011:   Printing failed when printing in background to
GPS. An erc of 2345 was returned when the
Document Designer is querying if GPS is
available. The erc is originated in the routine
OpenByte Stream in the module SamSwi.asm.

SPR 11071:   The user must reboot cluster workstations with
local printers after a Master without a printer is
rebooted – otherwise ERC 718 is displayed on
the clusters.

SPR 11090:   When printing a document containing overstrike
sequences with negative offsets in either the
HMI or VMI axes, the printer performed
extremely erratically feeding many sheets of
paper through and occasionally printing a
character here and there.

SPR 11100:   Can't print more than 129 characters in one line
with printer 8815. The same problem occurred
with GPS 1.0 and 80 characters.

2.2   Changes from Release 1.1

The major change to GPS for this release was the addition of the font database.   The Font Service allows device drivers and Document Designer 2.0 to share information about the fonts which are available on the various devices.   All of the device drivers have been changed to use the font database.   (Files, such as <gps>wp.whl are no longer needed.)

A number of other significant changes have been made for this release.   The Print Manager has been completely rewritten to improve its performance and reliability.   A device driver is now available for the Epson FX–286 printer (and compatible printers). The Imagen and HP LaserJet device drivers have been significantly changed to enhance their capabilities and reliability. The GPS 2.0 servers can be loaded with the PMOS Server to utilize extended memory above the 1 Mbyte boundary on processors so equipped.

3.0   Contents of Distribution Diskettes

The Generic Print System Distribution Diskettes are your master copies, and have been shipped write–protected.   They should not be write–enabled, nor should they be used as working copies.

The following Generic Print System components are contained in this distribution set:
    GPS Print Manager
    GPS system servers
        Routing Switch
        Spooler
        Device drivers
    Font Server and runtime Font Database
    Font Tool
    editable Font database source files
    GPAM object library, example program source files and
    cluster installation files

Parameters entered by the user at installation time control which of the above printing components will be installed, and whether the installation is intended for a master system or an LFS cluster workstation.

The Generic Printing System is designed to operate over the full range of Convergent workstations and CTOS versions currently supported.   As such, the distribution diskettes contain versions of runfiles and loadable request files which are suitable only for certain hardware/software configurations.   All possible configurations are shipped on the distribution diskettes, but only those components needed on a particular configuration are

actually copied from the installation diskettes to the hard disk of the target system. In addition, a second installation procedure, "LfsInstall.sub", is included in the GPS distribution which may be used to install GPS on cluster workstations with local file systems from their master.

GPS is distributed in archival form, a file format created by the Selective Backup command and read by the Restore command. The archival format does not create distinct files on the distribution diskettes, but instead combines the files into a single archive file, which span 5 diskettes. On each diskette is an extent of this file, named .01, .02, .03, .04, and .05, respectively. The installation procedure queries the user as to the type of hardware and software in use and loads the correct subset of files to the target system. There are additional files in the <Sys> directories of diskettes 1 of 5 and 5 of 5, that are used for control of the installation sequence. Of these files, only those that are also used in the "LfsInstall.sub" cluster installation sequence are copied to the <Gps> directory on the target system. The complete list of files is listed below. The files not transferred by any installation sequence are marked with an asterisk, (*).

Archive file:
```
<Gps>mBinaryModeDD.run      <Gps>mDaisyDD.run
<Gps>mEpfx286DD.run         <Gps>mGpsInstall.run
<Gps>mGpsRs.run             <Gps>mGpsSp.run
<Gps>mHPLaserJetDD.run      <Gps>mImagen8300DD.run
<Gps>mLptSimpleDD.run       <Sys>mFontService.run
<Gps>SRPInitCPxx.jcl        <Gps>SRPInitFPxx.jcl


<FontDB>FontReduction.port <FontDB>FontDB.sub
<FontDB>FontDevice.port     <FontDB>FontFamily.port
<FontDB>FontRaster.port     <FontDB>FontKey.port
<FontDB>FontTranslate.port <FontDB>FontWidth.port
<FontDB>VM003TextSet.Font  <FontDB>TextSet.Font
<FontDB>FontCharacterSet.port <FontDB>Script
<FontDB>FontPseudoFamily.port
<Gps>LfsEditFontData.sub   <Gps>LfsInstall.sub
<Gps>Lfs.sub               <Gps>Gpam.lib
<Gps>Gpam.pas              <Gps>GpamProcs.edf
<Gps>GpamTypes.edf         <Gps>GpsBs.pas
<Gps>GpsProcs.edf          <Gps>GpsTypes.edf
<Gps>Graphics.c            <Gps>LinkGpam.sub
<Gps>LinkGpsBs.sub         <Gps>LinkGraphics.sub
<ReleaseNote>gps.relnote
<ReleaseNote>gps.relnote.wp
<ReleaseNote>gps.engUpdate
<ReleaseNote>gps.engUpdate.wp
<Gps>BinaryModeDD.run      <Gps>DaisyDD.run
<Gps>EpFx286DD.run         <Gps>HPLaserJetDD.run
<Gps>Imagen8300DD.run      <Gps>LptSimpleDD.run
<Gps>GpsSp.run             <Gps>GpsInstall.run
```

```
<Gps>GpsRs.run                     <Sys>FontForms.lib
<Sys>FontIsam.config               <Sys>FontTool.run
<Sys>ISAMServer.run                <Gps>Font.dbs
<Sys>DeinstallFS.run               <Sys>FontService.run
<Gps>gpsforms.lib                  <Gps>GpsPm.Msg
<Gps>GpsPm.run                     <Sys>Gps.User
```

Diskette 1 of 5 files:
```
IGpsWSmin.fls                      ISysWSmin.fls
IGpsPrinters.fls                   IGpsNoPrinters.fls
IGpsFontServer.fls                 ISysFontServer.fls
IGpsnoFontServer.fls               ISysnoFontServer.fls
ISysFontTool.fls                   ISysnoFontTool.fls
IFontDB.fls                        NotSRPI.fl  (*)
NotSRPII.fls  (*)                  SRPI.fls  (*)
SRPII.fls  (*)                     GpsSupport.fls  (*)
ResNotSRP.sub  (*)                 ResSRP.sub  (*)
ResSys.sub  (*)                    Res!Sys.sub  (*)
ResNoPrinters.sub  (*)             ResPrinters.sub  (*)
ResNoFontTool.sub  (*)             ResFontTool.sub  (*)
HdInstall.sub  (*)                 Install.sub  (*)
InstallMaster.sub  (*)             InstallFiles.sub  (*)
```

Diskette 5 of 5 files:
```
CmdFontServer.sub                  CmdFontTool.sub
CmdPrinters.sub                    CmdNoFontServer.sub
CmdNoFontTool.sub                  CmdNoPrinters.sub
PMCmInstall.sub                    mgRqIFontTool.sub
mgRqInoFontTool.sub                mgRqIIFontTool.sub
mgRqIInoFontTool.sub               Request.I.sys
mRequest.9.sys                     CTOSI>Request.9.sys
CTOSII>Request.9.sys
```

If the distribution installation specifies the **SRP, Master** and **CompleteGPS** installation parameters, all the above unmarked files will be copied to the target volume, since that particular configuration requires all the files in the lists. Other installation parameter combinations will copy a subset of the above list.

`Gpam.lib` is an object library that provides the procedures necessary for an application program to use the Generic Print Access Method and the underlying Generic Print System services. This library name should be specified to the Linker in the `[Libraries]` parameter line when linking the application.

`FontService.run` is the runfile for the Font Service. `Font.dbs` is the runtime version of the font database that contains the font information that may be accessed through the Font Service. `DeinstallFS.run` is a utility program, invoked by the 'Deinstall Font Service' command, which will cause the font database and Font Service to be removed from memory. Refer to section 10.3 of this document for further information about the font database.

GpsPm.run is the runfile for the Print Manager, the user interface to GPS. This program is used to install GPS and to monitor its functions. The files GpsForms.lib and GpsPm.msg are needed for Print Manager operation. GpsInstall.run is the runfile for the program that implements the 'Install Generic Print System' command that installs the Generic Print System in system memory, given the desired system configuration as recorded in the file [Sys]<Gps>GPS.Printers, built by the Print Manager.

GpsRs.run is the runfile for the Routing Switch, a system service that accepts GPS requests from application programs and routes them to the proper service, whether on the same workstation, another workstation in the cluster, or over CT-Net to a remote node.

GpsSp.run is the runfile for the GPS Spooler program.

LfsInstall.sub is a submit file which allows the installation of GPS on local file system cluster workstations after the installation has been completed on the master workstation. The files lfs*.sub and those transferred from Diskettes 1 of 5 and 5 of 5 listed above, are used by this installation process and should be kept in the master workstation's <Gps> directory until all distribution installation is complete throughout the workstation cluster. Section 4 of this document describes the installation process.

CTOSI>Request.9.sys, mRequest.9.sys and CTOSII>Request.9.sys are the loadable request files that **need to be read and loaded by the operating system at bootstrap time** in order to enhance the operating system to include GPS and Font-Service facilities. For the CTOS-II operating system, the appropriate Request.9.Sys file is merged with the Request.Sys file during installation of the GPS software. CTOSI>Request.9.sys is the CTOS-I, workstation loadable-request file. mRequest.9.sys is the CTOS-I, SRP loadable-request file. CTOSII>Request.9.sys is CTOS-II loadable-request file. Request.I.sys is the loadable-request file for the ISAM server, that is needed by the Font Tool. The distribution installation procedures place the appropriate request information into their proper places, provided that the hardware and software description parameters are specified properly at installation time.

`BinaryModeDD.run`, `DaisyDD.run`, `EpFx286DD.run`, `HPLaserJetDD.run`, `Imagen8300DD.run`, and `LptSimpleDD.run` are the runfiles for the device drivers supplied with this release of the Generic Print System. The corresponding files that begin with 'm' are only required for MegaFrame SRP systems which are not yet running the CTOS–II operating system. Further details about the device drivers are contained in section 10.3.

`Gps.relNote` in the `<ReleaseNote>` directory is the editable form of this document in Document Designer 2.0 format. The file `Gps.relNote.wp` is the same document in Word Processor Format.

`Gps.engUpdate` in the `<ReleaseNote>` directory is a correction notice for the First Edition of the **Printing Guide** in Document Designer 2.0 format. The file `Gps.engUpdate.wp` is the same document in Word Processor 10.3 Format.

4.0   Installation Procedures

First, a comment about some ambiguous terminology. The term *installation* has two meanings:

1.   **The copying of new distribution files to a workstation or SRP.** That is what most of this release notice is about. The following subsections describe copying different sets of GPS 2.0 files onto different hardware configurations. We will call this the **distribution** installation in this subsection.

2.   **The invocation of a file that then becomes a part of that processor's OS (i.e., a "System Service").** Each time that a system–server file is run or invoked so that it may be accessed by system users, it is said to be installed. We will call this the **server** installation in this subsection.

Most of the GPS 2.0 files are servers, so they must be "installed" twice. Their first "installation" is when they are copied to the system from the distribution diskettes or from the master to the cluster workstation by the `LfsInstall.sub` procedure. Their second installation is each time that they are invoked for use by the system.

The Generic Print System should only be used on Convergent Information Processing Systems which are equipped with hard disk, or in clusters where the master is equipped with hard disk. The Generic Print System works on AWS, IWS, CWS, NGEN, and 286i workstations.

The Generic Print System requires that Standard Software at revision level 10.3 or later exists on the workstation. **If you have not yet installed Standard Software at such a revision level, do so before installing the Generic Print System**, otherwise the wrong version of the Request.9.Sys file will be left on the hard disk.

Use the installation procedures described below. Characters that you must type are shown in **boldface**. Special keys, such as RETURN and GO, are shown in upper case.

Warning: make sure that GPS is not currently running on the workstation where you intend to install this release. Otherwise, the installation procedure may not be able to copy the new software to the hard disk. If necessary, use the administrator REMOVE command of the Print Manager to deinstall GPS before starting the installation procedure. **Use the Deinstall Font Service command to remove that server if it is installed. Use the Deinstall Queue Manager command to remove that server from the master workstation.**

Warning: The pre−10.3 Queue Manager created a queue file format incompatible in some respects with later versions. It is recommended that all spooler queues be deleted before installing GPS. GPS Device Driver installation will create any queues needed.

Warning: The CTOS−II−1.0 version of the Restore program terminates improperly if there is inadequate disk space to restore all specified files. In some cases the workstation may crash with an Erc−91. If the workstation crashes while installing this software; reboot the system, delete enough files to insure adequate file space, and repeat the installation procedure.

Note: This installation uses Restore to install selective lists of files on your system. Restore reports two numbers: the number of files processed (present in the backup archive) and the number of files successfully restored. These numbers will differ, depending on the installation parameters that have been specified. If Restore fails to install any of the files that were required, a third number will be reported: the number of files which could not be restored.

The Font Service, the Font Tool and the editable Font Database files are included in the GPS 2.0 (distribution) installation. The Font Service is the set of files enabling the user to install and access the Convergent-supplied Font Database. The Font Tool is the set of programs enabling the user to customize the Convergent-supplied Font Database. The editable Font Database files are the font data files used by the Font Tool to create customized font databases.

Typically, the user will not want to use the Font Tool and, therefore, not want to install the editable Font Database files either. Since the editable Font Data files are large, the user is given the option of installing the Font Tool, but not installing the Font Database Files.

If you require the use of the Screen Font Service at a cluster workstation (e.g., you have a VM-003 bitmap video display and will be using Document Designer 2.0), you will need to install the **Screen Font Database** product (STA-2200) after completing GPS (distribution) installation.

After GPS 2.0 (distribution) installation, (server) installation of the Font Service may be performed at **either** the master workstation or the cluster workstation. If you do not have sufficient local disk space on the cluster workstation to hold the Font Service files (about 300 sectors), it is probably better NOT to install the Font Service at the cluster workstation. If you have sufficient local disk space, and can afford to give up 20K of local memory for the Font Service (server installation), better performance may be obtained by (server) installation of the Font Service on each cluster workstation which requires it.

The Font Service may be (server) installed **both** on the master and on as many cluster workstations as desired. Those cluster workstations which do not have a local font service will access the Font Service from the master.

Only one Font Service can be accessed from any workstation: either the one (server) installed locally, or if there is none, the one (server) installed at the master.

In short, provided that each workstation has access, either locally or at the master, to the font services that it requires, the Font Service may be (server) installed on as many workstations as you like.

4.1 Stand—Alone Hard Disk Systems

A. Place the Generic Print System installation Diskette 1 of 5 in drive [f0] and enter the Install command as follows:

```
Command     Install  GO
Install
```

or, if you do not have the Install command:

```
Command     Submit   RETURN
Submit
   File List          [f0]<Sys>HdInstall.sub
   [Parameters]       [f0]  GO
```

B. Follow the instructions in changing the default installation parameters. By default, software for CTOS—II, Master systems will be installed. For a stand—alone system, REMOVE the parameter **Master** and press GO. If you want the CTOS—I software, be sure to change the appropriate parameter.

C. Follow the instructions in choosing the options you want. Most likely you will choose the **Printers** parameter. In this case, be sure to choose the **FontServer** parameter as well.

D. If you choose the **FontTool** parameter, then be sure to choose the editable Font Database files also, by removing **XX** from the parameters line.

E. During the installation, you will be prompted to mount the appropriate volume .02, .03, .04, or .05.

F. Reboot the workstation when the installation is complete.

G. If **FontTool** was selected as one of the installation—option parameters, execute the following command:

```
Command     Submit   RETURN
Submit
   File list          [Sys]<FontDB>FontDB.sub
   [Parameters]       (volume where Font Tool is)  GO
```

H. See the **Printing Guide** for instructions on (server) installation of the Font Service and the device drivers you need.

4.2   Master Hard Disk Systems

Master systems generally will be intended to support GPS users on clusters of workstations and the default "**CompleteGPS**" procedure below will do this.   However, you may want to install GPS on masters used for other purposes.   For example, a pass-through network node on a cluster of non-GPS users (install Routing Switch and Print Manager only); a master supporting printing devices only (install Routing Switch, Print Manager, Printers and FontServer only); or some other special purpose master system. The procedure below also can be used to install GPS in these special circumstances.

A.   Place the Generic Print System installation Diskette 1 of 5 in drive [f0] and enter the Install command as follows:

```
Command      Install   GO
Install
```

or, if you do not have the Install command:

```
Command      Submit    RETURN
Submit
   File List            [f0]<Sys>HdInstall.sub
   [Parameters]         [f0]   GO
```

B.   Follow the instructions in changing the default installation parameters.   By default, software for CTOS-II, Master systems will be installed.   For a Master system, press GO.   If you want the CTOS-I software, be sure to change the **II** parameter to **I.**

C.   Follow the instructions in choosing the options you want. Most likely you will choose the **CompleteGPS** parameter so that all the cluster workstations will be able to update themselves from the master.   If you want the SRP software, be sure to change the **notSRP** parameter to **SRP.**   Press GO.

D.   If you choose to remove the **CompleteGPS** parameter, then you will be prompted for the individual GPS components to install.

If you choose the **Printers** parameter, be sure to choose the **FontServer** parameter as well.

If you choose the **FontTool** parameter, then be sure to choose the editable Font Database files also, by removing **XX** from the parameters line.

E.   During the installation, you will be prompted to mount the appropriate volume .01, .02, .03, .04, or .05. The .01 file is on the first installation diskette, so you do not have to change to the second installation diskette until volume .02 is requested.

F.   Reboot the workstation when the installation is complete.

G.   If **FontTool** or **CompleteGPS** was selected as one of the installation option parameters, execute the following command:

```
Command    Submit    RETURN
Submit
   File list            [Sys]<FontDB>FontDB.sub
   [Parameters]         (volume where Font Tool is)   GO
```

H.   See the **Printing Guide** for instructions on (server) installation of the Font Service and the device drivers you need.

4.3   Local File System Cluster Workstations

Cluster workstations with local file systems can have GPS installed on them after successful GPS installation with the "**CompleteGPS**" option on the Master workstation of their cluster. Alternatively, a cluster workstation with a local file system can be installed using the same procedure outlined in section 4.1 (Stand-Alone Hard Disk System). In this case, however, it is not mandatory that the editable Font Database files be copied to the cluster workstation.

The following command sequence performs the distribution installation by copying specified files from the master workstation to the cluster workstation's local file system.

A.   Execute the command:

```
Command    Submit    RETURN
Submit
   File list            [!sys]<Gps>LfsInstall.sub   GO
   [Parameters]
   [Force Expansion?]
   [Show Expansion?]
```

B.   Follow the instructions in changing the default installation parameters. By default, software for CTOS-II and the Print Manager will be installed. If you want the CTOS-I software, be sure to change the appropriate parameter.

If you have printers connected locally to the cluster workstation, then you probably will want to select the **Printers** parameter. If this is the case, then it is recommended that you select the **FontServer** parameter also.

Reading sections 4.0 and 4.6 will help you decide whether you want to install the Font Service.

C. Reboot the workstation when the installation is complete.

D. If **FontTool** was selected as one of the installation–option parameters and the editable Font Database files were copied to the cluster workstation, execute the following command:

```
Command    Submit    RETURN
Submit
    File list              [Sys]<FontDB>FontDB.sub  GO
```

E. See the <u>Printing Guide</u> for instructions on (server) installation of the Font Service and the device drivers you need.

4.4   MegaFrame SRP Systems

A. Signon at a cluster workstation (equipped with a floppy drive) that is attached to the SRP. If the Signon Form is displayed, fill it in and press GO.

B. Follow the instructions given in Section 4.2 (Master Hard Disk systems) and take the default **Master** parameter option.

   Since this is an SRP installation, be sure to change the notSRP parameter to SRP.

C. See Section 9.2 of this document for information about installing the GPS servers on the MegaFrame SRP.

4.5   Stand–Alone Floppy Disk Systems

The Generic Print System is not supported on stand–alone floppy disk systems.

4.6   Installing the Font Service

The Font Service must be installed as a service before Generic Print System device drivers, which require its presence. It may be installed at the master workstation of a cluster, or at local workstations where devices are installed for better performance. If the Font Service is not already installed, the Install Generic Print System command will install it (with default parameters) prior to installing a device driver.

Initially, the Font Service should be installed from the "Admin" form of the Print Manager if it is to be installed locally. This will change the [Sys]<Gps>GPS.Printers file, allowing the Font Service to automatically be installed in the future with the Install Generic Print System command. If you wish, you may install the Font Service by entering the following Executive command:

```
Command   Install Font Service  GO
Install Font Service
  [Font Database]
  [Bytes of Buffer Space]
```

The default font database is [Sys]<Gps>Font.dbs, while the default size of the buffer is 8192 bytes. The maximum that can be specified is 65535 bytes. Performance may be improved by increasing the buffer size to 11264 bytes. The performance improvements are slight with sizes larger than 11K.

Note: The device drivers and Document Designer 2.0 require access to the font database, that is, they must have a Font Service (server) installed. The Font Service may be installed at the master workstation and shared by all users in the cluster, or it may be installed at individual workstations for better performance.

4.7   Configuring the Context Manager

The GPS installation procedures, both from distribution diskettes and "LfsInstall.sub", provide an option to install the Print Manager into the Context Manager configuration file. Alternatively, it can be installed by the procedure outlined below. It is important that the correct command case be specified, as in the following example:

```
Command  CM Add Application   RETURN
CM Add Application
  [CM Config File]
  Application                 'Print Manager'
  Run file                   [Sys]<Gps>GpsPm.Run
  Memory required            170
  [Abbreviation]             ' P M'
  [Function key]
  [Command case]             PM   GO
```

5.0   Required Files

The installation procedure causes the creation of the directory `<Gps>` on the system volume. Into this directory it copies the files required for correct GPS operation. During normal operation of GPS, the `<Gps>` directory is also used for temporary storage of GPS data files.

The installation procedure also copies files into the `<Sys>`, `<FontDB>`, and `<ReleaseNote>` directories. See Section 3 for a list of the files which will be added to each directory.

If the Print Manager is to be executed from the workstation, the following files are required in the `<Gps>` directory:

                GpsForms.lib   GpsPm.msg
                GpsPm.run

If a device driver is to be installed at workstation, the following files are required:

                <Gps>GpsInstall.run   <Gps>GpsRs.run
                <Gps>GpsSp.run   <Gps>Font.dbs
                <Sys>FontService.run   <Sys>DeinstallFS.run

plus; one or more of the following device drivers will also be required in the `<Gps>` directory:

                BinaryModeDD.run   DaisyDD.run
                EpFx286DD.run   HPLaserJetDD.run
                Imagen8300DD.run   LptSimpleDD.run

The following files are only needed in the `<Gps>` directory while you are completing installation with "LfsInstall.sub" on all of the workstations in your cluster:

lfs.sub   lfsEditFontData.sub
LfsInstall.Sub   IFontDB.fls
IGpsWSmin.fls   ISysWSmin.fls
IGpsPrinters.fls   IGpsNoPrinters.fls
IGpsFontServer.fls   ISysFontServer.fls
IGpsnoFontServer.fls   ISysnoFontServer.fls
ISysFontTool.fls   ISysnoFontTool.fls
CmdFontServer.sub   CmdFontTool.sub
CmdPrinters.sub   CmdNoFontServer.sub
CmdNoFontTool.sub   CmdNoPrinters.sub
PMCmInstall.sub   mgRqIFontTool.sub
mgRqInoFontTool.sub   mgRqIIFontTool.sub
mgRqIInoFontTool.sub   Request.I.sys
CTOSII>Request.9.sys   CTOSI>Request.9.sys

The run files beginning with 'm' (e.g. `mGpsRs.run`, `mDaisyDD.run`) are only required on MegaFrame SRP systems running versions of CTOS prior to CTOS-II.

The installation procedure also copies Font Tool files into the `[Sys]<Sys>` and `[Sys]<FontDB>` directories if **font** is specified as one of the installation-option parameters.

The following Font Tool files are required in the `[Sys]<Sys>` directory:

```
FontTool.run          IsamServer.run
Request.I.sys         FontForms.lib
FontIsam.config
```

The following Font Tool files are required in the `[Sys]<FontDB>` directory (these files could actually be in any directory, but they are placed into `[Sys]<FontDB>` by the GPS installation procedure):

```
<FontDB>FontCharacterSet.port
<FontDB>FontDB.sub
<FontDB>FontDevice.port
<FontDB>FontFamily.port
<FontDB>FontKey.port
<FontDB>FontPseudoFamily.port
<FontDB>FontRaster.port
<FontDB>FontReduction.port
<FontDB>FontTranslate.port
<FontDB>FontWidth.port
<FontDB>Script
<FontDB>TextSet.Font
<FontDB>VM003TextSet.Font
```

6.0   System Software Compatibility

The Generic Print System is designed to be backward compatible with previous Convergent printing products in that it supports the Spooler and Queue Manager operations previously used in applications and therefore can support spooled printing in the former fashion. Version 10.3 or later of the Queue Manager should be used with this release of GPS. **It is important that both `QueueMgr.run` and `InstallQMgr.run` be 10.3 or later.**

Direct printing through GPS from previous applications is not supported. However, a direct-print application and a direct-print GPS device driver may share a device if they do not attempt to print to that device at the same time.

6.1   Workstation Environment

The Generic Print System and Font Service depend upon loadable requests that are read for the [Sys]<Sys> directory at bootstrap time. Due to this need, the loadable request facility provided by 9.1/9.4 and later versions of CTOS is also a necessity.

Because of the new request file, GPS components from versions preceding 2.0 will no longer function. Only the 2.0 GPS software will work with the new loadable request file. Custom GPS device drivers must be rebuilt with PrintGen 2.0 before they can be installed on the same machine with 2.0 GPS servers.

6.2   Diskless Workstations

The Generic Print System builds a set of unique configuration files for each workstation in a cluster which has installed GPS services. These files are located in the GPS working directory, [Sys]<Gps>, at each workstation. Diskless workstations share the GPS directory at the master workstation, and thus require some method of distinguishing these files as unique to a particular workstation. GPS provides a method of creating an alphanumeric prefix, specified in the user file, to be used to uniquely distinguish these files. See section 10.0 for instructions.

6.3   MegaFrame SRP

The Generic Print System and Font Service depend upon loadable requests that are read for the [Sys]<Sys> directory at bootstrap time. Due to this need, the loadable request facility provided by 3.2 and later versions of MegaFrame—CTOS is also a necessity.

MegaFrame—CTOS version 3.2 or later MUST be used with GPS

7.0   Hardware Information

7.1   Hardware Configurations Supported

The Generic Print System can run on AWS, CWS, IWS, NGEN, and 286i workstations (including NGENs with the XC-002 port expander) with hard disk or hard disk at the Master. The Print Manager can be executed on an AWS 210 workstation, but no device drivers can be installed, due to the lack of serial and parallel I/O ports.

7.2   Special Hardware Requirements

The Generic Print System can run on the full range of Convergent workstation products provided they are equipped with at least 512K memory, and that they have access to 5Mb of disk either locally or elsewhere on their cluster.

8.0   Resource Requirements

The Generic Print System consists of a set of installable system services (Routing Switch, Spooler, Font Service, and device drivers) that perform the actual transmittal, spooling, de-spooling and presentation of output data; and an interactive program (Print Manager) that is used for system installation, maintenance, status, and control operations.

8.1   Memory Requirements

The installable services require a fixed amount of system memory to be allocated to them exclusively. The Print Manager executes as an application program and will work under the Context Manager version 2.0 or later.

The memory requirements (in KBytes) of the GPS components are summarized in the table below. The PMOS entry indicates how much of the total memory is used in the first megabyte when the Protected Mode Operating System server is running.

Component	Total Memory	PMOS
Routing Switch	27	11
Spooler	31	17
Font Service	20	11
Imagen Driver	79	27
Epson Driver	127	46
Daisy Driver	74	22
HP LaserJet Driver	65	17
BinaryMode Driver	59	15 *
LptSimple Driver	62	17 *
Installer	60	**
Print Manager	170	**

*   These values apply when the device driver is installed with a 4KB font buffer. The marked device drivers could be installed with a 2KB font buffer, since they make minimal use of the font database.

**   The Installer and Print Manager are not installed services, and do not make use of the extended memory in protected mode.

The Routing Switch must be installed at each workstation which has a printer attached to it as well as at the master workstation.

The GPS Spooler must be installed at each workstation which has a spooled printer attached.

The device drivers included in this release must be installed at the workstation that is attached to the appropriate printer.

8.2   Disk Requirements

The directory <Gps>, created on the [Sys] volume by the installation procedure, is the working directory for GPS.   A similar directory is required for each workstation which has installed GPS components.

The directory <FontDB>, created on the [Sys] volume by the installation procedure, is where the Font Database source files are placed.   If font files are not requested as one of the installation options, then this directory is not created.

The directory <ReleaseNote>, created on the [Sys] volume by the installation procedure, is where the editable form of the document you are currently reading is placed.

8.3   CTOS Resource Requirements

GPS installed services request operating system resources as needed for their execution.   Since these resources are allocated from a fixed pool whose size is determined when the operating system image is built, it may sometimes be necessary to build a new system image with more resources in order to install GPS when there are a significant number of other servers installed at the same workstation.   The table below lists the fixed resources consumed by each GPS installed service or application program.

Server	#PCB	#exch
Routing Switch	6	11*
Spooler	2	4**
Device Driver	2	5
Font Service	1	2

Application	#PCB	#exch
Print Manager	2	5
Installer	1	2

#PCB = Process Control Block
#exch = exchange

* A Routing Switch installed at the master workstation consumes 1 additional exchange for each device installed at a cluster workstation.

** The values in the table are for a spooler installed to support 1 device driver. Add 1 PCB and 2 exchanges for each additional device driver supported.

9.0   Restrictions

Use of GPS under PMOS. GPS can be used with PMOS to gain access to extended memory above 1 MByte, but cannot be dynamically deinstalled from that memory, due to an incompatibility between PMOS and the multipartition deinstallation sequence of GPS. The workaround for this problem is to reboot the workstation.

GPS on SRP. GPS does not at this time utilize the inter-CPU routing that is available on the SRP. This means that the GPS components Routing Switch, Spooler, and Device Drivers can be installed on one and only one SRP processor at a time. This implies that all devices controlled by GPS must be physically attached to the same processor board, either a Cluster Processor (CP) or a Terminal Processor (TP).

Which GPS servers are to be server installed on the SRP is determined by the contents of the file [!sys]<Gps>GPS.Printers. This file is built during an interactive session of the Print Manager by the system administrator, selecting the Master function key from the Admin form. While in this mode, all installation commands are recorded in this file but the installations themselves are deferred until the SRP itself in rebooted.

The recommended SRP installation sequence is to install the Queue Manager and the Font Service on the Master File Processor, since both of these servers make frequent disk accesses and operate more efficiently when executing directly upon a file processor. The rest of GPS; Routing Switch, Spooler, and Device Drivers, should be installed on either a CP or a TP, to which are attached whatever printers supported by the SRP. The files <Gps>SRPInitFPxx.jcl and <Gps>SRPInitCPxx.jcl provide an example of such an installation sequence. The contents of these files should be combined with the existing SRP initialization batch files to install GPS. Please note the use of the **sync** program in the example files. Sync is used to ensure that both the Queue Manager and the Font Service complete their respective server installations before GpsInstall.run is invoked to install the rest of the GPS servers.

Use of Font Service on SRP. The Font Service can be installed only on the Master File Processor board of a Shared Resource Processor. See the file `<Gps>SRPInitFPxx.jcl` for an example installation sequence that accomplishes this.

Graphical objects that exceed page dimensions. It is possible with the Document Designer to create a page of graphical objects whose dimensions exceed that of the page dimensions. In such cases, a graphics device driver may produce unexpected results.

Typethrough. Typethrough is not implemented in this release of GPS.

Nonreentrant GPAM Library. The 2.0 GPAM library uses some static data structures internally and thus is not reentrant. This means that a single application cannot have more than 1 GPAM output stream open at one time. This restriction will be removed in a future release.

Routing Switch parameters. The 2.0 Routing Switch has increased the maximum number of devices and the number of open files and has fixed this number at 64. Thus, the 2.0 version of the Routing Switch ignores parameter values passed to it during installation except for parameter 1, which is the optional workstation prefix.

Font Service installation location. The Font Service will automatically be installed when a device driver is installed if there is no Font Service already running on the workstation or the master. Problems will occur if a device driver installed locally is unable to access the Font Database at the master, such as when the master goes down. Forcing the installation of a local Font Service through the Admin form of the Print Manager will prevent such problems, at the cost of less available memory.

10.0   Supplementary Information

10.1   User File Additions

Some users will want to run the Print Manager program in administrative mode. This enables a user to install and remove GPS services. The two steps needed to run in administrative mode are: First, edit the [Sys]<Sys>UserFileTemplate.sys file and add the following lines:

```
:Category:Generic Print System
  :Field:GPSUserClass
    :Description:User Class (User, Admin)
    :Default:User
  :Field:GPSDefaultPrinter
    :Description:Default Printer Name
  :Field:GPSWorkstationPrefix
    :Description:Unique Id   (diskless only --
                             may be any string of up
                             to 12 characters.)
```

The second step is to run the User File Editor, and set the GPS *UserClass* to 'Admin'. Thereafter, when the user runs Print Manager, the administrator mode functions will be available.

The user file 'GPS.user', supplied with the installation files, is an example of a user file with Admin privileges.

Warning: The use of the ":SignonUserName:" option in a user file will make it impossible for GPS to find your user file, since you have, in effect, changed its name. The effect of this is to ignore any of your GPS user file options.

10.2   Use With Pre—GPS Applications

Any application released prior to GPS that uses the printer file [Sys]<Sys>Sys.printers, can access GPS facilities if the following rules are applied. Using the following example entry,

DIABLO: [SplB]: Diablo630: DiabloF32

A.   Use the first field of the printer entry in Sys.printers as the device name when installing the device with the GPS Print Manager. In the example, **DIABLO.**

B.   Use the second field of the printer entry in Sys.printers as the queue name when installing the device with the GPS Print Manager. Pre—GPS applications can only reference GPS devices that are spooled. In the example, [SplB].

C. Include the third field of the printer entry (printer type in the 'Device Setup' field of the Install Device form of the Print Manager) to configure the Daisy device driver, if it is any of the following values: Diablo630, QumeSprint9, NEC3515 or Envision. If the third field is 'draft', you should install the LptSimple device driver instead. In the example, **Diablo630.**

D. If it is present, include the fifth field of the printer entry (sheet feeder in the 'Device Setup' field of the Install Device form of the Print Manager) to configure the Daisy device driver for that sheet feeder. Values allowed are DiabloF32, DiabloF33, Ziyad200, Ziyad300, NecSingle and NecDual. In the example, **DiabloF32.**

E. The sheet feeder and printer type names in the "Device Setup" field may appear in any order and must be separated by a space. If these values are omitted, the Daisy device driver will be configured for a Diablo630 without sheet feeder.

10.3   New Device Driver Features

A.   Automatic Line Wrap. In previous releases of the Generic Print System, any text that would run beyond the right edge of the page was automatically "wrapped" to the next line of the page. And any text that would run beyond the bottom edge of the page was automatically moved onto the next page. This has changed somewhat in this release of Generic Print System.

In GPS 2.0, a distinction is made between **formatted** and **unformatted** text. **Formatted** text is any text that includes an explicit text-placement command (e.g., GpamReposition). **Unformatted** text is any text that has no explicit text-placement commands.

Formatted text is neither "wrapped" to the next line nor automatically moved to the next page. The assumption is that a GPS device driver should not attempt to override the text placement performed by a text-formatting application.

Unformatted text may be treated in one of two ways by the GPS 2.0 device drivers:

1. As it was in previous GPS releases (lines automatically "wrapped" if too long, and automatically advanced to the next page if too many lines). This "pre-2.0" text-overflow treatment is invoked by entering the string "WRAP:" on the **Device Setup** line of the device-driver installation form.

2. The GPS 2.0 method:
   a) Text that appears to extend beyond the right edge of the page is NOT "wrapped" to the next line.
   b) Text that appears to extend beyond the bottom edge of the page IS automatically moved onto the next page.

   This is the default for text-overflow treatment in GPS 2.0 device drivers.

Device-Reset String: A device-reset string may be specified at device driver installation. If such a string is specified, it will be output to the device each time that:
1. A print job is cancelled.
2. Whenever a pre-GPS "reset" Spooler escape sequence is encountered in a non-GPAM document.

A device-reset string is specified at device driver installation time by entering a character string in the Install Device form "Device Setup" field. The string must consist of two parts, with no space between them:
1. **Prefix:** This must be the character string "`Reset:`"
2. **Reset sequence:** The actual hexadecimal values that are to be output to the device when it is to be reset. It must consist of only hexadecimal digits, and there must be an even number of digits.

For example, if the characters **Ab1** were to be output whenever a device should be reset, then the following string should be entered into the "Device Setup" field when the device driver is installed:

`Reset:416231`

The characters **Ab1** have the hexadecimal values 41, 62, and 31, respectively. The reset sequence above is the concatenation of these values.

C.   Page Width: The "Chars Per Line" and "Width" fields of the Install Device form are the two means of specifying the page width when a 2.0 GPS device driver is installed. The "Width" field is in the new Page Dimensions area of the form.

For **non-GPAM** documents, the device driver will use the "Chars Per Line" value to determine when a line is full. The "Width" value is ignored for non-GPAM documents. The maximum "Chars Per Line" value is 440 for a driver with a default character width of 0.1 inch. Some device drivers may enforce a much smaller maximum width.

For documents which **do** include GPAM escape sequences, only the "Width" value will be used to determine when a line is full. The "Chars Per Line" value is ignored for these documents.

D.   Page—Landscape String: A hexadecimal string to command the device into landscape mode may be specified at device driver installation. If such a string is specified, it will be output to the device each time that:

1.   A new page begins, AND
2.   The page is a **landscape** page (wider than it is long),

only if:

> Two page orientations are allowed by the particular device driver.

This feature is not necessarily adequate to enable rotation to the landscape orientation, rather it is intended to augment GPS device drivers which already support the landscape orientation. It is intended for use by a GPS device driver which supports:

1.   Landscape output, and
2.   Several similar output devices which differ in the command codes required to put them into landscape mode.

Only one of the GPS 2.0 Convergent—supplied device drivers supports this feature. It is the Daisy driver. See the description of the Daisy device driver in Section 10.4.

A Page—Landscape string is specified at device driver installation time by entering a character string in the Install Device form "Device Setup" field. The string must consist of two parts, with no space between them:

1.   **Prefix:** This must be the character string "PageL:"
2.   **Command sequence:** The actual hexadecimal values that are to be output to the device when a landscape page begins. It must consist of only hexadecimal digits, and there must be an even number of digits. A maximum of ten bytes may be specified.

E.   Page—Portrait String: A hexadecimal string to command the device into portrait mode may be specified at device driver installation. If such a string is specified, it will be output to the device each time that:

1.   A new page begins, AND
2.   The page is a **portrait** page (longer than it is wide),

only if:

> Two page orientations are allowed by the particular device driver.

This feature is not necessarily adequate to enable rotation to the portrait orientation, rather it is intended to augment GPS device drivers which already support the portrait orientation. It is intended for use by a GPS device driver which supports:
1. Portrait output, and
2. Several similar output devices which differ in the command codes required to put them into portrait mode.

Only one of the GPS 2.0 Convergent–supplied device drivers supports this feature. It is the Daisy driver. See the description of the Daisy device driver in Section 10.4.

A Page–Portrait string is specified at device driver installation time by entering a character string in the Install Device form "Device Setup" field. The string must consist of two parts, with no space between them:
1. **Prefix:** This must be the character string "PageP:"
2. **Command sequence:** The actual hexadecimal values that are to be output to the device when a Portrait page begins. It must consist of only hexadecimal digits, and there must be an even number of digits. A maximum of ten bytes may be specified.

10.4   Device Drivers and Fonts

Font.dbs contains font information for all the embedded fonts available in the EpFx286 printer. For the Imagen printers, the font database contains 2 proportional typefaces (Times, Helvetica) which are available in three styles (Roman, Bold, Italic) in a range of point sizes from 6 to 36 points. A monospaced font, Courier, is also available in a range of point sizes from 6 to 14 points. Due to memory limitations in the printers, not all styles are available in all point sizes. However, a representative selection of face/style/point size combinations has been created to suit most application needs. HPLaserJet font cartridges 92286A and 92286B are supported by the Convergent–supplied Font Database.

BinaryModeDD.run is a device driver which performs no translation of data generated by an application, but sends all the data unmodified to the I/O port controlled by the device driver. This device driver is provided so that programs which generate all of the data necessary to control a device can coexist with GPS and take advantage of GPS inter–net routing facilities. With BinaryModeDD.run, it is possible to drive previously supported plotters from the Art Designer and the Business Graphics Package via GPS.

GPAM data, or NORMAL image-mode data is NOT accepted by `BinaryModeDD.run`. This driver is intended ONLY for the spooled output of BINARY or IMAGE image-mode data.

For example, this driver could be used with one of the plotters that is supported by Art Designer. Art Designer supports direct output to plotters, so the BinaryMode driver need not be installed for direct, single-user output. But if shared, multi-user output is desired, `BinaryModeDD.run` may be installed for spooled output to the plotter. Since Art Designer determines whether or not a device is spooled and what its queue name is by reading the `sys.printers` file, the queue name specified in `sys.printers` must correspond to the queue name specified for the GPS device driver when `BinaryModeDD.run` was installed. This will result in Art Designer placing its formatted plotter-output data into the queue served by the BinaryMode driver.

The "Font Buffer" parameter should be set to "2" (KBytes) when installing the BinaryMode driver to save 2 KBytes.

The default "Font Device Type" of the BinaryMode driver is "Simple" (which is the same as for the Simple device driver). `BinaryModeDD.run` does not use data from the font database, but a valid "Font Device Type" is required for successful installation.

`DaisyDD.run` is the device driver supplied for those devices that utilize print thimbles or print wheels. This driver has been updated to use the font database instead of wheel sets. Utilities are available within the font database programs to convert wheel sets into font database entries. Consult the Printing Guide for the details of this conversion process. `DaisyDD.run` uses a default printwheel of **"Courier 72"** and will **pause and request that this printwheel be mounted** before the first document is printed after installation. The user should make sure that printwheel is mounted before issuing a Restart from either the Print Manager or the Document Designer. From that point on, print wheel changes take place when they are requested from within a document.

The font device-type for the daisy driver is "daisy" when using the Convergent-supplied font database (`Font.dbs`). The Daisy driver's default font device-type is "daisy", so the "Font Device Type" field of the Device Installation form in the Print Manager may be left blank (defaulted) when using the Convergent-supplied font database.

This driver parses the font database's alias data (of a font key) in order to:

1. Determine the cartridge or printwheel to be loaded. Should a change be needed, the driver pauses and sends a message that the operator should mount the appropriate cartridge or printwheel on the device, and restart the printing job from the Print Manager. and,

2. Find and transmit to the device any escape sequences.

Any space delimited font-key-alias token that starts with "\" is assumed to be an escape sequence. All other tokens are assumed to be parts of a cartridge or printwheel name. If such a name is present in a font key alias, that name will be used to prompt the printing device operator to install the desired cartridge or printwheel.

There are three font families for the Daisy device type in the font database, Courier, CourierWP, and Cubic PS 96. The "pseudo family" feature of the font database serves to map from the old wheel-set names to the specific Courier-family fonts. The current font database supports all the print wheels available through the pre-2.0 Document Designer. Users who need to convert other print wheel sets for inclusion in the font database should consult the "Printing Guide". If a document references other font families than Courier, these font references will be mapped to the Courier family.

In addition to the printers supported by the Daisy device driver, some "Diablo emulating" laser printers may also work with this driver. This is made possible by:

1. The Daisy driver's interpretation of the font-key-alias, as described above.

2. The Font Tool's ability to add new font data corresponding to additional device types.

3. Support for page rotation by the Daisy driver, as described below.

4. The ability to specify a different "Font Device Type" at installation.

How well such laser printers will work with this driver is dependent upon how truly they actually emulate the Diablo printer. Convergent's PrintGen product may also be used to create a GPS device driver to take full advantage of the capabilities of such "Diablo-replacement" laser printers.

The Daisy device driver provides some support for page rotation. The printing direction of daisy wheel devices cannot be rotated, but the printing direction of many "Diablo-replacement" laser printers can be rotated. This is possible because the Daisy device driver accepts the **PageL** and **PageP** parameters (described in

Section 10.3 of this release notice). The bytes comprising the device command sequence to switch the "Diablo–replacement" printer into landscape operation is specified following **PageL:**. Each time that a landscape page begins, this string of bytes is first output to the device. The sequence to command portrait operation is specified following **PageP:**. Each time that a portrait page begins, this string of bytes is first output to the device. (A landscape page is one that is wider than it is long –– a portrait page is one that is longer than it is wide.) This approach assumes that the laser printer's landscape fonts are the same as its portrait fonts.

Page sizes up to 14″ by 14″ are supported by the Daisy GPS device driver.

`EpFx286DD.run` is the device driver supplied for the Epson FX–286 printer. This driver utilizes the font database to take full advantage of the font selection capabilities of the printer. This driver is also a full graphic device driver and can plot Document Designer/Art Designer pictures at 72 dots per inch.

The font device type for the Epson Fx-286 driver is "EpFx286" when using the Convergent–supplied font database (`Font.dbs`). The Fx–286 driver's default font device–type is "EpFx286", so the "Font Device Type" field of the Device Installation form in the Print Manager may be left blank (defaulted) when using the Convergent–supplied font database.

This driver parses the alias data (for a font key) in order to determine the necessary escape sequences to send to the Fx–286. These escape sequences are too long to be placed in the alias field directly, so keywords are used to indicate what escape code is necessary. The escape sequence used to set printer character width and print attributes in this driver is the Master Select sequence. This sequence is not implemented on some older versions of Epson printers. An example of a keyword is the code "Bold". Including this word in the alias field for a font key would indicate to the EpFx286 driver that this font key requires that the Bold bit in the Master Select escape sequence be turned on. This keyword would be included in the alias field of any font key entry for bold fonts. The other Fx286 font keywords recognized by the Fx286 driver can be found by examining the aliases of the Fx286's font keys in the Convergent–supplied Font Database. Note that the fact that "any combination of keywords may be entered" does not mean that any combination will be recognized by the Fx286 device. Some combinations will result in one or more keywords being ignored. Consult the appropriate printer manual for specific information. The Epson FX–286 User's Manual gives detail information concerning the limitations of attribute selection.

The font family implemented on the Epson FX–286 is the "Courier" family. Various character pitches are available but only one point size is really available and that is 12 point. For the purpose of making various pitches available, the fiction of half a dozen point sizes is maintained. All possible fonts and point sizes are mapped into the six available point sizes. Bold and Italics are available in the various pitches supported.

To run properly, the Epson FX–286 must be set up in "Epson Mode". Improper setting of dip switches can produce results that might be interpreted as font database problems, since many of the escape sequences are ignored in other modes.

This driver may support earlier Epson printers as well as printers by other manufacturers who support Epson compatibility. If they do not support the same escape sequences and operational modes, or do not support the same resolutions, they are not supported by this driver.

Page sizes up to 14″ by 14″ are supported by the Fx286 GPS device driver.

`HPLaserJetDD.run` is the device driver for the HP LaserJet and LaserJet+ laser printer. The font database contains information allowing the immediate use of the HP font cartridges 92286A and 92286B. Font cartridge names (numbers) are included in the alias fields of the LaserJet's font keys.

The font device–type for the LaserJet driver is "HPLaserJet" when using the Convergent–supplied font database (`Font.dbs`). The LaserJet driver's default font device–type is "HPLaserJet", so the "Font Device Type" field of the Device Installation form in the Print Manager may be left blank (defaulted) when using the Convergent–supplied font database.

Due to the physical construction of the LaserJet printer, characters cannot be printed all the way to the edges of the paper (even though the LaserJet allows one to specify such printing). The LaserJet device driver is supplied with default values for the size of the dead zones on the top, bottom, left and right borders of the paper. For a LaserJet printer with dead zones that vary from the nominal, the dead–zone value for any of the four edges can be changed at device–driver installation time by entering the desired value (in inches) in the appropriate **Border** field of the device–driver installation form. If these fields are left blank, the driver's default values are used. When these default values are used, the **LaserJet driver should be installed with the value 79 specified in the Characters Per Line field of the device–driver installation form.**

All page sizes supported by LaserJet printers may be specified at device driver installation. The behavior of this device driver with LaserJet printers using 14″ paper cartridges is not known.

The default borders for this driver result in a portrait–orientation page length of 10.5 inches. This is 63 lines per page at 6 lines per inch. This should be taken into account when using applications that generate formatted output. For example, Multiplan and Extended–Multiplan assume 66 lines per page by default. For such applications, the "lines per page" limit should be changed to 63.

Manual paper feed is not supported on this device in this release.

Imagen8300DD.run is the device driver supplied for the Imagen 8/300 laser printer. This device supports full integrated graphics capabilities in addition to publishing–quality printing. The Imagen driver is designed to support either the IP–2 or IP–3 printer products.

The font device–type for the Imagen driver is "Imagen" when using the Convergent–supplied font database (Font.dbs). The Imagen driver's default font device–type is "Imagen", so the "Font Device Type" field of the Device Installation form in the Print Manager may be left blank (defaulted) when using the Convergent–supplied font database. Imagen–printer font–file names are specified in the alias field of the Imagen's font keys.

Both portrait and landscape page orientations are supported by the Imagen GPS device driver. All Imagen fonts are available in both orientations. A page will be printed in the landscape orientation if it is wider than it is long. It will be printed in the portrait orientation if it is longer than it is wide. Individual pages of a Document Designer document may be of either landscape or portrait orientation. The Document Designer page orientation is specified by formatting a page to be wider than it is long, or vice versa. The Document Designer is able to specify orientation on a page–by–page basis since it utilizes the GPAM calls which enable applications to specify page size and orientation. Any application which uses these GPAM functions can command orientation on a page–by–page basis when printing to the Imagen. For the printing of non–GPAM documents on the Imagen, page orientation for the entire document may be set to either orientation at device–driver installation time. The default installation values for page size specify a portrait default orientation. The user may change these values at installation to cause a default orientation of landscape. Also, if the **Chars Per Line** value, divided by 10, is greater than the installation page length, then non–GPAM documents will be printed in landscape orientation. For example, using the default page–length value (11") and entering a **Chars Per Line** value of 132 will result in non–GPAM documents printing in the landscape mode.

Due to the physical construction of the Imagen printer, characters and graphics cannot be printed all the way to the edges of the paper (even though the Imagen allows one to specify such printing). The Imagen device driver is supplied with default values for the size of the dead zones on the top, bottom, left and right borders of the paper. For a Imagen printer with dead zones that vary from the nominal, the dead-zone value for any of the four edges can be changed at device-driver installation time by entering the desired value (in inches) in the appropriate **Border** field of the device-driver installation form. If these fields are left blank, the driver's default values are used. When these default values are used, and portrait page orientation is desired for non-GPAM documents, **the Imagen driver should be installed with the value 79 specified in the Characters Per Line field of the device-driver installation form.**

All page sizes supported by Imagen printers may be specified at device driver installation. The behavior of this device driver with Imagen printers using 14" paper cartridges is not known.

The default borders for this driver result in a portrait-orientation page length of 10.5 inches. This is 63 lines per page at 6 lines per inch. This should be taken into account when using applications that generate formatted output. For example, Multiplan and Extended-Multiplan assume 66 lines per page by default. For such applications, the "lines per page" limit should be changed to 63.

It is possible to specify more fonts than the Imagen printer can print in a single document. This usually results in the desired characters being replaced by "a question-mark in a diamond" character upon the Imagen-output pages. And if the Imagen "job header" is enabled, Status messages will be listed concerning the fonts that could not be defined and the "glyphs" (characters) that could not be printed. If this happens, the solutions either: 1) reduce the number of fonts used in the document; or 2) break the document into a number of smaller documents.

The Imagen laser printer may sometimes produce a trailer page which specifies some "undefined glyphs" in the preceding document although there are no apparent flaws in the document. This condition is caused by a problem in the communications bytestream controlling the device. It is harmless and will be fixed in a future release.

When cancelling a job on the Imagen printer, it is sometimes possible to cause a paper jam in the printer. This is caused by a timing inconsistency between the Imagen "image processor" and the "marking engine". If this happens, open the marking engine by lifting the green lever on the right side of the marking engine and clearing any paper in the paper path.

Imagen—Driver Status Codes

Code	Meaning
15300	The document specifies more distinct fonts than can be output in one document by this device driver. Reduce the number of fonts in the document.
15301	An erroneous 2nd-level-translation value has been encountered in the Font Database's font-translation data for the Imagen printer. Verify that the Imagen device driver was installed with a valid "**Font Device Type**" string (leaving this field blank will cause the correct font data to be used if the Convergent-supplied Font Database is being used). Use the Font Tool to correct the Imagen's translation data in the Font Database.
15302	An erroneous 2nd-level-translation value has been encountered in the Font Database's font-translation data for the Imagen printer. Verify that the Imagen device driver was installed with a valid "**Font Device Type**" string (leaving this field blank will cause the correct font data to be used if the Convergent-supplied Font Database is being used). Use the Font Tool to correct the Imagen's translation data in the Font Database.
15303	More Imagen-printer "Families" than can be used at one time, are required by this document. Reduce the number of fonts in the document.
15304	More Imagen-printer "Maps" than can be used at one time, are required by this document. Reduce the number of fonts in the document.

`LptSimpleDD.run` is a draft-quality device driver intended to support a wide variety of ASCII printing devices. If a device can recognize and process the ASCII codes CR, LF, and FF, it can be used as a draft-quality device via this driver.

This driver should be used for any printer that is not explicitly supported by one of the other GPS device drivers. The Simple driver does not support the **bold, underlined** or **struckthrough** attributes.

This driver assumes:
1. The simple ASCII character set (although the font database may be modified to support many "nonstandard" character sets).
2. Six lines per inch.
3. Ten characters per inch.

This device driver has been designed to place text upon the page as near to its requested location as possible.

Therefore, the best results with GPAM documents (e.g., a Document–Designer document) will be obtained by specifying character and line spacings that are identical to that of the printer. Assume, for example, that a different line spacing (eight lines per inch) is specified for the Document–Designer document. But the line printer can advance in only one–sixth inch increments. After three of the "one–eighth" inch lines have been printed, the printer will actually have advanced ½ inch and printed (the third line) at this ½ inch vertical displacement. Now when the text for the fourth line is received by the Simple device driver, its requested location will be ½ inch down the page, and it will be printed at that location, even though data has already been printed on that line. So by specifying a line spacing that differs from the printer's, occasional overprinting may result. Section 10.3 of this document describes new features which can be used to specify the action to be taken when a line longer than the printable area is encountered.

The "Font Buffer" parameter may be set to "2" (KBytes) when installing the Simple driver to save 2 KBytes.

The default "Font Device Type" of the Simple driver is "Simple".

Page sizes up to 45″ by 45″ are supported by the Simple GPS device driver.

This device driver, like all other GPS 2.0 device drivers, uses the font database to perform character translation. This makes it possible to direct output to printers that may not support the complete ASCII character set, such as printers that only support upper case alphabetic characters. Such character translation does not come free, the 2.0 version of the device driver can operate at approximately 75% of the performance of its 1.1 version predecessor. This performance degradation may be noticed on high speed line printers.

11.0   Documentation Updates

11.1   Standard Documentation

The Generic Print System is documented in the **Printing Guide** (DA−170). The **GPS Programmer's Guide** documents GPS and GPAM interfaces for use by application programmers.

11.2   Changes to Documentation

The first edition of the **Printing Guide** (part number 09−00967−01) has several errors and omissions. These defects will be fixed with **Update Notice 1** to the Printing Guide (part number 73−00161−A). Until this document is available, refer to **Engineering Update** (part number 09−01022−01−A), for information about these errors and omissions.

12.0   Status Codes

Many status codes have been added to the **Generic Print System. Update Notice 1** to the **Printing Guide** (part number 73−00161−A) has a complete listing of these new Status codes.   Until this document is available, refer to **GPS Engineering Update** (part number 09−01022−01−A) for information about these codes.

13.0   Known Errors and Omissions.

Server installation failure due to insufficient CTOS resources. Section 8.3 describes the CTOS resources needed in order for the various GPS servers to install properly.   If these resources are unavailable, it is possible that the system may hang during the installation process. Contact Technical Support for instructions on "Sysgening" an operating system with the appropriate resources.

Server installation failure due to a CTOS I deficiency. If the system occasionally hangs during the installation process, then a file system timing deadlock during the installation of servers may be occurring.   This can happen when several servers are rapidly installed on a system running CTOS I.   If this is a frequent problem on your system, remove the automatic installation of GPS from the .jcl file and install the GPS servers manually from the Print Manager.

Cancellation of print jobs from Print Manager. If a job is printed from the Print Manager Print form and is subsequently canceled, the Print Manager will prompt with "Continue printing file list? Press GO to confirm, Cancel to Deny, F1 to retry". If the file canceled is the last one in the list, any response will cause the same result: job cancellation.

Printing lists of files with passwords from Print Manager. If the Security Mode option is used for printing a list of files to a spooled device, all files in the list are queued before the password for the first file may be entered, since the password must be entered from the Restart form, a form not accessible from the Print Form. Only restart-from-current-position is available from the Print Form.

Queueing print jobs to be printed after a specified date and time. The time specified will be based on the clock of the workstation or SRP where the queue manager is installed, not the clock of the workstation making that queued the print job. These two clocks may vary if the printer is attached to a remote CT-Net node.

Limitations of mixed cluster configurations. It is not possible to perform a remote installation to a master workstation running CTOS II when the workstation where the installation is executing CTOS I, since the neccessary Standard Software tools needed to merge loadable request files are not available on CTOS I systems.

Changes in Detail menu. The Printing Guide states that the Detail menu will show the date and time the selected job ended. This is not the case. The Detail menu shows the state of the job while printing, but the display does not update after the job completes.

Offpage printing with Daisy device driver. When an unformatted document is sent to the Daisy device driver, and the "Wrap" feature described in Section 10.3 is not used, lines that exceed the maximum page width of the device can produced highly undesirable output, since the device driver loses synchronization with the device. If documents without periodic line breaks are to be printed on Daisy devices, use the Wrap feature.

Timeout required after device installation failure. If a device installation fails for some reason (due to reference to an invalid I/O port name, for example), it is necessary to allow up to 45 seconds delay before attempting to do the installation again with corrected parameters. This delay is required so that the Routing Switch at the master workstation eliminate duplicate entries in its internal tables. Failure to wait the 45 seconds can cause an error code 4586 to be returned.

Too many fonts per document on Imagen. The Imagen device driver has a built-in limit of 50 distinct fonts per document. If this value is exceeded, it is possible that the error code that (15300) will not be returned to the caller under some circumstances. Characters printed after the overflow occurred may be printed in the wrong font. A possible workaround would be to split the document into separate print jobs, printing from page 1 to page n in one job, page n+1 to end-of-document in another job; where each job has less than 50 fonts requested.

Overlap of text and graphics objects on Imagen. Due to a mismatch between text and graphical object placement, it is possible to cause overlap or wraparound if textual data is placed close to a graphic object which is at the right edge of a page. The workaround is to increase the border on the left side of the graphical object, allowing more space between the objects.

Underlining of white space in footnotes. The Imagen and HP device drivers perform underlining by fetching the underscore character from the font database in the same font as the preceding text. There is an anomaly in this logic when text follows a superscript character, such as in a footnote. The anomaly is that the whitespace characters have a different font identifier than the preceding text and therefore are underlined with a different point size font. This anomaly can be avoided by specifically changing the point size of the superscript so that it is different than the following text. For example, if a footnote is printed in 10 point Courier type, change the superscript to 8 point Courier to work around the above problem.

Installation of driver at a port with no printer attached.
Installation of a driver at an [lpt] port that has no printer attached may cause problems. A number of configurations will result in blockage of the installer when it attempts to output to, or close an [lpt] port with no printer attached. This can be particularly annoying when the GPS installation is performed from the sysInit.jcl file, as it will hang up system initialization.

Subscript or superscript continuation over multiple lines. The vertical offset seems to be forgotten over multiple lines If a super or subscript starts on one line and continues on the next line, the super or subscript will not be printed correctly on the second line.